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THE REPUBLIC OF UGANDA

Ministry of Water and Environment

Water and Sanitation Development Facility – CENTRAL

P.O.BOX 80, WAKISO

In any correspondence on this subject please quote no CF / ADM / 107

February 8, 2023

The Executive Director,
National Environment Management Authority

SUBMISSION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT FOR THE PROPOSED CONSTRUCTION OF IGAYAZA-KIKWAYA TOWN WATER SUPPLY AND SANITATION SYSTEM UNDER WATER SUPPLY AND SANITATION PROGRAMME PHASE III

The Water and Sanitation Development Facility – Central (WSDF-C) officially commenced in July 2010 with approval of the work plans and budgets by Government of Uganda and Development Partners (DPs). The Facility is now in its 12th year of implementation covering twenty-Nine districts across three sub regions of Central Uganda.

The WSDF-C provides technical and financial support to help districts and Town Councils to develop, rehabilitate and expand water supply services and sanitation in the small towns and rural growth centers, following a demand-based approach under the framework of Uganda's water and sanitation policies and relevant sector strategies. The core activities funded by the WSDF include water supply and sanitation infrastructure development (new investment, rehabilitation, and major extensions), software and sanitation promotion programmes in small towns and rural growth centers.

Igayaza- Kikwaya Rural Growth Centre is one of the portable waters stressed rural centres in Central Uganda. Currently, the water service level for Igayaza Town Council and Kikwaya sub-County is low and mostly from boreholes within the area. These boreholes are prone to contamination due to the urbanization and related pit latrine sinking. The situation is expected to become worse if no intervention is made.

The Environment and Social Impact Assessment (ESIA) for the proposed construction of Igayaza- Kikwaya Piped Water Supply System in Igayaza Town council, Kakumiro District has been undertaken. Raw water will be pumped from the source (River Nkusi) at the abstraction point located at **291093.00 mE, 113270.00 mN** in in Rubasengura LCI, treated and then pumped (3.2Km) to the main reservoir from the treatment plant as the potential source of water for the proposed Town Water Supply System.

The project is expected to cost approximately **UGX 21,999,680,382 VAT inclusive** (Twenty-One Billion Nine Hundred Ninety-Nine Million Six Hundred Eighty Thousand Three Hundred Eighty-Two shillings only inclusive of VAT).

In compliance with the National Environment Act, Act No. 5 of 2019 and following the approval of the Terms of Reference, WSDF-C is submitting this ESIA Report for your review and subsequent award of clearance to proceed with the development.

Looking forward to a positive review and quick approval of the proposed project

Yours faithfully,

Eng. Kato Paul

Branch Manager - Water and Sanitation Development Facility Central

Uganda Revenue Authority
DEVELOPING UGANDA TOGETHER

Payment Receipt

For General Tax
call our Toll Free
(256) 800117000
Or log on to URA web portal
https://www.ura.go.ug

Notice DT-2079

Notice Date : 21/02/2023

WATER AND SANITATION DEVELOPMENT FACILITY-CENTRAL
012,KISIMBIRI WARD,
KISIMBIRI CENTRAL,
WAKISO TOWN COUNCIL,BUSIRO EAST,
LUZIRA,WAKISO

Notice Number
NS01230035144

TIN :
1020196699

Section A - Payment Information

Sr No	Payment Registration	Tax Head	Reference Number	Date of Payment	Amount
1	2230009936672	NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY -> ENVIRONMENT IMPACT ASSESSMENT -> FEES PAYABLE ON PROJECTS -> Total Value is more than 5billion but does not exceed 70bn-EIA	ESIA FOR IGAYAZA	21/02/2023	4,619,933.00
Total					4,619,933.00

Section B - Official MDA Representative

Authorized Signature	**Designation of Signatory** MDA
Name of Signatory SANTA ATIMANGO	**Contact Number** 782251694
This receipt has been issued for and on behalf of the Commissioner/Commissioner General	

REPUBLIC OF UGANDA

MINISTRY OF WATER AND ENVIRONMENT

DIRECTORATE OF WATER DEVELOPMENT

WATER AND SANITATION DEVELOPMENT FACILITY- CENTRAL

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF IGAYAZA-KIKWAYA PIPED WATER SUPPLY AND SANITATION SYSTEM

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT REPORT

Prepared by:

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FEBRUARY 2023

LIST OF FIGURES

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ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BOD	Biochemical Oxygen Demand
BoQs	Bill of Quantities
BTS	Bright Technical Services
BWSSS	Bitsya Water Supply and Sanitation System
CAO	Chief Administrative Officer
CBOs	Community Based Organizations
CDO	Community Development Officer
CFP	Chance Find Procedure
CGV	Chief Government Valuer
CMP	Construction Management Plan
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
dBA	Decibels
DCDO	District Community Development Officer
DEO	District Environment Office
DMM	Directorate of Museums and Monuments
DNRO	District Natural Resources Office
DO	Dissolved Oxygen
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
EAC	East African Community
EHS	Environment, Health and Safety
EHSGs	Environment, Health and Safety Guidelines
EIA	Environment Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EPB	Environment Project Brief
ESIA	Environmental and Social Impact Assessment
ESIS	Environmental and Social Impact Statement
ESMMP	Environmental and Social Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
ESSs	Environment and Social Standards
FGDs	Focus Group Discussions
FIs	Financial Intermediaries
GBV	Gender Based Violence
GC	Grievance Committee
GFS	Gravity Flow Scheme
GIIP	Good International Industry Practice
GIS	Geographical Information System
GoU	Government of Uganda
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HIV	Human Immuno deficiency Virus
HWFs	Hand Washing Facilities
ICRs	Implementation Completion Reports
IEC	Information Education and Communication
IFC	International Finance Corporation
ILO	International Labour Organization
IPF	Investment Project Financing
ISRs	Implementation Supervision Reports

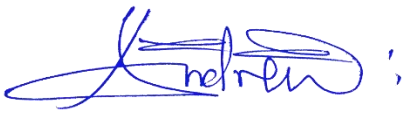
IUCN	International Union for Conservation of Nature
KDLG	Kakumiro District Local Government
KII	Key Informant Interview
Km	Kilometre
LAeq	Average Noise Level
LA_{MIN}	Lowest Noise Level
LA_{MAX}	Highest Noise Level
LC	Local Council
MoGLSD	Ministry of Gender, Labour and Social Development
MoLHUD	Ministry of Lands, Housing and Urban Development
MWE	Ministry of Water and Environment
NDP III	Third National Development Plan
NEA	National Environment Act
NEMA	National Environment Management Authority
NES	National Environment Statute
NGOs	Non-Government Organizations
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NSSF	National Social Security Fund
NWIS	National Wetland Information System
MWE	National Water and Sewerage Corporation
OPs	Operational Procedures
OSH	Occupational Safety and Health
O&M	Operation and Maintenance
PAPs	Project Affected Persons
PAYE	Pay As You Earn
PCDP	Public Consultation and Disclosure Plan
PCRs	Physical Cultural Resources
PMT	Project Management Team
PPE	Personal Protective Equipment
PWDs	Person With Disabilities
RAP	Resettlement Action Plan
RGC	Rural Growth Centre
RWSRCs	Rural Water and Sanitation Regional Centres
SDGs	Sustainable Development Goals
SEHS	Social Economic and Health Survey
STDs	Sexually Transmitted Diseases
STIs	Sexually Transmitted Infections
S/C	Sub-County
SOx	Sulfur Oxides
TN	Total Nitrogen
TOC	Total Organic Carbon
ToR	Terms of Reference
TP	Total Phosphates
TSS	Total Suspended Solids
UAs	Umbrella Authorities
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shillings
UN	United Nation
UNBS	Uganda National Bureau of Standards
URA	Uganda Revenue Authority
UWSD	Urban Water and Sewerage Department
VAT	Value Added Tax

VES	Visual Encounter Survey
VIP	Ventilated Improved Pit latrines
VOCs	Volatile Organic Compounds
WB	World Bank
WHO	World Health Organization
WHT	Withholding Tax
WMD	Wetland Management Department
WMZ	Water Management Zone
WSS	Water Supply System
WTP	Water Treatment Plant

ESIA TEAM COMPOSITION

Table 1 presents the composition of the Environmental and Social Impact Assessment (ESIA) team that will undertake the ESIA for the proposed Igayaza-Kikwaya Water Supply and Sanitation System (WSSS) in accordance with the provisions of the *National Environmental Act No. 5 of 2019* of the Laws of Uganda, the national Environment (*Environmental and Social Impact Assessment) Regulations (2020)* and the *National Environment (Conduct and Certification of Environmental Practitioners) Regulations (2003).*

Table 1: Proposed ESIA Team Composition

Name of Key Specialists	**Assigned Position**	**Signature**
Dr. Denis Byamukama, PhD. *NEMA Certified Environmental Impact Assessor* ***(CC/EIA/073/22)*** *– Team Leader*	Team Leader/Water Quality and Waste Management Specialist	
Mr. Pius Kahangirwe, MSc. *NEMA Certified Environmental Impact Assessor* ***(CC/EIA/159/22)*** *– Team Leader*	Environmental and Natural Resources Management Specialist	
Mr. Andrew Nkambo, BSc. *NEMA Certified Environmental Practitioner* ***(CC/EIA/273/22)*** *– Team Member*	Plant Ecologist	
Contributing Specialists		
Dr. Emmanuel Tumwesigye	Hydrologist	
Mr. Anthony Begumisa	Sociologist	
Ms. Sheila Akatukunda	Faunal Studies	
Ms. Hamidah Namatovu	Occupational Health and Safety	
Mr. Simon Njuki	GIS Expert	
Ms. Jackline Abitegeka	Environmentalist	

EXECUTIVE SUMMARY

The Government of Uganda, through the Ministry of Water and Environment in collaboration with its development partners has established the Water and Sanitation Development Facilities (WSDFs) as a funding mechanism to focus on provision of water supply and sanitation in Small Towns in the country. The Water and Sanitation Development Facility – Central (WSDF–C) is undertaking feasibility studies and detailed engineering design of water supply and sanitation systems in small Towns and Rural Growth Centres in Central and Mid-Western Regions of Uganda under a framework contract. This assignment was lotted in three regions: Nile, Albertine and Victoria according to the location of the towns.

Adequate safe water is a pre-requisite for a healthy society, which in turn, among other factors, makes it feasible for the majority of the population to engage in meaningful socio-economic activities that would increase household income and thereby reduce poverty. In Uganda, most of the rural areas and upcoming small towns access water from point water sources like boreholes, protected springs and shallow wells. These point water sources are in many cases characterized by low level of service, poor functionality and poor water quality in addition to diminishing water resources. The project targets to serve two sub counties with a population of over 18,293 (Detailed Engineering Design Report, October 2021). The Igayaza- Kikwaya WSSS is envisaged to bring an end to water stress and overreliance on a few low yielding boreholes within Igayaza Town Council and Kikwaya Sub-County and neighbouring community.

The proposed project infrastructure and facilities include the following components:

- Intake weir across the river
- Raw water collection channel
- Intake sump
- Raw water pumps, and
- Raw water abstraction main (from River Nyarwambu)
- High rise main
- The full conventional water treatment plant will all unit operations with a capacity of 2,200 m^3/day sized for 20 h operation per day
- 15,998 m of transmission gravity mains and 3,600m of booster pumping main
- A main reservoir of 400 m^3 ground pressed section steel panel tank supported on reinforced concrete dwarf walls at Kamukachi Hill as a balancing tank and the following three satellite tanks:
    - 1 No. 200 m^3 at Kibingo Karungu Sub County to serve Katara Parish
    - 1 No. 180m^3 at Bitsya
    - 1 No. 150m^3 at Hambuga in Kasharara parish
- 44,104 m of distribution pipe line of different sizes and pressure rating
- 8No. public/institutional sanitation facilities.

In compliance with the National Environment Act 2019 and the National Environment (Environmental and Social Assessment) Regulations 2020, WSDF-C undertook an Environmental and Social Impact Assessment (ESIA) and this report presents the findings of an ESIA that has been undertaken at the proposed project sites. The ESIA study has been conducted in consideration of the policies, legal and institutional frameworks relevant to this proposed project. Various policies and laws have been reviewed in relation to the proposed project activities e.g. construction and operational requirements, environmental quality, land use, public health, occupational safety, labour standards and other legal obligations. AfDB Safeguard Policies have also been reviewed during this detailed ESIA study to ensure that the proposed development meets these requirements and some of the clauses that are likely to be

triggered have been identified and the corresponding mitigation and enhancement measures proposed in this ESIA report.

A comprehensive stakeholder engagement was carried out during ESIA specifically with Kakumiro District Local Government Officials, Town Council/Sub-County Officials, Local Community Representatives and Community members among others. The main findings from the stakeholder engagements were largely categorized into two parts i.e. the anticipated impacts (both negative and positive) and general concerns on the project. It is anticipated that the establishment of the water scheme is expected to have the following benefits:

- Improved access to clean and safe water
- Improved health conditions due to access to safe clean water
- Employment during construction and operation of the water scheme
- Eradication of poverty and improved livelihoods of the local people through employment
- Reduced expenditure on water and medical bills due to diseases
- Reduced time spent walking long distances to wells and springs especially women
- Reduction of child mortality
- Improved local economies and induced development especially sourcing of raw materials for construction activities
- Ensure environmental sustainability

Further still, the project will also address the focal area of access to clean water as stipulated under the Uganda Vision 2040 and the National Development Plan III (NDP III). The project will also contribute towards achieving Sustainable Development Goals (SDG) *(specifically SDG 6 on clean water and sanitation)*.

However, some concerns were raised by various stakeholders as regards to the project and these include:

- Poor waste management practices at construction sites
- Destruction of existing vegetation especially when establishing the intake and trenching
- Soil erosion due to loss of vegetation especially at the water abstraction point
- Land degradation
- Dust and vehicle emissions
- Increase in noise and injuries on duty
- Increased spread of communicable disease associated with construction labour
- Destruction of crops during the trenching activies along distribution lines.

However, the ESIA findings indicate that adverse impacts will be mitigated and are limited to the project sites where construction works will be undertaken. Various enhancement and mitigation measures have been proposed and the developer should ensure that these are implemented such as:

- Maintaining good house-keeping
- Screening unsightly aspects from public view including excavations, construction material storage areas, waste storage areas and ablutions, erecting fencing around construction site to act as a screen minimizing the effect of wind in generating dust emissions
- Re-vegetation of all areas of natural vegetation that have been disturbed as a result of construction activities
- Proper waste management in accordance with the National Environment (Waste Management)
- Regulations, 2020 such as continuously monitor and evaluate the processes that generate waste streams from source through to recovery, recycling and disposal
- Containment of storm water especially during rainy season
- Timely compensation of the Project Affected Persons (PAPs)
- As a contractual obligation, contractors shall be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during project execution
- Local workers will preferentially be employed and paid directly through their banks
- All construction workers shall be orientated and sensitized about responsible sexual behaviour

in project communities.

Based on the above anticipated benefits and adverse impacts, an Environmental and Social Management Plan (ESMP) has been elaborated to ensure that environmental and social impacts, risks and liabilities identified are effectively managed during the construction, operation and closure of the proposed project. The ESMP specifies the avoidance, mitigation, adaptation, prevention and management measures to which the developer is committed and shows how the Project will mobilize organizational capacity and resources to account for the factors evaluated in order to implement the compiled measures.

Therefore, the proposed project is environmentally and socially feasible for implementation provided the recommended mitigation and monitoring measures are implemented, and the proposed implementation arrangements are upheld.

1 INTRODUCTION

1.1 Overview of Water and Environment Sector

The Water and Environment sector consists of two sub-sectors: (i) the Water Supply and Sanitation (WSS) sub-sector; and (ii) the Environment and Natural Resources (ENR) sub-sector. The WSS sub-sector comprises water resources management, rural water supply and sanitation, urban water supply and sanitation, and water for production. The ENR sub-sector comprises environmental management; management of forests and trees; management of wetlands and aquatic resources; and weather and climate. The Rural Water Supply and Sanitation sub-sector is defined to include all those areas under the jurisdiction of District Local Councils and Rural Growth Centres, but excluding those urban areas governed by Town Boards, Town Councils, Municipalities and Kampala Capital City. In practice this means that rural water supply covers those communities and villages with populations up to 1,500 and Rural Growth Centres (RGCs) with populations between 1,500 and 5,000.

The Project Development Objectives are to improve water supply and sanitation services and strengthen water resources management in project targeted areas. The Project will achieve this PDO through three strategic areas: (i) delivering the necessary water and sanitation infrastructure in targeted areas; (ii) supporting water related institutions (MWE, local government, and service providers) develop and strengthen measures to establish and consolidate operational efficiency and service quality in small towns and rural areas; and (iii) strengthening national and regional capacity to improve WRM. The Project's implementation approach will consider spatial differences between rural, small towns and urban large towns. It will also ensure that citizen engagement strategy, gender approaches, and sanitation and hygiene campaigns are included to foster behaviour change and ownership within the population. Combined with infrastructure investments to support WSS services, the Project will integrate water source and catchment protection measures, comprehensive sanitation planning and service delivery support to ensure sustainability and increase resilience to climate variability.

1.2 Project Background

The Government of Uganda, through the Ministry of Water and Environment in collaboration with its development partners has established the Water and Sanitation Development Facilities (WSDFs) as a funding mechanism to focus on provision of water supply and sanitation in Small Towns in the country. The Water and Sanitation Development Facility – Central (WSDF–C) is undertaking feasibility studies and detailed engineering design of water supply and sanitation systems in small Towns and Rural Growth Centres in Central and Mid-Western Regions of Uganda under a framework contract. This assignment was lotted in three regions: Nile, Albertine and Victoria according to the location of the towns.

The WSDF was established as a national instrument for major, multi-year water sector investments. The Water and Sanitation Development Facility – Central (WSDF – C) located at Wakiso District Headquarters was established in July 2010 and serves 29 districts of the Central and Mid – Western districts of Uganda, these include; Wakiso, Mpigi, Butambala, Mukono, Kiboga, Kyankwanzi, Kibaale, Masindi, Masaka, Buikwe, Buvuma, Mityana, Luwero, Nakasongola, Nakaseke, Mubende, Buliisa, Kiboga, Kiryandongo, Gomba, Kalungu, Lwengo, Bukomansimbi, Hoima, Kalangala, Kakumiro, Kagadi, Kikuube and Kassanda. The Urban Water and Sewerage Department (UWSD) of the MWE introduced the Water and Sanitation Development Facility - Central (WSDF-C) to support the development of water supply systems and sanitation facilities in STs and RGC through a decentralized and demand driven financing mechanism in Central Uganda districts. The WSDF-C provides technical and financial support to help districts and town councils to develop, rehabilitate and expand water supply services and sanitation in STs and RGCs, following a demand responsive approach under the framework of Uganda's water and sanitation policies and relevant sector strategies.

As a measure to ensure that environmental integrity and plight of communities where these water supply / sanitation systems are to be implemented are not adversely, an Environmental and Social Management Framework (ESMF) for the Water Supply and Sanitation was developed. This program-wide ESMF was prepared in accordance with NEMA environmental / social assessment procedures, and agreed upon by the relevant stakeholders including MWE and NEMA. The ESMF aims to ensure that implementation of projects / activities under this program are done with little or no harm to the environment and community at large.
Accordingly, a consultant was engaged by WSDF-C to undertake Environment and Social Impact Assessment (ESIA) with site specific ESMP for the proposed Igayaza- Kikwaya Rural Town Piped Water Supply System in Igayaza Town Council and Kikwaya sub county, Kakumiro District.

1.3 Water and Sanitation Development Facility- Central

The Water and Sanitation Development Facility – Central (WSDF-C) officially commenced in July 2010 with approval of the work plans and budgets by Government of Uganda and Development Partners (DPs). The Facility is now in its 12th year of implementation covering twenty-Nine districts across three sub regions of Central Uganda.
The WSDF-C provides technical and financial support to help districts and Town Councils to develop, rehabilitate and expand water supply services and sanitation in the small towns and rural growth centers, following a demand-based approach under the framework of Uganda's water and sanitation policies and relevant sector strategies. The core activities funded by the WSDF include water supply and sanitation infrastructure development (new investment, rehabilitation, and major extensions), software and sanitation promotion programmes in small towns and rural growth centers.

1.4 Justification of the Project

The people in Igayaza and Kikwaya Rural Growth Centres and the surrounding areas depend on wells, boreholes, open rivers/ streams and shallow wells as sources of water. This water is unreliable and not safe for drinking. According to the Socio-economic survey (November 2020), about four in every five households were accessing water from boreholes, irrespective of the season. The other major sources of water were; rain, taps, and shallow wells. According to the LC3 Chairperson, the sub county has 15 boreholes and 10 shallow wells. There is also only one piped water scheme which is privately owned. It has four (4) tap stands and one 5000 litre water tank. Water is sold at UGX 300 at this scheme Furthermore, the current water sources are not safe and the quality of the water here is poor for drinking and therefore implementation of the project will relieve women from wasting time at water sources, school going children will be able to go to school and the quality of water will improve hence improving the quality of life among the population.

The increasing population in the proposed project area has resulted in the need to increase on the accessibility and provision of safe and clean water for the local communities. In the view of the above, the Ministry of Water and Environment, specifically the Water and Sanitation Development facility-Central (WSDF-C) is implementing a project whose overall objective is to sustainably increase access to safe water supply and improve on sanitation to the communities of Igayaza-Kikwaya towns in Kakumiro district thereby contributing to Sustainable Development Goals (SDGs) 6 and 12.

1.5 ESIA Requirements

The proposed development falls under Schedule 5 of the National Environment Act No.5 of 2019 (i.e. Utilization of water resources and water supply). It is in the category of projects requiring mandatory Environmental and Social Impact Assessment (ESIA) before implementation. An Environmental and Social Impact Study is thus required before NEMA can give clearance for the proposed construction of the Igayaza-Kikwaya RGC WSS to proceed.

In accordance with the *National Environmental Act No. 5 of 2019* of the Laws of Uganda and the *Environmental and Social Impact Assessment Regulations (2020)*, the Environmental and Social Impact

Study process starts with the scoping exercise that identifies areas and issues that should be included and addressed in the ESIA study process. The issues identified through the scoping process were developed into the Terms of Reference (ToR) that were submitted to NEMA for review so that any other areas and issues deserving attention are identified and included before the ESIA commences. Thus, this ESIA was guided by the scoping process.

Therefore, this ESIA report has been developed in conformity with the National and WB safeguards policies and frameworks. This ESIA report has been prepared following Uganda's and the World Bank's Environmental and Social requirements, sets out to identify potential environmental and social impacts of the proposed Bitsya Water Supply and Sanitation Project, with a view of informing the final engineering design and recommending mitigation measures to be implemented during construction and operational phases of the project. The main objective is to carry out an ESIA for the proposed construction of Igayaza-Kikwaya RGC WSSS. Specific objectives include the following:

- To study the baseline environmental conditions of the project areas and their surrounding and to assess how these conditions will be affected by the proposed development.
- To identify and assess the likely impacts (positive and negative) of the proposed project and to recommend feasible measures to avoid, minimize or mitigate the negative impacts.
- To develop an environmental and Social Management Plan/Mitigation plan for the identified negative impacts and an environmental monitoring plan for project implementation.
- To compile an Environmental and Social Impact Statement for submission to NEMA for consideration and approval.

1.6 Details of Developer and Investment Cost

The project is to be implemented by the Ministry of Water and Environment represented by the Water and Sanitation Development Facility-Central (WSDF-C). The investment cost of the project is approximately Uganda Shillings Twenty One Billion Nine Hundred Ninety-Nine Milliion Six Hundred Eighty Thousand Three Hundred Eighty Two shillings only inclusive of VAT only including all taxes **(UGX 21,999,680,382).**

The address/contact person of the Developer is presented below:

Mr. Paul Kato
Water and Sanitation Development Facility-Central (WSDF-C),
P. O. BOX 80 Wakiso, Uganda
E-mail: wsdf-c@mwe.go.ug

1.7 Addressing NEMA Responses to Terms of Reference

Table 2: Responding to the Comments from NEMA's ToR approval

SN	REQUIREMENTS	COMMENTS
1.	Give clear elaboration of the proposed Sanitation System component and that of the Piped Water Supply of the project. Note however, the cumulative impacts of both projects components should be evaluated and mitigation measures provided in the respective reports.	The proposed sanitation system is a public/institutional toilet that will be constructed as part of the project and the institution or site will be decided by the relevant authorities (Local Government)
2.	Provide a clear description of the water supply scheme, including the designs, treatment processes and a detailed lay-out plan for the project and the water treatment plant, location of the different infrastructure and geographic coordinates for the different infrastructure;	This has been addressed under Chapter 3 of this Report (Project Description)

3.	Undertake a comprehensive assessment of the potential impacts of the project its associated components, particularly the options for water abstraction on the hydrology and ecosystem of the water source;	This has been addressed under Chapter 8 of this Report (Anticipated Project impacts).
4.	Evaluate the risks associated with the project and emergency preparedness options in case of breakdown of the system and discuss these options in the ESIS;	This has been addressed under Chapter 8 of this Report (Anticipated Project impacts).
5.	Undertake comprehensive consultations with the key stakeholders and develop a clear stakeholder engagement plan for the entire project cycle to regularly respond to stakeholder concerns in a timely manner. Ensure that the views/concerns of the stakeholders consulted are well documented and addressed in the report and lists of persons consulted appended to the ESIA report;	Addressed under Chapter 7 and the different views documented under sub section 7.3.6 of this Report and the consultation lists attached as Annex 2
6.	Provide detailed description of site-specific baseline information of the project sites for the different project components;	Chapter 5 of this Report addresses the Baseline information of the project area
7.	Assess the different types of waste streams likely to arise from the project activities and propose measures for managing such waste;	This has been addressed under Chapter 8 of this Report
8.	Ensure that detailed soil and water analyses are carried out for the project site, and the results provided in ESIA report;	Geotechnical investigations and water quality analysis were done. Annex 3 shows the Water Quality Certificates
9.	Include in the ESIA report comprehensive mitigation and environmental management and monitoring plans, respectively (preferably in table matrix format), that related to the identified potential environmental impacts and risks;	This has been addressed under Chapter 8 of this Report (Anticipated Project impacts and the respective mitigation measures).
10.	Assess any other critical environmental aspects/ concerns which may have not been initially foreseen during the preparation of the scoping report and TOR are addressed, and include an evaluation of such concerns in the ESIA report;	Comprehensive assessment has been undertaken during the preparation of this report
11.	Indicate the estimated cost of the project evidenced by a certificate of valuation of the project (investment) cost, issued by a qualified and registered valuer, in accordance with Regulation 18(1) of the National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.	This has been addressed under section 1.6 and Annex 9 (Valuation Certificate)
12.	Accompany the ESIA submission with evidence of payment of the 30% ESIA fees, in accordance with Regulation 49 of the National Environment (Environment and Social Assessment) Regulations, S.I. No. 143 of 2020.	This has been addressed as seen before the cover page and annex 10 of this Report

1.8 Structure of the ESIA report

This Environmental and Social Impact Assessment report is concise and limited to the significant environmental and social issues. It focuses on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting the data. The report contains, but not limited to the following major contents:

1) Cover Page (Title of the proposed project, Location, Name, Address and information of the developer)
2) Table of content
3) Declaration by ESIA team and their details
4) List of acronyms
5) Executive Summary
6) Introduction
7) Policy, Legal and Administrative/Institutional Framework.
8) Description of the Proposed Project.
9) Description of methodology and techniques used in the assessment and analyses of project impacts,
10) Baseline conditions of the physical, biological and socio-economic environment of the project area, including results of relevant studies and other geophysical and geotechnical studies.
11) Description/Assessment of the Environment and social impacts of project activities.
12) Analysis of Alternatives.
13) Environmental and Social Impacts and Mitigation Measures.
14) Chance finds procedure to facilitate the handling of any unknown or known Physical Cultural Resource(s).
15) Grievance Redress Mechanism to facilitate the handling of any complaints that may arise during project implementation.
16) Environmental and Social Management Plan (ESMP) matrices detailing measures for addressing potential negative environmental and social impacts of the project. In addition, the ESMP should clearly identify institutional arrangement, roles, responsibilities, implementation schedules and costs in addressing the mitigation measures that will be proposed in the ESIA, including capacity building requirements; and
17) E&S Monitoring Plan with clear monitoring indicators and institutional roles to be used in tracking the implementation and compliance of the proposed mitigation measures;
18) Institutional mandates.
19) List of References.
20) Appendices:
    - Approved Scoping Report/Terms of Reference
    - Land title/agreements
    - Records of Stakeholder meetings
    - Map, drawing and pictorial complement, especially to convey information on the project affected area and proposed project activities
    - Chance Finds Procedure
    - Grievance Redress Mechanism

2 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Introduction

Key legislation governing an ESIA study in Uganda includes the National Environmental Act (NO. 5 of 2019) of the laws of Uganda and the Environmental and Social Assessment Regulations, S.I. No. 143 of 2020. The National Environmental Act established NEMA and entrusts it with the responsibility to ensure compliance with ESIA process and procedures in planning and execution of development projects. The procedures require that a project proponent prepares an ESIA report with a clear assessment of relevant potential impacts, based on Terms of Reference (ToRs) developed from a scoping exercise. This requires that the ESIA addresses potential direct and indirect socio-environmental impacts during the pre-construction, construction, operation and decommissioning phases and an environmental and social management plan (ESMP) has also to be prepared.

Policies, legal and institutional framework considered relevant to this proposed project are discussed in this section. Various laws here reviewed relate to minimum acceptable construction, operational requirements, environmental quality, land use, public health, occupational safety, labour standards and international legal obligations.

2.2 Policies and plans relevant to the Proposed Project

Table 3 below presents the policies and plans related to the project.

Table 3: Policies and plans related to the Project

Policy	Goal and objectives	Relevancy of the Policy to the proposed project
National Environment Management Policy, 2014	The overall policy goal is sustainable development which maintains and promotes environmental quality and resource productivity for socio-economic transformation. The Policy provides a system of Environmental Impact Assessment (EIA) and environmental monitoring so that adverse environmental impacts can be foreseen, eliminated or mitigated.	Environment and development are interrelated, and this policy requires that environmental aspects are considered in all development projects such as the rehabilitation and expansion work. Therefore, this ESIA study has been conducted to take into consideration any adverse social and environmental impacts of the rehabilitation and expansion works
The National Water Policy, 1999	The goal of this 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	Because the management of the storm water drainage has an impact on downstream water quality, this policy is relevant to the proposed project since the proposed project activities are aimed at controlling floods and improving the quality of run-off that is discharged into the River Nkusi. This project will be implemented to adequately convey

Policy	Goal and objectives	Relevancy of the Policy to the proposed project
	generations. The policy aims to: Promote rational use of water; Control pollution and promote safe storage, treatment and disposal of waste, which could pollute water and impact public health; and Promotion of awareness of water management and development issues and capacity building.	storm water through the respective catchments to improve on storm water management in the City, and reduce flooding problems which can contribute to water pollution
The National Land Policy, 2013	The goal of this Policy is: "to ensure an efficient, equitable and optimal utilization and management of Uganda's land resources for poverty reduction, wealth creation and overall socio-economic development". One of its objectives is to ensure sustainable utilization, protection and management of environmental, natural and cultural resources on land for national socio-economic development.	By undertaking an ESIA for the proposed project, the developer is ensuring planned and environmentally friendly infrastructure development. Enhancement and mitigation measures should be implemented by the developer and the contractor(s) to ensure that all land use practices conform to land use plans and the principles of sound environmental management such as biodiversity preservation, soil and water protection, conservation and sustainable land management.
Uganda National Climate Change Policy, 2015	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 including integration of climate change issues into planning, decision making and investments in all sectors.	ESIA promotes the wise use of water resources to minimize harmful effects to the environment and water resource monitoring. It promotes and strengthen the conservation and protection against degradation of watersheds, water catchment areas, river banks and water sources in order to increase their resilience to climate change impacts.
The National Health Policy, 2010	The overall objective of this policy is to reduce mortality, morbidity and fertility, and the disparities therein.	The project will contribute to the reduction of water borne diseases thus improving on the health of communities that carryout activities along the Channel.
The National Gender Policy, 2007	The goal of this policy is to mainstream gender issues in the national development process in order to improve the social, legal/civic, political, economic and cultural conditions of the people of Uganda, particularly women. The policy recognizes women and children as the main carriers and users of water and related sanitation facilities. It anchors the importance of gender responsiveness in terms of planning, implementation and management of water and sanitation initiatives.	This policy would especially apply in the recruitment process of labour, both during construction and operation phase. Men and women should have equal opportunities for available jobs. This policy also requires provision of a work environment that is safe and conducive to women, as it is for men, considering gender-disaggregated differences and vulnerabilities. For example, women should have separate facilities from men at workers' camps and sites.

Policy	Goal and objectives	Relevancy of the Policy to the proposed project
The Occupational Health and Safety (OHS) Policy	This policy seeks to: Provide and maintain a healthy working environment; Institutionalize OHS in the power-sector policies, programs and plans; and Contribute towards safeguarding the physical environment. The OHS Policy also takes into consideration the Health Sector Strategic Plan, all of which aim to improve the quality of life for all Ugandans in their living and working environment.	This policy will be especially relevant for OHS of construction crews and subsequently, operation and maintenance personnel. The policy will also have relevance in mitigation measures that protect the public from health and safety impacts as a result of project construction and subsequent operation and maintenance activities.
The Environmental Health Policy 2005	The policy provides a framework for the development of services and programs at National and Local Government levels that establish the environmental Health priorities.	Analysis of water quality was done during this ESIA where water samples were collected at the proposed intake point on River Nkusi and analyzed in the laboratory to ascertain the pollution variation.
The National Policy for the Conservation and Management of Wetland Resources, 1995.	The goal of this Policy is to curtail the rampant loss of wetland resources and ensure that benefits from wetlands are sustainable and equitably distributed. Wetlands acting as sources of water supply wastewater treatment should be fully protected. This policy outlines guidelines for wetland resource developers.	The proposed project is aimed at Conservation and Management of Wetland Resources within the catchment area. The designs will adhere to the principles of sustainability such that areas within wetlands are left intact, as much as possible
The National Land Use Policy, 2007	The overall goal for the national land use policy is "To achieve sustainable and equitable socioeconomic development through optimal land management and utilization in Uganda." Specific goals of this policy include among others: To adopt improved agriculture and other land use systems that will provide lasting benefits for Uganda; To reverse and alleviate adverse environmental effects at local, national, regional and global levels.	By undertaking an ESIA for the proposed project, the developer is to ensure planned and environmentally friendly infrastructure development. Enhancement and mitigation measures should be implemented by the developer and the contractor(s) that ensure all land use practices conform to land use plans and the principles of sound environmental management such as biodiversity preservation, conservation and sustainable land management.
The National HIV/AIDS Policy, 2004	HIV/AIDS is recognized by Ministry of Health as a considerable risk in construction of infrastructure projects and it (together with the Ministry of Gender, Labour and Social Development) encourages employers to develop in-house HIV/AIDS policies, provide awareness and prevention measures to workers and avoid discriminating against workers living with or affected by HIV/AIDS. The policy encourages employee awareness and education on	It is anticipated that during the construction phase, there may be an influx of people into the project area possibly resulting into sexual fraternisation and a risk of HIV/AIDS spread. The construction contractors or their subcontractors, will provide in-house HIV Policy, worker sensitisation and provision of free condoms. This policy is relevant to the project if implementation of proposed construction activities leads to in-migration into the project

Policy	Goal and objectives	Relevancy of the Policy to the proposed project
	HIV/AIDS. The policy also guides about HIV/AIDS management including awareness and provision of condoms in workplaces.	area by people seeking construction jobs and indulging in prostitution or irresponsible sexual fraternisation associated with HIV/AIDS risk.
The National Child Labour Policy, 2006	The policy provides an enabling environment for the prevention, protection and elimination of child labour. It is intended to establish guiding principles in Uganda's effort to eliminate child labour and priorities for government and stakeholder action. This policy is based on recognition that all human beings, adults and children, have rights. Children by virtue of their age and needs are entitled to specific rights, including education, health, survival development, protection and participation.	The project management should ensure that all employees are above 18years and not school going.
The National Orphans and other vulnerable children's Policy, 2004	The goal of the Policy is full development and realization of rights of orphans and other vulnerable children. The policy provides support to vulnerable children and families such that their capacity to sustain themselves is strengthened; and provides residential care for orphans and other vulnerable children as a last resort	The project Developer (MWE/WSDF-C) and the contractor(s) including their sub-contractor(s) will ensure that the project activities do not compromise or in any way affect the lives and livelihood of all the vulnerable groups like the orphans and children in general during the project implementation
The National Equal Opportunities Policy, 2006	The National Equal Opportunities Policy provides a framework for re-dressing imbalances, which exist against marginalized groups while promoting equality and fairness for all. With a goal of: providing avenues where individuals and groups' potentials are put to maximum use by availing equal opportunities and affirmative action.	The Water supply projects come along with a lot of opportunities including service delivery, trainings and employment. The project will avail equal opportunities and affirmative action.
The National Sanitation Policy for Uganda, 1997	The Goal of this policy is to promote and preserve the health ofthe community through improved sanitation. Attaining and maintaining a good standard of sanitation and greatly contribute to reducing mortahity and morbidity from sanitation related diseases as well as improving the socio-economic status of the community.	The proposed project will promote proper management of solid and liquid wastes and promote IEC for behaviour change concerning sanitation.

Policy	Goal and objectives	Relevancy of the Policy to the proposed project
Uganda Vision 2040	In 'Vision 2040', Uganda sets goals to achieve by the year 2040 ranging from political, economic, social, energy, water, and environment. It acknowledges that the slow accumulation of infrastructure i.e. water among others retards the economic development.	Investment in the water supply infrastructure is therefore of dire importance so as to provide people with safe water and also spur economic development. The proposed project aims at providing and accessing safe water which always disrupt the economic dealings and at times loss of life through water related diseases
National Development Plan III (NDP III)	The plan focuses on increasing and matching the capacity of the local authorities with the high urbanization rate of Uganda where most of the urban areas in Uganda have expanded beyond their original spatial plans with many of them surrounded by vast sprawling unplanned settlements and have increasingly encroached into the wetlands and drainage corridors contributing to the frequent flooding especially when it rains.	Investment in the water supply infrastructure is therefore of dire importance so as to provide people with safe water and also spur economic development. The proposed project aims at providing and accessing safe water which always disrupt the economic dealings and at times loss of life through water related diseases.

2.3 Laws and regulations relevant to the Proposed Project

Table 4 below presents the Legal framework related to the project.

Table 4: Legal framework related to the project

Legal Framework	Provision and Requirement	Relevancy to the proposed project
The Constitution of the Republic of Uganda; 1995; amended as at 15th February 2006, Government of Uganda.	The State shall promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations. The Constitution is the cardinal law in Uganda upon which all environmental laws and regulations are founded.	All environmental impact actions of the project are therefore meant to conform to the broader objectives of the Constitution which requires a healthy environment for all citizenry. ESIA report has been prepared for NEMA's consideration before implementation of the project. Therefore, this Project will be implemented in a manner that will incorporate the appropriate safeguards for environmental and social issues, especially land take. Any land required for the implementation of the construction activities will be obtained within

		the confines of the law, after a Resettlement Action Plan (RAP) has been conducted where possible.
The National Environment Act No. 5 of 2019	This act provides for various strategies and tools for environment management, which also includes the ESIA for projects likely to have significant environmental impacts. The Third Schedule of the National Environment Act, No. 5 of 2019 lists projects to be considered for environmental impact assessment. Under that categorization, most water resources related projects fall under two ground and surface water resources.	The Act governs and guides environmental management in Uganda. This ESIA is prepared to conform to the Act's requirement that projects likely to have significant environmental impact undertake an ESIA before they are implemented. ESIA report has been prepared for NEMA's consideration before implementation of the project.
The Water Act, Cap 152 and The Water Resources Regulations, 1998	Management of water resources Regulation and issuing of water use, abstraction and wastewater discharge permits; Prevention of water pollution. Managing and monitoring and regulation of water resources	Water abstraction permit should be obtained from DWRM before operation phase. Water analysis was done under ESIA and results compared to those obtained at design stage and national standards for portable water.
The Land Act, Cap 227	Section 74 (i) states that where it is necessary to execute public works on any land, an authorized undertaker shall enter into mutual agreement with occupier or owner of the land in accordance with Act.	These tenure systems will be important during resettlement planning. The extent of works designed to ensure the construction of the WSS will necessitate land take in the Project Area. Any land required for the implementation of this Project will be acquired in accordance with the provisions of this Act.
The Occupational Safety and Health Act, 2006	Provision of Occupation Health and Safety of workers and Inspection of places of works. This Act requires that employers provide and maintain safe working conditions and take measures to protect workers and the public from risks and dangers of their works, at his or her own cost (Section 13). Employers with more than 20 workers should prepare and often revise a written policy with respect to safety and health of workers (Section 14). The contractor therefore is obliged to provide employers with washing facilities, First Aid, facilities for meals and safe access to workplaces	An ESMP has been prepared and the Contractor will ensure the workplace is registered under the Ministry of Gender, Labour and Social Development (MoGLSD) under the Department of OHS. The construction activities will require workers during the construction, and operation and maintenance phases. Therefore, the Act requires that MWE and all contractors must ensure that workers have a safe working environment at all times and that their health is not at risk as a result of the working environment.

The Workers' Compensation Act, 2000	This requires compensation to be paid to a worker injured or acquired an occupational disease or has been harmed in any way in the course of his/her work.	This Project will require workers during construction, operation and maintenance phases. Any injury or illness resulting from Project related activities will be subject to conditions of the Workers' Compensation Act. Kakumiro District Labour officers will also be involved in ensuring compliance of the Contractor's' with labour laws. The developer shall ensure that all contractors and sub-contractors provide personal protective equipment (PPE) to employees to minimize accidents and injuries and ensure workers safety onsite.
The Public Health Act, Cap 281	The Public Health Act aims at avoiding pollution of environmental resources that support health and livelihoods of communities. It gives local authorities powers (Section 103) to prevent pollution of watercourses.	WSDF-C shall provide for adequate sanitary facilities, proper solid waste management and provide and operate first aid services especially in public places and shall ensure that such facilities are available in all other privately allocated and developed areas requiring such to possess them. Anybody falling sick and needs services beyond the first aid shall be refered to the nearest health centre. WSDF-C should implement an HIV/AIDS prevention control plan as part of mitigation measure. The disposal of waste from the proposed project will have to be appropriately managed so as to prevent risk to public health, in line with the provisions of this Act.
The Local Governments Act, Cap 243	Provides for the system of local governments based on the decentralization of district for the enforcement of environmental law.	The developer will work closely with the District Water Officer (DWO), District Natural Resources Officer (DNRO) and Town Council/Sub-County Community Development Officer in carrying out monitoring activities to ensure no damage onto the environment and social amenities.

The Investment Code Act, Cap 92	Section 18(2) (d) of the Act requires an investor to take necessary steps to ensure that development and operation of an investment project do not cause adverse ecological and socio-economic impacts.	WSDF-C is the implementing agency for the project that received funding from the AfDB. This ESIA is in partial fulfilment of the requirements of this Act, since adverse ecological and socio-economic impacts as a result of the project implementation have been identified and mitigation measures developed.
The Employment Act, 2006	This Act is the principal legislation that seeks to harmonize relationships between employees and employers, protect worker's interests and welfare and safeguard their occupational health and safety through: i) Prohibiting forced labour, discrimination and sexual harassment at workplaces (Part II; Part IV). ii) Providing for labour inspection by the relevant ministry (Part III). iii) Stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI). iv) Continuity of employment (continuous service, seasonal employment, etc. (Part VIII). This Act is relevant to both construction & operation phases.	The Act will govern labour arrangements and conditions under which persons hired by the project work. It prohibits Child labour (a condition the contractor must comply with) as well as providing guidance on work rights during the post-construction phase.
The Mining Act, Cap. 148	Stone quarry sites and gravel borrow pits will be necessary for materials needed to construct the concrete works of the project components. Therefore, applicable licenses shall be obtained from the Commissioner of the Geological Survey and Mines. The Mining Act of 2003 regulates mining developments including set up of new quarries and/or sandpits. Relevant environmental studies required for this license application are described in Part XI.	This Act will apply to the project's contractor(s) who will be required to obtain license for extraction of stone/ aggregate and murram materials required for construction. The extraction of stone/aggregate and murram materials will be undertaken in line with the provisions of this Act. Issues of restoration of the sites after extraction of murram will be of key importance after construction of the proposed project.
The Children's Act, Cap 59	This is an Act to reform and consolidate the law relating to children; to provide for the care, protection and maintenance of children; to make provision for children charged with offences and for other connected purposes. Part II of the second schedule of this Act defines a child as a person below the age of eighteen (18) years. In the same schedule under Section 8 of this Act provides that no child shall be employed or engaged in any activity that may be	This Project will require workers during construction, operation and maintenance phases. No child should be employed under project work force requirement however, any employment or engagement of children will be done in line with the restrictions of this Act and the Employment Act to ensure that risks to children are either eliminated, or reduced to as low as reasonably practicable. In

	harmful to his or her health, education or mental, physical or moral development.	addition, the contractor will confirm age of potential labourers prior to hiring through National Identity card, birth certificate or confirming with LC and community elders. Kakumiro District Probation Officers will provide guidance to Contractors and their employees' areas of compliance.
The Historical Monuments Act, 1967	Sub-section 12(1) requires that any portable object discovered in the course of an excavation shall be surrendered to the Minister who shall deposit it in the Museum. The Act adds that, notwithstanding provisions of the subsection, where any object is discovered in a protected site, place, or monument, the owner of the protected site, place, or monument shall be entitled to reasonable compensation.	This 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 Heritage. Any chance find objects, material or infrastructure that may be identified as falling under the category of 'archaeological pale-ontological ethnographical and traditional interests' during the Project implementation will therefore, be reported to the Department of Museums and Monuments for advice and where necessary undergo a forensic assessment
The National Environment (Environmental and Social Assessment) Regulations, 2020	According to sections 15 of the Regulations, the developer of any project that has or is likely to have a significant impact on the environment is required to undertake an ESIA process after approval of the ToRs.	ESIA report has been prepared for NEMA's consideration after the approval of the Terms of References before implementation of the proposed project.
The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000	In Regulation 17 (1), every landowner, occupier or user who is adjacent or contiguous with a wetland shall have a duty to prevent the degradation or destruction of the wetland and shall maintain the ecological and other functions of the wetland. The tool used under these Regulations to ensure compliance is the permit.	Prior to any works at the discharge of effluent back into the environment or any wetland, WSDF-C will seek permission from NEMA, as provided for in these Regulations. Water source protection measures and an independent WSPP have been proposed to protect any wetland resources within the catchment area for the Igayaza-Kikwaya WSS.
The National Environment (Waste Management) Regulations, 2020	Regulation 5 (1) stipulates that a person who generates waste, a waste handler or product steward has a duty of care and shall take measures to ensure that waste is managed in a manner that does not cause harm to human health or the environment among other provisions.	These regulations apply to both construction and operation-phase waste which should be managed in a way such as to avoid environmental and public health impact. Therefore, all the generated various

<table>
<tr><td></td><td></td><td>types and volume of waste should be managed and conform to these regulations.</td></tr>
<tr><td>The National Environment (Noise Standards and Control) Regulations, 2000.</td><td>Part III Section 8 (1) requires facility operators, to use the best practicable means to ensure that the emission of noise does not exceed the permissible noise levels. The regulations require that persons to be exposed to occupational noise exceeding 85 dBA for eight hours in a day should be provided with requisite hearing protection.</td><td>All construction activities should be carried out between 7am – 6pm by the Contractor as working hours. No construction activities to be carried out at Night. Noise levels should also be monitored and not to exceed 85dB as per Regulation.</td></tr>
<tr><td>The Water Resources Regulations, 1998</td><td>With regard to water abstraction, Part II: Section 3 Sub-section (1) of these regulations requires application for Water Permits by anyone who: (a) Occupies or intends to occupy any land; (b) Wishes to construct, own, occupy or control any works on or adjacent to the land referred to in regulation 10; may apply to the Director for a water permit.</td><td>Water abstraction permit will be obtained by the developer from the Directorate of Water Resources Management (DWRM) before operation phase.</td></tr>
<tr><td>The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020</td><td>Section 5 details that a person shall not discharge effluent into water or land except in accordance with the Act, the Water Act, the National Environment (Waste Management) Regulations, 2020, the Petroleum (Waste Management) Regulations, 2019, the Water (Waste Discharge) Regulations, these Regulations and environmental standards. For this project, this standard is applicable to liquid waste/ sewage treatment plant and public toilets.</td><td>Effluent/liquid waste (such as human waste, food scraps, oils, soaps and chemicals) should not be discharged into any wetland or in the River water resources and should be managed in a manner that does not cause harm to human health or the environment.</td></tr>
<tr><td>Draft National Air Quality Standards, 2006</td><td>The draft national air quality standards provide Uganda's regulatory air quality standards.
<table>
<tr><th>Pollutant</th><th>Averaging time for ambient air</th><th>Standard for ambient air</th></tr>
<tr><td>Carbon dioxide (CO_2)</td><td>8 hour</td><td>9.0 ppm</td></tr>
<tr><td>Carbon monoxide (CO)</td><td>8 hour</td><td>9.0 ppm</td></tr>
<tr><td>Hydrocarbons</td><td>24 hour</td><td>5 mg m^{-3}</td></tr>
<tr><td>Nitrogen oxides (NO_x)</td><td>24 hour
1 year arithmetic mean</td><td>0.10 ppm</td></tr>
<tr><td>Smoke</td><td>Not to exceed 5 minutes in any one hour</td><td>Ringlemann scale No.2 or 40% observed at 6m or more</td></tr>
<tr><td>Soot</td><td>24 hour</td><td>500 µg Nm^{-3}</td></tr>
<tr><td>Sulphur dioxide (SO_2)</td><td>24 hour</td><td>0.15 ppm</td></tr>
<tr><td>Sulphur trioxide (SO_3)</td><td>24 hour</td><td>200 µg Nm^{-3}</td></tr>
</table>
Note: ppm = parts per million; "N" in µg/Nm-3 connotes normal atmospheric conditions of pressure and temperature (25oC and 1 atmosphere).</td><td>These standards will apply particularly during construction of the water treatment plant and reservoirs.</td></tr>
</table>

The National Environment (Audit) Regulations, 2020	Part III on Environmental Compliance Audit, Section 12, Sub-section (1) requires the developer of a project or activity listed in Schedule 3 to these Regulations to carry out an environmental compliance audit.	The project will involve construction and operation of water supply and sanitation facilities that have a potential to impact negatively of the environment. Therefore WSDF-C should conduct Environmental Audits to assess if there are impacts, to what extent and mitigate them.

2.4 International legal and lenders requirements

Uganda is a party to a number of international and regional agreements which requires her to comply with provisions of the agreements when setting up projects like the Igayaza-Kikwaya RGC Piped Water Supply and Sanitation Project.

International financial institutions like the African Development Bank (AfDB) have environmental and social safeguard policies that are designed to avoid, mitigate, or minimize adverse environmental and social impacts of projects supported by them.These are complimented by the Performance Standards (PS) which have been set by the International Finance Corporation (IFC). These safeguard policies and performance standards (Table 5) can be used and adhered to during the project cycle to ensure that the project meets the international standards.

Table 5: The Safeguard policies and Performance Standards relevant to the Project

Operational Safeguard/ Performance Standard	**Key Issues**	**Relevance/Applicability**
OS 1: Environmental and social assessment	Mainstream environmental and social considerations, including those related to climate change vulnerability and thereby contribute to sustainable development in the region. It governs the process of determining a project's environmental and social category and the resulting environmental and social assessment requirements	An environmental and Social Impact Assessment (ESIA) has been conducted for this project (this Report) where potential impacts have been identified and mitigation measures proposed. This will ensure that the project is implemented in a sustainable way.
OS 2: Involuntary resettlement, land acquisition, population displacement and compensation	Mainstream resettlement considerations in AfDB operations. It consolidates the policy commitments and requirements set out in the Bank's policy on involuntary resettlement, and incorporates a number of refinements designed to improve the operational effectiveness of those requirements	All people whose land is to be affected for example at the proposed water abstraction site, reservoir sites and some areas along the proposed pipeline route will be compensated prior to start of construction works.
OS 3: Biodiversity and ecosystem services	Identify and implement opportunities to conserve and sustainably use biodiversity and natural habitats as well as observe, implement, and respond to requirements for the conservation and sustainable management of priority ecosystem services.	Mitigation measures have been proposed in this Report to minimize probable impacts of this project on biodiversity, including water resources so that their ability to provide ecosystem services to people are not compromised.
OS 4: Pollution prevention and control,	Manage and reduce pollution in AfDB funded projects. It covers a range of key impacts including	The project proponent and contractor will set up a waste management plan to handle liquid

hazardous materials and resource efficiency	pollution, waste, and hazardous materials for which there are agreed international conventions, as well as comprehensive industry specific and regional standards, to be followed to safeguard the environment and humans from being polluted as a result of the development activities	and solid wastes, including those of hazardous nature.
OS 5: Labour conditions, health and safety	Protection of workers' rights and provision of their basic needs. It establishes the Bank's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation of the labourers	The project will abide by the labour laws to protect the interests of workers. This will include for example: providing contracts to all hired workers, providing workers with personal protective equipment, setting up a grievance handling mechanism (**Annex VII**) to enable workers express their complaints, among others.
Performance Standards		
PS1: Social & environmental assessment and management systems	It establishes the importance of: (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of environmental and social performance throughout the life of the project.	An ESIA has been carried out. Potential impacts of the project have been identified and their mitigation measures proposed. Stakeholder involvement was a major component of the ESIA.
PS 2: Labour and working conditions	This performance standard is concerned with management of labour risks such as lack of contracts, insufficient wages, exploitation of minors, discriminatory hiring, unsafe and un hygienic living conditions, internal grievance handling, excessive over-time and handling of casual laborer.	A grievance handling mechanism will be put in place where workers can lodge their complaints. The project will employ workers following the relevant labour laws of Uganda.
PS3: Resource efficiency and pollution prevention	Requires project to efficiently use resources and to minimize or avoid pollution to the environment	The Developer shall ensure that pollution control measures are in place and only the required resources are utilized.
PS4: Community health, safety and security	This performance standard looks at aspects that can expose the public to accidents, excessive noise, traffic	An ESMMP has been put in place detailing the management of

	congestion, diseases, insecurity, among others	impacts related to community health, safety and security.
PS5: Land acquisition and involuntary resettlement	Establishes requirements for efficient and timely compensation and/ resettlement of project affected persons	All the required for project activities will be obtained following the laws of Uganda, and all people whose land is affected will be compensated prior to the start of project activities
PS6: Biodiversity conservation and sustainable management of living natural resources.	Requires that projects put up necessary measures to conserve biodiversity and natural habitats	An ESMMP has been put in place with measures to ensure biodiversity is not adversely impacted by the implementation of the project.
PS7: Indigenous peoples	Promotes the protection of indigenous people	No indigenous peoples as defined under this standard are considered to be resident in the project area.
PS8: Cultural heritage	Requires that all resources of cultural importance are identified and protected	No cultural resources were identified during this assessment. However, any cultural resource that may be identified at any stage of project operation will be protected and relocated according to the established laws of Uganda. A chance finds procedure (Annex V) will guide handling and management of any PCRs that may be found during civil/earth works.

2.5 Institutional Framework

Table 6: Institutional framework for the project

Institution	Role
Ministry of Water and Environment	▪ Review and approve the ESIA report (ESIS) ▪ Through Kakumiro District Natural Resources Office (DNRO), undertake environmental monitoring during project implementation.
Directorate of Water Resources Management (DWRM)	▪ Issue water abstraction and wastewater discharge permits. ▪ Ensure monitoring of surface water resource, laboratory and field works and ultimately water pollution control..
National Environment Management Authority (NEMA)	▪ The Environmental Monitoring and Compliance Department of NEMA will be responsible for the review and approval of ESIAs, post-implementation audits and monitoring of approved projects. Although project sponsors have a responsibility for monitoring their own activities, NEMA carries out its own monitoring largely through District Environmental Officers and environmental

	inspectors at NEMA's head office/ Lead Agencies. ▪ Coordinate, inspect, supervise and monitor project activities to ensure that the environment and natural resources are not depleted but managed sustainably.
Directorate of Environment Affairs (DEA)	▪ Coordinate, inspect, supervise and monitor the environment and natural resources. ▪ Ensure that environmental policies and laws are respected while implementing water resources related projects.
District Local Administration Structures (Kakumiro District Local Government)	▪ 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. ▪ Facilitate and/or coordinate activities of the developer in their areas of jurisdiction. ▪ Mobilize local communities and key stakeholders to participate in EIA consultations and/or public hearings.
Ministry of Gender, Labour and Social Development (MGLSD)	▪ The department of Occupational Health and Safety (OHS) is responsible for inspecting and registering the workplace and monitoring of conditions under which employees on the project are subjected.
Developer (Ministry of Water and Environment/ Rural Water Supply and Sanitation Department	▪ Apply for Surface Water Abstraction Permits from DWRM. ▪ Compensate local Project Affected Persons (PAP) for any loss or negative effect of the project before implementing the project. ▪ Implement mitigation measures and actions to protect the environment and monitor implementation of proposed measures in the specific site- ESMPs.
Contractor	▪ The Contractor(s) must include in their schedule of works, all proposed mitigation measures. ▪ The Contractor(s) must have designated personnel (Supervising Consultants) to monitor environmental, safety and health matters during construction works, and report regularly to the Developer. ▪ It is recommended that the Supervising Consultant Team include an Environment Management Specialist, who must be responsible for the day-to-day guidance of the project activities on environment and social compliance to the requirements of the Contract and legislation.

3 PROJECT DESCRIPTION

3.1 Location of the Proposed Project

Kikwaya Town Water supply area is located in Kikwaya subcounty, Kakumiro District. The project area is bordered by Kakindo sub-county to the North, Rwembuba, Igayaza TC and Kiryanga sub-counties to the East, South and West. The project area is located 38km by road from Kakumiro District headquarters along the Kakumiro-Bukumi-Kakindu-Hoima main highway and 70km from Mubende town centre.

Igayaza TC Water supply area is located in Igayaza Town Council, Kakumiro District. The project area is bordered by Kikwaya sub-county to the North, Kashambya, Birembo and Bwamiramira sub-counties to the East, South and West. The project area is located 33km by road from Kakumiro District headquarters along the Kakumiro-Bukumi-Kakindu-Hoima main highway and 70km from Mubende town centre

Kakumiro District was curved out of kibaale district in July 2012. Kakumiro District has an average annual rainfall in two rainfall seasons, March to May and August to November. The average temperatures are high of 22.9^{o}C in February and low of 20.9oC in July. The District has a land area of 1,668 square kilometers and population of 473,400 with 232,900 females and 240,500 Males with the average house hold size of 5.4, with a total of 15,353 households. The literacy levels are at 49.2% females and 50.8% male according to a projection by UBOS statistics. The district found in a hilly environment with farming as the main activity undertaken by the residents is comprised of 8 sub counties and one town council.

Table 7: Proposed Water Supply Areas in Igayaza Town Council

District	Sub County	Parish/Ward	Village
Kakumiro	**Igayaza Town Council**	Igayaza	Rubasengura
			Rubasengura Central
			Kabanyoro Central
			Kabanyoro
			Kapoporo
			Rwebigaga
			Buhumuliro
		Rubazi	Kibuku A
			Kibuku B
			Rubazi
			Muroba
			Rubazi Central
			Rubazi West
			Kyamulinya
		Kaboijana	Kaboijana East
			Kaboijana West
			Igayaza Central
			Igayaza A
			Igayaza B
			Nyakagera
			Kyamurara
		Buramagi	Buramagi
			Buramagi East
			Buramagi West
			Kingereza
		Kiseke	Kikandwa

			Kiseke A
			Kiseke B
			Bweyale A
			Bweyale B

Table 8: Villages in the Project Area of Kikwaya Sub County

TC / SubCounty	Parish (Ward)	Village
Kikwaya Subcounty	Kikwaya	Kikwaya
		Rutoma
		Mbooga
		Rwanjale
		Kyarukooka
		Kanani
	Kamuli	Kagezi
		Kanyamwabura
		Kyatererkera
		Kamuli
	Kyakajumbi	Kyakajumbi
		Katooma
		Mburamaizi
		Ikarabirenge
	Kyakabangali	Kigwara
		Kemigisa
		Kyakabangali
		Kiryabukurura

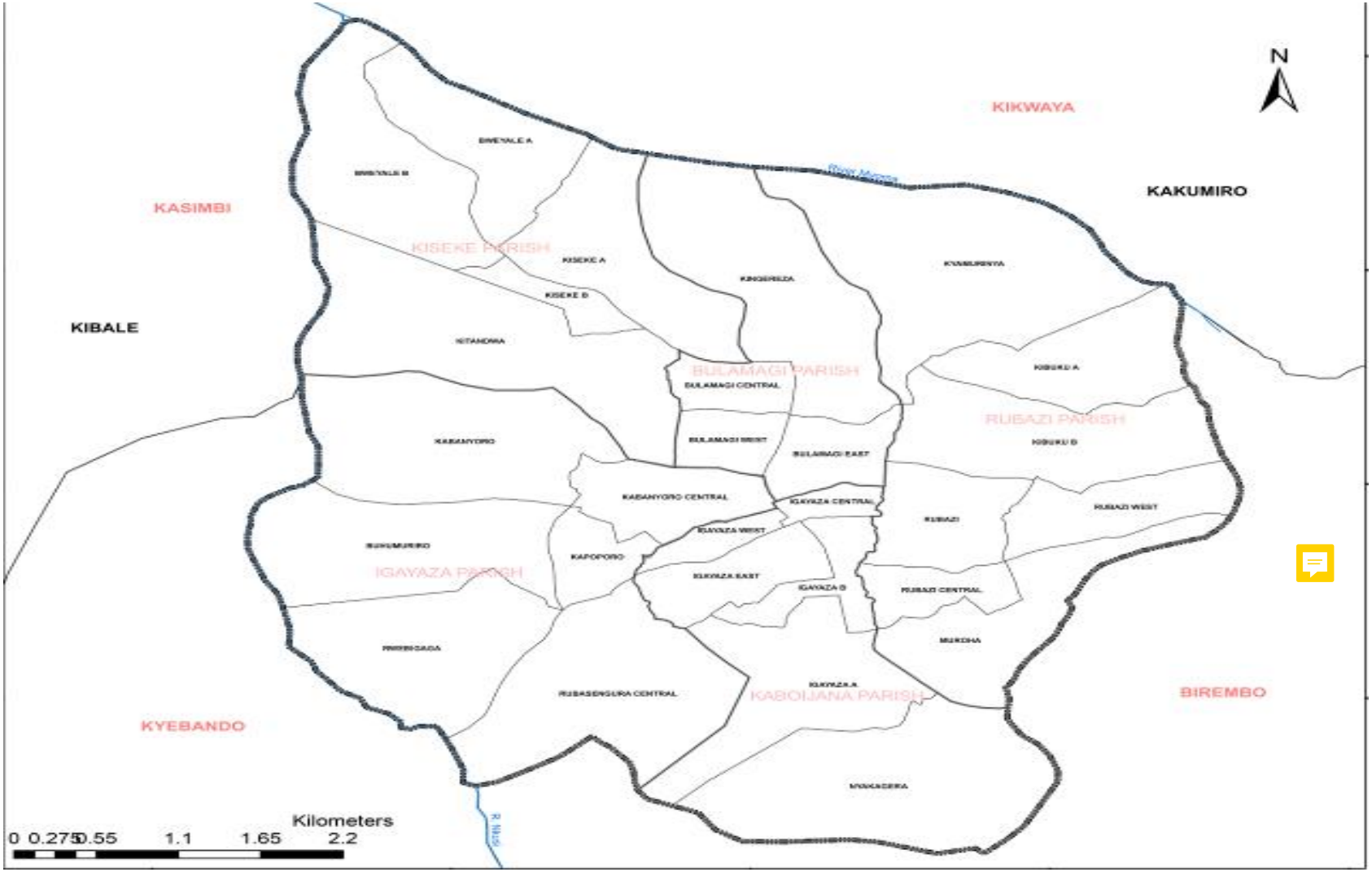


Figure 1: Map showing location of project area of Igayaza

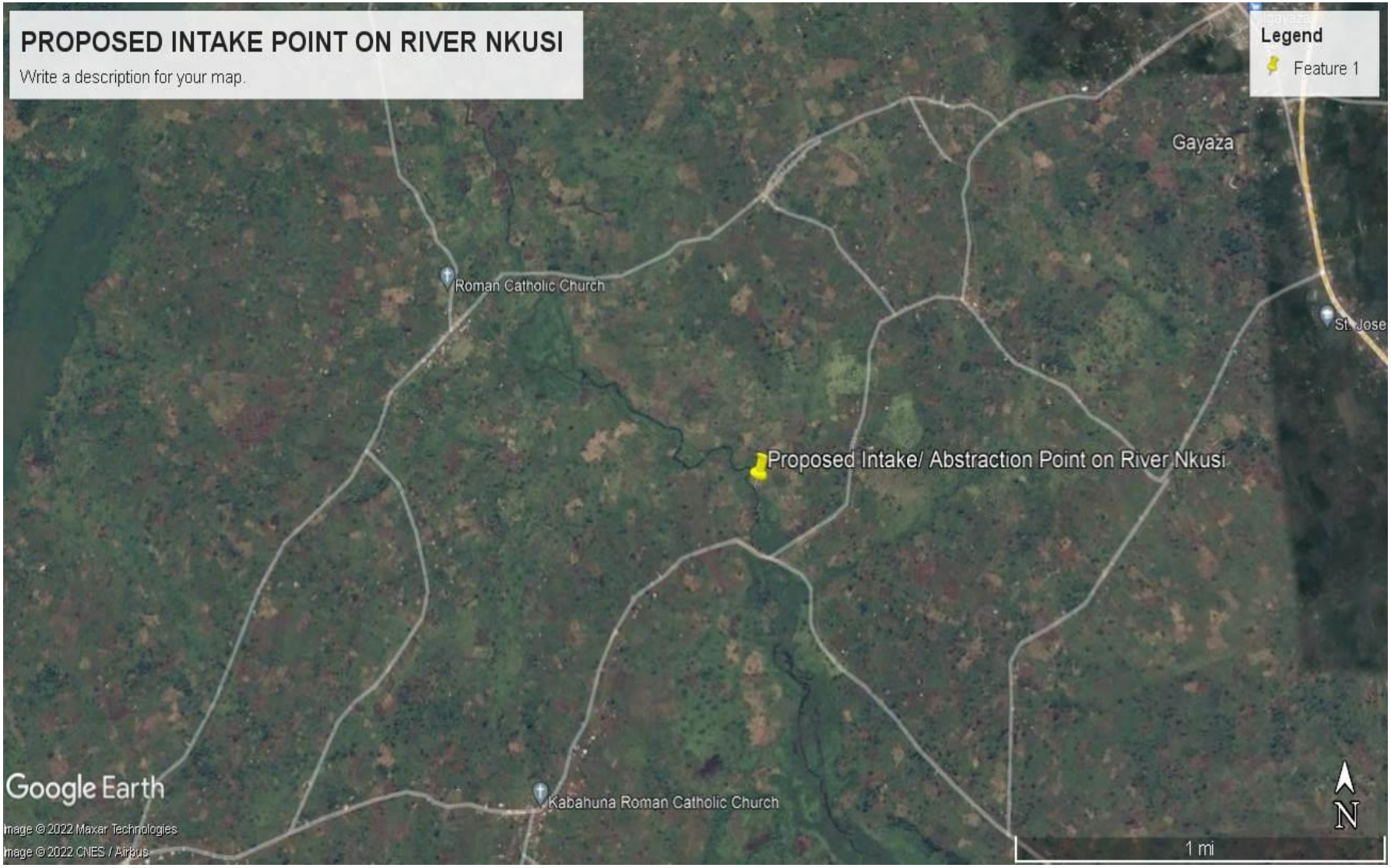


Figure 2: Proposed intake point on River Nkusi, Kakumiro District

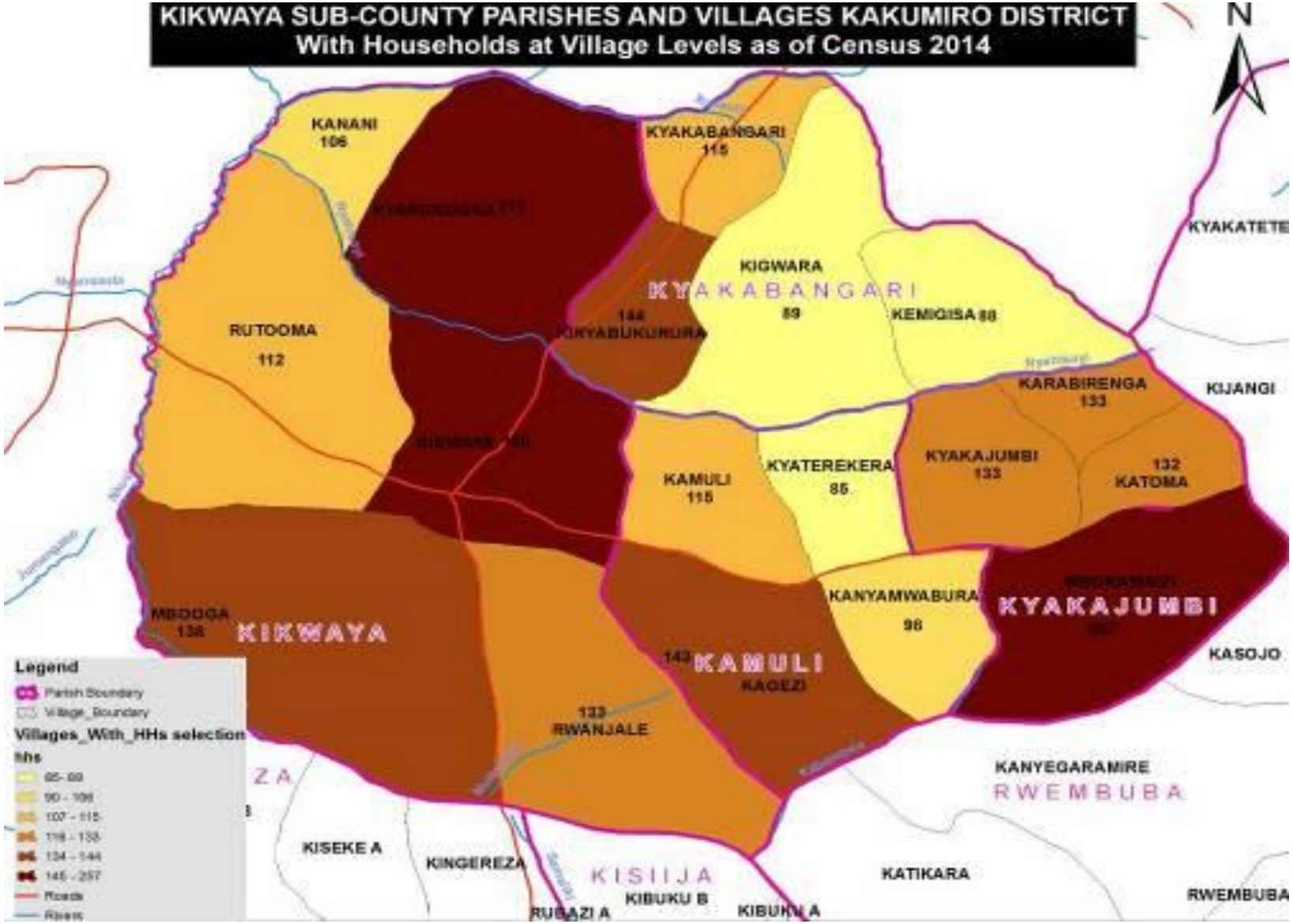


Figure 3: Project Area of Kikwaya, Kikwaya S/C

3.2 Project Description and Design

3.2.1 System Overview

The system is meant to serve the residents in Igayaza Town Council. The intake shall be located in Rubasengura LCI, Igayaza parish, Igayaza Town Council. The treatment plant will be located in close proximity to the intake (200m away). The raw water main, treatment plant, and treated water pumping mains will have the capacity for the entire the project area.
Raw water will be pumped from the source (river Nkusi), treated and then pumped (3.2Kms) to the main reservoir from the treatment plant. The general layout of the pipe network system showing the location of the intake, treatment works, transmission, distribution mains, and reservoirs. This development scenario consists of River Nkusi as the source of water and contains the following aspects:

I. Construction of an intake on River Nkusi in Rubasengura LCI, Igayaza parish, Igayaza Town Council at coordinates (291093.00 mE, 113270.00 mN)
II. Raw Water Pumping Main to the adjacent Water Treatment Plant.
III. Construction of a of 7018m^3/day conventional Water Treatment Plant nearby.
IV. Combined Treated water Pumping Main from the WTP to a storage reservoir located on the hill in Igayaza Project area.
V. A dedicated gravity main constructed from Igayaza reservoir to the Kikwaya reservoir
VI. Construction of a new 1234m^3 Storage Reservoir on 2m concrete plinth wall for in Igayaza area.
VII. Separate Distribution Networks from the reservoirs to the respective towns.
VIII. Laying of 43.4km of Distribution system for the Igayaza Supply Area
IX. Supply and laying of a 42.7Km long distribution network for the Kikwaya supply area
X. Making 1,084 new consumer connections.
XI. Construction of water office.

Table 9: Igayaza Water Supply System Capacity

Description	**Quantity (m^3/d)**	**Comment**
Maximum Day Demand	6,683.8	Maximum Day Demand
Capacity of Intake and Treatment Works	7,018.0	Maximum Day Demand plus 5% for Treatment Plant and Surrounding Community Use
Water Treatment Plant use plus Surrounding Community Demand	334.2	5% of Maximum Day Demand
Capacity of Raw Water Transmission Main	7,018.0	Maximum Day Demand plus 5% for Treatment Plant and Surrounding Community use, and 5% for en-route population from WTP Use
Capacity of Treated Water Transmission Main	7,018.0	Maximum Day Demand plus 5% for en-route population from WTP
Source: Project Estimates		

3.2.2 Treatment Plant and System Capacities

Following the feasibility study presentation, it was agreed that the headworks to of the Igayaza system be merged with that the shortfall of the 2No. Borehole supplies of Kikwaya Water Supply System owing to the fact that the two areas are in close proximity to one another. This shall be done to minimise on the investment cost for constructing independent treatment plants and also minimise on the cost of operations and maintenance of the systems. The reservoir location for the Igayaza tank can as well enable water to flow to the Kikwaya system by gravity. This meant that the two systems headworks will be combined and located at the Igayaza site to reduce on the cost of operation and maintenance of the completed works.

The combination of Igayaza demand and the shortfall to be met in Kikwaya system resulted in the totals demand of 6,683.8 m3/d and is summarised in the table below.

Table 10: Summary of Combined Demands

No.	Project Area	Maximum Day Demand (m^3/day)					
		2020	2025	2030	2035	2040	2045
1	Kikwaya project area short fall Project Area	134	399	745	1,198	1,792	2,569
2	Igayaza Project area demand	1,069	1,381	1,833	2,400	3,142	4,115
	Total Water Demand	**1,203**	**1,779**	**2,578**	**3,598**	**4,934**	**6,684**

Source: Project Estimates

Plate 1: Proposed site for the Water Treatment Plant (WTP) (36N 292333, 103634)

3.2.3 Raw Water Intake

The intake shall be of the weir type with a wet well on the side of the river below to ensure availability of water all year round. Flow abstraction is by direction of water through two DN600 outlet pipe inserts each controlled by a penstock. Removable coarse screens of robust construction and manufactured from stainless steel shall be installed in the wet well to ensure that any debris that would have found its way into the wet well cannot damage the pumps which are located in another chamber. Access ladders shall be placed so as to enable operations and maintenance be carried out easily and quickly.

Plate 2: Proposed Water Intake on River Nkusi (36N 292026, 103632)

3.2.4 Design of Raw Water Pump and Pumping Main

The raw water pumping main was sized for a flow of 438.64m^3/hr (16 hours of operation) by calculating the head loss along the pipe. The raw water pumping main design is summarised in the table below.

Table 11: Pump and Transmission Main Details

Parameter	Raw Water Pumping Main
Demand- 2045 (m^3/day) (Igayaza)	**4,114.84**
Demand- 2045 (m^3/day) (Kikwaya)	2,569.22
Total Demand- 2042 (m^3/day)	6,684.06
Treatment Plant Use (5%) (m^3/day)	334.20
Total Amount of Water Abstracted (m^3/day)	7,018.27
Hours of Pumping (hr)	16
Efficiency (%)	60.0%
Required Delivery (m^3/hr)	438.64
Required Delivery (m^3/s)	0.1218
Pump Installation Level (m amsl)	1114.000
Inlet Level (m amsl)	1127.000
Static Lift (m)	13.0
Hazen Williams Coefficient, Cwh (C)	120
Pipe Details	DN400 DI PN6
Pipe Diameter ND (mm)	400.00
Pipe Diameter ND (m)	0.400
Velocity (m/s)	0.970
Flow in Pipe (m^3/s)	0.1218
Length of Pipe (m)	200
Friction Loss (m)	0.5
Fittings losses - 10% (m)	0.1
Total Friction Loss (m)	0.5
Total Head (m)	13.6
Head Used (m)	14
Power (kW)	27.9
Source: Project Estimates	

The 200m long raw water pumping main will be in DN 400 Ductile Iron PN 6 terminating at the Cascade Aerators, and will have the following appurtenances:

- DN 80mm PN 10 Double Air Valve (1nr)
- Inr Washout with online isolating valve at the exit of the raw water intake.
- Flow regulation using an online biutterfly valve on the DN 450 DI PN10 pipe before entry into the Aerators in the WTP

Electromagnetic flow meter on a DN 400 DI PN10 pipe section before entry into the Aerators in the WTP, The raw water pumps proposed are submersible with their control panels to be housed in the Pump House. Three pumps each having a head of 14m and capacity of 219.32m^3/h shall be utilized with two (2) operating while the third will be on standby.

3.2.5 Pre-Chlorination of Raw Water

Pre-Chlorination of raw water is not planned for on a continual basis and has not been designed for. However, this is occasionally needed in order to protect the water treatment process from micro-organisms / microbial (biofilm) growth which tend to settle in the water treatment structures especially on the lamella clarifiers and filter media increasing filter head loss and thus frequent backwashing. To effect this, the Post-Chlorination Pipework from the Chemical House to the Treated Water Contact Tank

will have a butterfly valve Tee-Off to the Flow Divider Chamber where this can be effected, as and when required. In addition, the addition of chlorine at this stage will assist in the removal of Iron, Manganese, colour, taste and odours, which are prevalent in a water that has eutrophic conditions and algae.

3.2.6 Rapid Gravity Filtration

Water from both Clarifiers flows through a common DN 450mm pipe to the filters. Five Rapid Gravity Filters will be used for filtration and have each been designed with a treatment capacity of 168.7m^3/hour. The summary of the design of the filters is given in the table below.

Table 12: Summary of Design of the Rapid Gravity Filters

Parameter	Unit	Design
Number of Filter Beds (n)	Nr	4
Flow into each Rapid Gravity Sand Filter	m^3/hr	79.7
Filters Inlet Main Details	mm	DN 450 DI PN10
	mm	450.0
Actual Velocity in Inlet Main	m/s	0.56
Filters Inlet Orifice Details (4No.)	mm	200.00
	mm	200.00
Actual Velocity in Orifices	m/s	0.55
Filters Outlet Main Details	mm	DN 300 DI PN10
	mm	300.0
Actual Velocity in Outlet Main	m/s	0.31
Filters to Treated Water Complex Main Details	mm	DN 350 DI PN10
	mm	350.0
Actual Velocity in Outlet Main	m/s	0.92
Filter Sand Bed Width	m	2.50
Width of Wash water Channel	m	0.50
Filter Internal Width	m	3.20
Filter Internal Length (Contains Filter Media)	m	4.60
Actual Length to Width ratio		1.84
Height of Water above Filter Sand Bed	m	2.00
Total Internal Length of All Filters	m	12.80
Actual Surface Area of One Filter Bed	m^2	11.50
Actual Surface Area of All Filters	m^2	46.00
Number of Nozzles required for All Filters	nr	2760
Surface Area of one filter bed	m^2	11.50
Rate of Filtration for running n filters	m^3/m^2/hr	6.93
Rate of Filtration for running n-1 filters	m^3/m^2/hr	9.25

Each filter will have the following characteristics:

- Internal Length : 8.80m
- Internal Width : 4.20m
- Depth of Filter Sand :1.20m
- Depth of Support Gravel :0.30m
- Outlet Control : DN 300 connecting to DN 350 pipe manifold
- Wash Water Pipe :DN 400mm

The filtration rate is 5.48m^3/m^2/hour when all five filters are in use, increasing to 6.85m^3/m^2/hour when one filter is out of service. Isolation of the beds will be through 500 x 500mm sluice gates operated by headstocks from the overhead walkway. Cleaning of the filters has been designed for air scour followed by pumped wash water from the 200m^3 backwash tank. The following parameters have been used in the filter backwash design.

Table 13: Summary of Filter Backwash Design

Filter Backwashing Sequence	Unit	Design
No. of Filter Units under backwash	Nr	1
1. Air Scour Stage		
Duration of air scouring	min	2.0
Selected Air Loading Rate	$m^3/m^2/hr$	60.0
2. Air Scouring + Wash Water Cycle		
Duration of Air Scour + wash water	mins	8.0
Selected Air Loading Rate	$m^3/m^2/hr$	60.0
Backwash water Rate	$m^3/m^2/hr$	20.0
Required Backwash Flow Rate	m^3/hr	230.0
3. Wash Water Cycle		
Duration of Backwashing (wash water only)	mins	7.0
Backwash water Rate	$m^3/m^2/hr$	20.0
Required Backwash Flow Rate	m^3/hr	230.0
Total Duration of combined Backwashing cycles	mins	17.0
Volume of Water required for Backwashing One Filter	m^3	57.50
No. of Filter Bed Volumes of Backwash water consumed	Nr	1.4
No. of Filter Beds to be washed per day	Nr	4.0
Daily Volume of Water to Filter Wash water Tank	m^3	230.00
Duration of backwash water pumping per day	mins	60.0

3.2.7 Treated Water Pump House

The treated water pump house will have floor area of 14.0m x 5.5m located downstream of the treated water tank. The treated water pumps have been designed to operate at full flow of 303.8m^3/hr on 3 duty / 1standby. The Treated Water will have the following pipework features:

- Inlet Pipe from Filters to Backwash Tank (1nr) :DN250mm,
- Suction Pipes for Backwash Pumps (2nr): DN400mm,
- Suction Pipes for Treated Water Pumps (4nr) :DN400mm,
- Suction Pipe for WTP Service Water (1nr) :DN80mm
- Overflow Pipe (1nr) : DN600mm,
- Washout Pipes (2nr) : DN100mm,

Additional ancillaries include access manholes, roof vents, level indicators, and access ladders; all galvanised.

3.2.8 WTP Plant Service Water

Potable water for the WTP plant use will be stored in an elevated 200m^3 pressed steel tank that will be fed by potable water pumps inside the treated water pump house. The system design is given in the table below.

Table 14: Service Water Pumps Design

Design Parameter	Units	Value
Length of WTP Service water tank	m	8.54
Width of WTP Service water tank	m	7.32
Water depth in WTP Service water tank	m	3.26
Effective Size of WTP Service water tank	**m^3**	**203.8**
Time to fill Service water tank	hr	10.00
WTP Service Water Supply pumps	**nr**	**1 + 1**
Pipe Details		**DN 80 DI PN10**
Velocity in pipe	m/s	0.722
Static Lift	m	13.4

Length of Pipe (m)	**m**	**225.00**
Total Friction and Fittings Losses (m)	m	3.25
Total Head in Pumping Main (m)	**m**	**18.0**
Delivery of each Service Water Pump	**m^3/hr**	**20.0**
Service Water Pump Head	**m**	**18.0**
Rated Power- 50Hz	kW	2.0

3.2.9 Filter Wash Water Tank

In order to observe environmental regulations, the wash water from cleaning the filters containing media fines (suspended solids) needs treatment before discharge into the environment. This involves separating the fines from the decantate (clear water on top) through plain sedimentation.

From the filters, the wash water flows into a Filter Wash Water Tank which allows the suspended solids to settle before the next filter is washed. The tank will have a hopper section on the inlet side in order to effect the sedimentation with the outlet section separated from this by a baffle wall set below TWL. As soon as the decantate reaches the top of the Baffle Wall it will overflow into the outlet chamber from where it gravitates into the environment at the WTP discharge point via an outfall. Treatment storage has been determined to be the equivalent of two filter washes for a retention period of 2.4 hours. When the settled solids (sludge) reach a predetermined level, below the top of the baffle wall, the sludge is pumped to the sludge treatment stage. Submersible sludge pumps will be provided in order to effect this.

The tank will have the following features:

- Internal Length : 16.00m
- Internal Width : 6.55m
- Max. Depth of Wash Water : 3.90m
- Internal Depth : 5.50m
- Baffle Wall Height : 2.35m
- Outlet Chamber Width : 2.0m
- Sludge Chamber Length : 12.75m
- Inlet Pipe from Filters : DN450mm
- Discharge Pipe : DN400mm

3.2.10 Sludge Treatment

The sludge which is produced from the Clarifiers and Filter Wash Water Chamber will be treated in;

- 2nr parallel sludge drying channels each 24.5m long, 3.0m wide and 1.65m deep.
- 1nr sludge drier 10.5m long, 7.0m wide and 4.0m deep.

One unit will be used for solids separation of the filter back wash water. The sludge drying channels receive the sludge from the Clarifiers. The liquid portion will be discharged into the receiving water, while the solids component will be taken for further sludge treatment in the sludge drier.

All these facilities will be located in the lowest part of the site so as to receive wastes from the whole site.

3.2.11 Workshop and Stores

A Workshop/Store building will be constructed with the following areas:

- Workshop with worktop - 43 m^2 floor space,
- Storage area with metallic shelves - 34 m^2 floor space,
- Laboratory with worktop - 14 m^2 floor space,
- Office -17 m2 floor space.

3.2.12 Treatment Plant Site Works

Besides the above structures, the water treatment plant will have the following:

- Construction of 2No. Type C semi-detached staff houses (4 houses); each 35m2 house having one bedroom, living room, kitchen, shower, and water closet.
- Construction of a fence and installation of 2 No. double leaf access gates for both the plant and staff quarter entrances.
- Construction of Sludge Drainage Manholes from Clarifiers to Sludge Drying Channel.
- Construction of site drainage including the backwash drainage line to an outfall.
- Construction of Site Road Works and Walkways.
- The inter-connecting pipe work in the Water Treatment Plant plus fittings.
- Flow meters on the raw water pumping, treated water pumping, backwash pumping, and service water delivery mains.
- Supply and Installation of a 1500 kVA 33 kV/415V 3-Phase Transformer with associated cabling for the Intake and WTP site.
- Supply and Installation of 1500 kVA prime rated diesel generator including housing in the WTP.
- Supply and Installation of Site Lighting
- Supply and Installation of Surge Protection Equipment for the clear water pumping main.

3.2.13 Interconnecting Pipework

The inter-connecting pipe work in the Water Treatment Plant is as follows:

- Raw Water Gravity Main to Aerators - DN 400 DI PN 10,
- Flow Divider to Flocculation Chamber - DN 450 DI PN 10,
- Flocculation Chamber to Clarifier - DN 600 DI PN 10,
- Clarifier Outlet to Filters - DN 500 DI PN 10,
- Filters Outlet to Treated Water Tank - DN 500 DI PN 10,
- Backwash Pumping Main to Filters - DN 400 DI PN 10,
- Filters to Filters Wash Water Tank - DN 450 DI PN 10,
- Treated Water Suction Main from Treated Water Tank - DN 300 DI PN 10,
- Backwash Suction Main from Backwash Water Tank - DN 400 DI PN 10,
- WTP Supply from Treated Water Wash Tank - DN 100 DI PN 10.

Bulk flow meters will be installed on the following mains:

- Raw Water Pumping Main - DN 500 PN 10.
- Backwash Water Pumping Main - DN 400 PN 10.
- Treated Water Pumping Main - DN 500 PN 20.
- WTP Supply from Treated Water Tank - DN 80 PN 10.

3.2.14 Water Treatment Plant Hydraulic Profile

The main controlling level of the WTP hydraulics is the depth of excavation of the Treated Water Tank Complex which has been balanced with the depth of excavation of the rest of the structures on the upstream end of the Plant. Due to the nature of the site, with steep slopes, additional freeboard to structure's minimum Top Water Levels have been incorporated in the hydraulics so as to minimise excavation depths in the plant.

3.2.15 Treated Water mains

The treated water and backwash pumping mains are as follows;

Table 15: Treated and backwash pumping mains

Parameter	Raw Water Pumping Main	Backwash Line	Clear Water Pumping Main
Demand- 2045 (m^3/day) (Igayaza)	4,114.84	334.20	4,114.84
Demand- 2045 (m^3/day) (Kikwaya)	2,569.22		2,569.22
Total Demand- 2042 (m^3/day)	6,684.06		6,047.00

Treatment Plant Use (5%) (m^3/day)	334.20		0.00
Total Amount of Water Abstracted (m^3/day)	7,018.27	334.20	6,047.00
Hours of Pumping (hr)	16	2	16
Efficiency (%)	60.0%	60.0%	60.0%
Required Delivery (m^3/hr)	438.64	167.10	377.94
Required Delivery (m^3/s)	0.1218	0.0464	0.1050
Pump Installation Level (m amsl)	1114.000	1043.000	1118.000
Inlet Level (m amsl)	1127.000	1066.660	1245.660
Static Lift (m)	13.0	23.7	127.7
Hazen Williams Coefficient, Cwh (C)	120	120	120
Pipe Details	DN400 DI PN6	DN250 DI PN6	DN400 DI PN16
Pipe Diameter ND (mm)	400.00	250.00	400.00
Pipe Diameter ND (m)	0.400	0.250	0.400
Velocity (m/s)	0.970	0.946	0.835
Flow in Pipe (m^3/s)	0.1218	0.0464	0.1050
Length of Pipe (m)	200	60	3200
Friction Loss (m)	0.5	0.3	6.4
Fittings losses - 10% (m)	0.1	0.0	0.6
Total Friction Loss (m)	0.5	0.3	6.4
Total Head (m)	13.6	23.9	134.7
Head Used (m)	14	24	135
Power (kW)	27.9	18.2	231.7
Source: Project Estimates			

- Raw water Pumping main of, D400 DI PN6 of length 150m.
- Backwash Pumping main of, DN250 DI PN6 of length 200m.
- Clear water Pumping main of, DN400 DI PN16 of length 3200m.

3.2.16 Design of Other Water Supply Facilities

a) Storage Reservoir

The required storage capacity has been computed as 30% of the maximum day demand. The required storage capacity is therefore 1531m^3 and represents a storage capacity of 30% in the ultimate year maximum day demand. The reservoir's storage capacity at various stages of the design period is reflected in the table below.

Table 16: Reservoir Storage Capacity for Igayaza Supply Area

Item	Igayaza TC Storage					
	2020	2025	2030	2035	2040	2045
MD Demand-m^3/day	1,069	1,381	1,833	2,400	3,142	4,115
Storage Capacity (m^3)	1234	1234	1234	1234	1234	1234

Item	Igayaza TC Storage					
	2020	2025	2030	2035	2040	2045
Hours of Storage	28	21	16	12	9	7
Storage Capacity (%)	116%	89%	67%	51%	39%	30%
Source: Project Estimates						

Table 17: Reservoir Storage Capacity for the Kikwaya Supply Area

Item	Kikwaya RGC Storage					
	2020	2025	2030	2035	2040	2045

MD Demand-m^3/day	854	1,119	1,465	1,918	2,512	3,289
Storage Capacity (m^3)	987	987	987	987	987	987
Hours of Storage	28	21	16	13	10	7
Storage Capacity (%)	117%	89%	68%	52%	40%	30%
Source: Project Estimates						

Due to the topography of the project area and the high pressures experienced in the far reaches of the distribution network, it is recommended to place the reservoir tank on a 2.0m high plinth wall. The reservoir shall be of square 1.22m panels measuring 24.4m long x 10.98m wide x 4.88m high and shall be provided with inlet, overflow, outlet, and drain pipe work. The following fittings shall also be provided for the reservoir;

- Internal ladder of galvanised steel,
- Wall mounted level indicator,
- Vents on the tank roof,
- Roof level access cover of galvanised steel.

The access covers shall be at least 100 mm above the finished level of the roof and shall be lockable. The roof vents shall be similarly set out and shall be fitted with vermin proofing and mosquito proofing fabric. The overall internal dimensions of the reservoir (2x766 or 1531m^3) are as follows: -

- Length - 2x12.2m, (24.40m)
- Width - 10.98m,
- Depth - 4.88m.

The pipe work (rated PN10) of the reservoir shall be in Epoxy Coated Steel Pipe work as follows;

- Inlet - DN 300,
- Outlet - DN 350,
- Overflow - DN 600,
- Drain - DN 200.

b) Distribution Network

The downstream of the distribution system from the reservoir has been modelled using EPANET 2.0. A peak hour factor of 2.0 was used. The smallest size of pipe chosen is OD 50 HDPE. Pipes smaller than OD50, will be laid as Network Intensification lines. Table below shows the estimated sizes and length of the distribution pipes.

Table 18: Distribution Mains for Igayaza Supply Area

Item	Pipe Size	Length (m)
Igayaza Distribution System		
1.	DN350 ST PN10	3129
2.	DN300 ST PN10	570
3.	OD250 uPVC PN10	15
4.	OD225 uPVC PN10	1200
5.	OD160 uPVC PN16	2065
6.	OD160 uPVC PN10	6791.84
7.	OD110 uPVC PN16	10731.4
8.	OD110 uPVC PN10	7863.54
9.	OD90 HDPE PN16	4614.48
10	OD90 HDPE PN10	354.98
11	OD75 HDPE PN10	3153.74
12	OD63 HDPE PN10	1481.24
13	OD50 HDPE PN10	1434
Sub Total 1		43,405
Source: Project Estimates		

Table 19: Distribution Mains for the Kikwaya Supply Area

Pipe Details	Length (m)
DN350 ST PN10	734
OD250 uPVC PN10	5,482
OD225 uPVC PN10	1,922
OD200 uPVC PN10	88
OD160 uPVC PN10	6,215
OD110 uPVC PN10	2,660
OD90 HDPE PN10	9,255
OD63 HDPE PN10	5,276
OD50 HDPE PN10	11,091
Total	42,723
Source: Project Estimates	

c) Service Connections

The location of the service pipes will not be known until applications for connections are received. At this stage, only an estimate of the sizes, quantities and costs can be given. On the basis of the population to be served at the tariff of USh 50/20 litres, the total number of connections required in the ultimate 2045 has been estimated as in the table below. The criteria used to determine the number of service connections for each served population category is as follows.

Table 20: Population per Category Criteria

Category	Population Served	Source of Criteria
House Connection	5 persons per household	Socio-Economic Study Data
Yard Taps	2 Households per yard tap	Project Estimates
Standpipes	150 persons Per Standpipe	Maximum Number- DWD Water Manual 2013
Urban Poor	150 persons per Standpipe	Standpipe coverage

The required number of service connections is given below.

Table 21 :Required Service Connections

Igayaza TC	House Conn	Yard Tap	Stand Pipe	No Supply	Total
2025	431	546	107	0	1,084
2030	565	753	140	0	1,458
2035	739	986	183	0	1,908
2040	968	1,291	240	0	2,499
2045	1,268	1,690	315	0	3,273
Total	3,971	5,266	985	0	10,222

Table 22: Required Service Connections (Kikwaya)

Kikwaya	House Conn	Yard Tap	Stand Pipe	No Supply	Total
2025	1,082	122	85	0	1,289
2030	1,417	159	111	0	1,687
2035	1,856	209	145	0	2,210
2040	2,430	273	190	0	2,893
2045	3,182	358	249	0	3,789
Total	9,967	1,121	780	0	11,868

A total of 10,222 and 3,789 No. service connections are to be made in Igayaza and Kikwaya respectively in the ultimate year 2045 as seen in the table above while 1084 will be made in the

initial year 2025. However, the consultant has allowed for a total of 1500 and 1289 connections for Igayaza and Kikwaya respectively in the bills of quantities to be made in the project area to cater for the planned increase in demand of connections once the implementation of the works commences It has been assumed that the connection materials will be supplied by the project on the payment of the connection fees. The number and location of the public stand posts will be determined during the construction period.

d) Network Intensification

There are some parts of the proposed water supply areas where the trunk mains are adequate but the mains are too far away for the customers to be able to connect at reasonable cost. 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. Estimated quantities for this item have thus been included in the Bills of Quantities to cater for this.

e) Scada System

Since the headworks of Igayaza system is to be combined with that of Kikwaya, the need for a supervisory control and data acquisition (SCADA) computer system for gathering and analysing real time data is more than required to ensure proper monitoring of all critical components of the works is done at all times.

The base or central monitoring center will be located at the water treatment plant which shall have an interlink with the booster stations and reservoirs. Also, a link will be placed at the water office to be constructed within the town council so as to monitor the operations of the system.

The system will be used to monitor and control all plant and equipment from the raw water pumps to the treatment plant system units to the treated water pumps and at the reservoir tank. All this will be done using a radio frequency provided by Uganda Communications Commission (UCC).

f) O&M Tools and Equipment

Part of the investment will be used to supply new O&M tools and equipment. Equipment will be supplied for the running the water supply system and well as equipping the water office. These will include;

- Plumbing Tools and Equipment,
- Mechanical Tools and Equipment,
- Electrical Tools and Equipment,
- Miscellaneous Tools,
- Chemical Equipment and Chemicals.

3.3 Pipe materials

Pipe materials commonly used in Uganda include ductile iron (DI), steel, galvanized steel (GS), un-plasticized polyvinyl-chloride (uPVC) and High Density polyethylene (HDPE). The suitability of a given pipe type for a particular application is influenced by the following factors:

- Its availability on the market in respect of sizes and pressure classes.
- Its cost price and that of its associated valves and fittings.
- Susceptibility to corrosion, mechanical damage, ageing and other causes of material deterioration.
- Storage costs.
- Ease of transportation.

The design team recommended use of HDPE for piped of diameter of utmost OD 90 mm, while uPVC for larger diameters Igayaza-Kikwaya piped water supply based on the above factors. The minimum piped pressure rating we have recommended is PN10 because pipes with a pressure rating of PN 6 have lower thickness and prone to damage although they can be used when the static pressure is less than 50m.

3.4 Standards

The materials that will be specified for implementation of the scheme shall meet the relevant ISO specifications especially imported otherwise the materials must meet the national standards of the country in which they are manufactured and shall not be lower than the corresponding BS specifications. The existing UNBS, BS, ISO standards and also new standards by the same institutions will also be taken into account in the design of the water supply infrastructure.
The Civil Engineering standard method of measurement issued by the Institution of Civil Engineers, London, CESMM3, 1995 or an updated version CESMM4, 2012 shall be used as the standard for the preparation of bills of quantities in civil engineering work in Uganda unless a different method is stated and modified to suit local conditions.

3.5 Plants and Equipment

Because of the nature of the construction activities that will be undertaken, a number of plants and equipment will be used to execute the assignment by the contractor or the sub-contractor(s) and these will include among the following: Graders, Vibrators /Rollers, Water Trucks, Bulldozers, Front End Loader, Vehicles, Containers, Excavators, Water Pumps, Mechanical Tool Boxes, Civil Plate Compactors, Dump truck, Concrete Mixer, Crane and Compactor.

4 METHODOLOGY

4.1 Introduction

This section outlines the methodology that was used to assess the environmental and social baseline and to identify, predict & assess the environmental and social impacts of the project on each relevant environmental component. It also covers the methodology for the identification of mitigation and monitoring measures that was recommended to address these impacts and identification of relevant stakeholders. The methodology consists of a review of Uganda's institutional arrangements, regulations and policies. Environmental and social impacts of the proposed project will be predicted in relation to environmental and social receptors and natural resources while comparing prevailing pre-project conditions and post-project situations.

The requirement for environmental impact assessment in Uganda is set out by the *National Environment Act No. 5 of 2019* and the *Environmental and Social Impact Assessment Regulations of 2020*. This process will be guided by the Environmental Impact Assessment (EIA) Guidelines (NEMA, 1997) and the process is schematically presented in Figure 4.

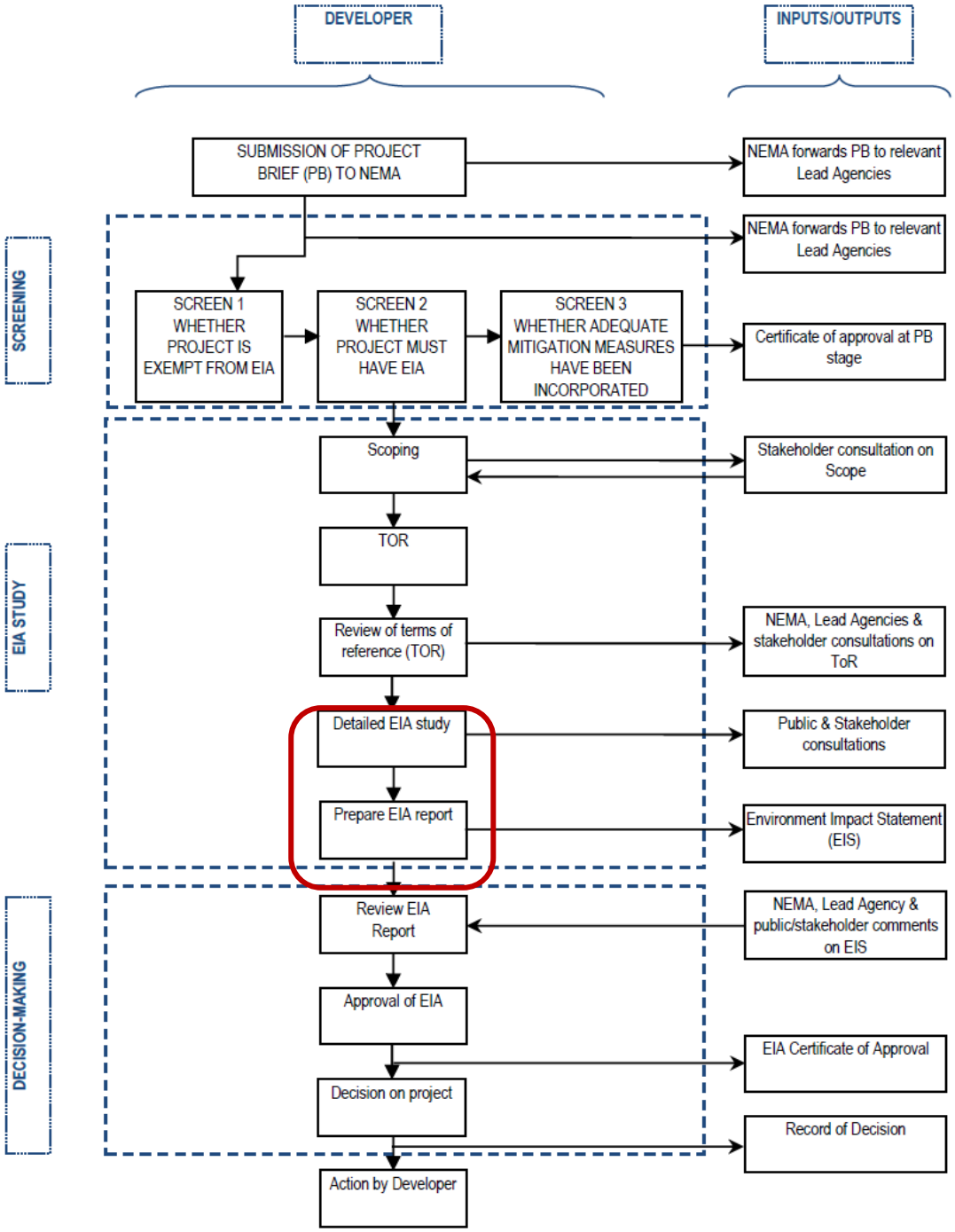


Figure 4: ESIA process that will be adopted as provided for under the Laws of Uganda

4.2 Physical Environment Survey

Baseline ambient noise levels, air quality and water quality were measured, not only to inform construction contractors about the pre-construction conditions existing at proposed sites, but also the first annual environmental audit. These were determined through the following actions:

4.2.1 Ambient Noise Assessment

Baseline noise measurements were undertaken at locations around the proposed construction sites with potential receptors such as water abstraction point, proposed site for construction of water treatment plant etc. Measurements of ambient noise levels were carried out using a precision integrating sound level meter, with an active range of 0-130 decibels (dB) and complying with IEC 651 and ANSI S4

standards. A Casella CEL-621C digital noise logger was set to record for a sample period of 10 minutes at each of the selected locations. The assessment procedure involved recording the LA_{MAX} and LA_{MIN} decibel levels. Measurement points were recorded using a Global Positioning System (GPS) receiver and the noise sources together with the ambient environment at each location noted. The obtained results were compared against the *National Environment (Noise Standards and Control) Regulations, 2003*. The regulations require that persons to be exposed to occupational noise exceeding 85 dBA for 8 hours in a day should be provided with requisite hearing protection.

4.2.2 Air Quality Assessment

Baseline air quality was measured using Digital MultigasRAE Meter for air composition (Oxygen, VOC and COx), Casella Microdust Pro Digital meter ($PM_{2.5}$ concentrations) and a Ibrid MX 6 Portable Multi Gas Monitor (SOx, NOx). Measurement points or locations were selected basing on presence of potential receptors (such as construction sites for water treatment etc.) and an averaging period of 8 hours was used. For gaseous emissions.

- The equipment was powered on and left in measuring mode for the first two minutes to allow zeroing and self-calibration. This will be followed by 10 minutes of measurement to allow digital readings to stabilize before they could be recorded.
- Measurements were conducted at each of the selected points to determine whether there would be any gaseous emissions detected.
- Values for Carbon monoxide (CO), Oxygen (O_2), Volatile Organic Compounds (VOCs), Sulfur oxides (SOx) and Nitrogen Oxides (NOx) were recorded.

For particulate matter.

- The equipment was allowed for two minutes for zeroing down and thereafter, it captured the samples for 5 minutes with an interval of 10 seconds.
- For every sampled point, a GPS coordinate was recorded.

4.2.3 Water Quality

In situ water quality measurements were recorded at the proposed water abstraction point. In situ water quality sampling is the measurement of physical and chemical parameters in a water body at the time of sampling. A multi-parameter water quality instrument (Multi-probe Hach HQ40d) was used for in situ measurements and the following parameters were assessed i.e. dissolved oxygen (DO), temperature, potential of hydrogen (pH), electrical conductivity (EC) and turbidity. In situ measurements were done because the measured parameters change rapidly (e.g. temperature) and the data was required to aid the interpretation of other water quality results.

Water samples for physical, chemical and bacteriological quality were further collected at the source of raw water. Water samples were transported in a cooling box on ice to the laboratory for analysis. The water samples were analyzed at the Directorate of Government Analytical Laboratory, Ministry of Internal Affairs, Wandegeya and the Test Results of the Water Quality Analysis are presented in this ESIA report. Metal ions were quantified from an acidified sample, at respective wavelengths, using Atomic Absorption Spectrometry technique, Shimadzu 6300. A five-point calibration curve was used to get the concentration of each metal ion. Nitrates, phosphates, sulphates, chlorides and ammonia were determined by UV-VIZ Spectrometry technique, Shimadzu, 1601 at respective absorption wavelengths. Coliforms and *E. coli* were determined by Membrane Filtration technique at 37^0C and 44^0C respectively. All determinations were done in duplicate. The tests were measured in conformity to US EAS 12: 2014 Specification of natural Potable Water and in conformity to Uganda's National Standards for Potable Water, which are within World Health Organisation (WHO) standards.

4.3 Biological Environment Survey

4.3.1 Flora Assessment

Transect walks were taken along the banks of River Nkusi and edges of the swamp; and records were made of the vegetation along the stretch. While some plant species were identified on site, specimens of others were collected and taken for confirmation at the Makerere University Herbarium. Additional information was obtained through consultation with communities on the local names, use and importance of some plant species. An inventory of the impacted vegetation was taken. The International Union for Conservation of Nature's Red List of Threatened Species (IUCN 2022) was utilized for categorization of species. Some of the tools that were used included: Plant press, Secateurs, Ivy tags, Measuring tape, Diameter tape and camera.

4.3.2 Fauna Assessment

4.3.2.1 Birds

Surveys were conducted along the areas planned for the water supply and sanitation systems. Bird species occurrences was surveyed through point count surveys using observations, hearing and consultations during which all species detected and encountered were recorded. Great emphasis was placed on species of conservation importance. Species identification was based on Stevenson and Fanshawe (2002) while some species were categorised according to IUCN (2022). Some of the tools that were used included: Binocular and camera.

4.3.2.2 Butterflies

Random sweeping using sweep net was done (biodiversity rapid assessment) and it involved a transect walk through the areas recording all butterfly species encountered on wings. Sample specimens were taken for most of the species, except for those whose identification could be easily confirmed in the field. Opportunistic observations were included to help build the species list. Each of the butterfly species was assigned to one of the ecological categories (Akite, 2008). Some of the tools that were used include: insect net and camera.

4.3.2.3 Herpetiles

Both reptiles and amphibians were surveyed using Visual Encounter Survey (VES) method (Rodda *et al.,* 2007). Visual Encounter Surveys were conducted by observation while walking through sites proposed for the project for a prescribed period of time, visually searching systematically along transects for animals. VES involved a search on the ground, trees and grasslands. Herpetiles were surveyed during the day from 08:00 am to 07:30 pm (Spawls *et al.,* 2006). Some of the tools that were used include: A camera and snake stick.

4.4 Social Environment Survey

4.4.1 Stakeholder Identification and Analysis

A rigorous stakeholder analysis was carried out prior to the commencement and during the consultation process. This activity enabled the consultants to identify all the key entities- individuals, groups and communities, with a stake or those likely to be affected or to affect the proposed project in any way. Key stakeholders were identified at the national, regional, District, Town Council/Sub County and community level through interviewing experts, brainstorming and document review. Stakeholder identification and engagement is an on-going process that requires regular review and updating. Therefore, the stakeholder list was updated from time-to-time.

The ESIA team collected and analysed data and held consultations with various stakeholders and other interested and affected parties involved, to ensure that all existing data and infomation relevant to the

assignment was obtained. The ESIA team undertook site survey to determine the area of influence and gathered information under several key areas such as:

- Socio-economic conditions in the surrounding communities such as health and infrastructure,
- Current land use in the proposed project sites.

Participatory stakeholder identification was used in identifying and analysing the key stakeholders, including planning for their participation. Therefore, it was the starting point of the participatory processes and provided the foundation for the design of subsequent stakeholder activities throughout this study. Identified stakeholders are summaried in Table 25 together with the method of engagement:

Table 23: Categorization of Stakeholders to be engaged during ESIA

Category	Identified stakeholders	Method of engagement
National	National Environment Management Authority; Ministry of Gender, Labour and Social Development	Key Informant Interviews (KIIs)
Regional	Regional offices of the Ministry of Water and Environment including: Rural Water and Sanitation Regional Centres (RWSRCs), Umbrella of Water and Sanitation (UWS), NEMA, Water Management Zones (WMZs	KIIs
District	District Local Government of Kakumiro. Specifically, the following offices of Water, Natural Resources, Planning, Health, Production and Community Development and the political wing including the Chairperson LC V and Councillors representing the beneficially areas	KIIs
Town Council/ Sub County	Town Council/Sub county Chief/Clerk, Community Development Officer, LC III Chairpersons	Focused Group Discussions (FGDs and KIIs
Community	Local Council I, Landlords of sites where the water infrastructure will be constructed and any CBOs or local NGOs in the sector	FGDs and KIIs

4.4.2 Sampling and Selection of Respondents

The sampling process was primarily purposive. The ESIA targeted particular individuals, groups and communities that have a stake in the proposed project. As thus, only such entities as identified in the stake holder analysis were selected to participate in the consultation process. Key informants at various levels and from different specialties, right from the community were also purposively selected to contribute their views on the impact of the project. This widened the perspectives on the projects, enrich the data collected and ultimately provided deep insights about the knowledge and attitudes of the various stakeholders towards the project.

4.4.3 Study Methods

Stakeholder analysis sought to answer the following fundamental questions: Who are the key stakeholders (primary/secondary)? What are the interests of these stakeholders? How have they been and or will be affected (positively/negatively)? Which stakeholders are most important for the success of the study? How will various stakeholder groups participate throughout the study? The following methods will be used for the social environment survey.

An interview guide was used for both KIIs and FGDs to elicit both baseline information and key concerns/issues from the selected key informants. KIIs and FGDs also aimed at information feedback, education and communication (IEC) to both the interested and affected stakeholders/ community and the following questions were utilized for ESIA among others:

i. How will the proposed project for water supply and sanitation benefit the targeted communities?
ii. How can the anticipated positive impacts and or benefits be enhanced?

iii. Do you feel the proposed project is likely to have risks and or impacts on the environment and the population? If yes, how will the proposed project impact negatively on the following aspects:
    - Physical environment (geology and soils, hydrology and water resources (quantity and quality, visual and aesthetic quality, air quality, noise etc.)
    - Biological environment (vegetation and wild animals)
    - Social environment (land use, population, housing, employment, transportation and traffic, public services, utilities, public health and safety, cultural resources etc.)

iv. Can you propose possible mitigation measures that can be put in place to ensure that the anticipated negative impacts are either avoided, minimized and mitigated from causing unintended harm to the environment or people?

a) Document Review

These include: existing data, existing environmental data, existing reports/documents, pre- and post-implementation of management/construction decisions, EIA reports and ESMPs in place. Examples of these documents include: Kakumiro District Development Plan, District State of Environment Report, Engineering Design Report for Igayaza-Kikwaya Water Supply and Sanitation System (October. 2021) etc.

b) Key Informant Interviews

Key Informant Interviews (KIIs) were held with civil servants (e.g. Chief Accounting Officer, District Natural Resources Officer, District Environment Oficer, District Community Development Officer, District Water Officer, Sub County Chiefs etc.), political leaders (LC V Chairperson, LC III Chairperson) and representatives of the management structures who are responsible for environmental management activities on various levels (e.g. the Village Natural Resources Management Committees). Key informants were interviewed and selected on the basis of their roles as leaders, specialized knowledge and experience on the subject under study.

c) Focus Group Discussions

Focus Group Discussions (FGDs) were held with stakeholders at Sub County, Parish and Village levels. FGDs were used as a qualitative approach to gain an in-depth understanding of social issues. The method aimed at obtaining data from a purposely selected group of individuals on the proposed project activities. Groups of people with the same social, economic and/gender characteristic were clustered together (with between 8-12 members each) and a guided discussion was held with these groups with the ultimate goal of eliciting community baseline information regarding the project development, impacts and issues of concern and the mitigation measures.

d) Transect Walks

Transect walks were carried around to gather more information through observation regarding the social and economic activities taking place, impact extents and also stimulating informal interaction with the community members and their experiences that helped in understanding the community dynamics in the project areas. A camera was used to take pictures of interest within the project areas that are presented in this report.

4.5 Impact Assessment and Evaluation

Based on the project details and the baseline environmental and social status, potential impacts as a result of the construction, operation and decommissioning of the proposed project activities have been identified. An impacts analysis criteria that takes into account the magnitude or intensity of impacts based on project activities and sensitivities in the project area that was identified in the environmental and social baseline. Impact characteristics considered are described in Table 13 and include:

- Type of impact, where direct or indirect
- Status, where positive or negative
- Duration of impact
- Intensity of impact
- Likelihood of impact occurring
- Spatial extent of area of impact
- Sensitivity of receptor of impact

The first six parameters give a sense of magnitude of impact, which together with sensitivity; result in an overall severity of impact.

Table 24: Impact Assessment and Evaluation

Criteria	Description
Type of Impact	▪ Direct - An impact that appears immediately as a result of an activity of the project. For example, the loss of vegetation is a direct impact of site clearing. The direct impacts would be experienced mainly during the construction process, and include effects on the physical environment, health and safety of the construction workers. ▪ Indirect - An impact that is related to the project but that arises from an activity of the project at a secondary level. For example, the demand for supplies and services may cause indirect impacts on the local economy by increasing indirect employment opportunities.
Status	▪ Positive ▪ Negative
Duration	▪ The lifetime of the impact; this is measured in the context of the life-time of the proposed development. Whether the Impact will be: ▪ Intermittent – not occurring at all times. ▪ Temporary-only for a short period. ▪ Short term - the impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase. ▪ Medium term - the impact will last for the period of the construction phase, thereafter it will be entirely negated. ▪ Long term - the impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter ▪ Permanent
Intensity	▪ Whether or not the intensity (magnitude) of the impact would be high, medium, low or negligible (no impact). An attempt to quantify the impacts of components on the affected environment will be described as using following definitions: ▪ Negligible ▪ Low - where impact alters the affected environment in such a way that natural processes of functions are not affected in any significant way. ▪ Moderate - where the affected environment is altered, however, function and process continue, albeit in a modified manner. ▪ High - where function or process of the environment is seriously altered and disturbed to the extent where it temporarily or permanently ceases.
Spatial Extent	▪ The physical and spatial size of the impact; a description of whether the impact would occur on a scale described as follows: ▪ Site - whether the impact will be within limited locale of the project site / study area affecting the whole or measurable portion of the area. ▪ Local - whether the impact will affect the environment or communities along the border of the study area or in the extended area adjacent to the site or perhaps outside the immediate environment. ▪ Regional - whether the impact extends beyond the study area affecting areas on a regional scale.

▪ Likelihood	▪ The probability or likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The probability that a certain impact will occur on scale described below: ▪ Uncertain - insufficient information to determine its probability. Because the precautionary principle is followed, this increases the significance of the impact. ▪ Improbable - the impact is unlikely to occur. ▪ Probable - the impact could possibly happen, and mitigation planning should be undertaken. ▪ Highly probable - it is most likely that the impact will occur at some or other stage of the development. ▪ Certain - the impact will take place regardless of any prevention plans, and only mitigatory actions can be relied on to contain the effect.
▪ Sensitivity	▪ Degree of change effected on natural processes or people's livelihoods; the sensitivity of the receptor of the impact to change ▪ Very low ▪ Low ▪ Moderate ▪ High

Table 27 below presents a quantitative format for ranking impacts based on parameters above, summarised as magnitude and sensitivity.

Table 25: Quantitative Rating of Impacts

Significance			**Sensitivity**			
			Very low	Low	Medium	High
			1	2	3	4
Magnitude	Very low	1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	3	3 Minor	6 Moderate	9 Moderate	12 Moderate
	High	4	4 Minor	8 Moderate	12 Moderate	16 Severe

Table 28 below presents the overall impact rating criteria, with illustrations of such impacts.

Table 26: Overall Impact Rating and Description

Overall Impact Rating	Description of Impact	Significance
Severe	▪ Non-compliance with national policy, environmental laws and regulations ▪ 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 exceedance 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 ▪ Extensive property damage or loss, ▪ Widespread effects on livelihoods.	>12

Overall Impact Rating	Description of Impact	Significance
Moderate	▪ Frequent breaches of national regulations, including water/air quality and noise guidelines, wetlands and river banks regulations causing localised nuisance both on and off site ▪ 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 but returning to normal in the medium term ▪ Elevated contribution to global air pollution problem partly due to preventable releases ▪ Unplanned immigration flows ▪ Increased traffic in sensitive environments ▪ Increased serious crime rates ▪ Widespread physical resettlement, affecting livelihoods	6 – 12
Minor	▪ 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 ▪ Infrequent localised nuisance ▪ Population increase not expected to stress existing infrastructure	2 – 4
Negligible	▪ 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. ▪ Temporary or intermittent changes to livelihoods or life quality aspects	< 2

4.6 Identifying Mitigation Measures and ESMP Preparation

Possible mitigation measures considering all the project implementation phases have been identified and described in detail. Measures and actions to address negative impacts have followed the risk management hierarchy of avoidance and prevent, minimization, mitigation or restore and compensation. Measures proposed are in compliance with the Ugandan legislation and those of the World Bank Operational Policies.

The ESMP is well defined with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources and responsibilities for implementation. The ESMP format is flexible to ensure the integration of project specific mitigating, enhancing and monitoring requirements. The ESMP's scope and level of details is proportional to the number and complexity of the measures required to ensure the project's environmental and social sustainability.

The following components constitute the minimal contents of an ESMP:

a) *Objectives of the ESMP* - This section specify what the ESMP aims to bring the project into compliance with applicable national environmental and social legal requirements and the Bank's safeguards policies and procedures. The other objective of the ESMP is to outline the mitigating/ enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts. It also addresses capacity building requirements.

b) *Context the ESMP* - briefly describes project activities and major environmental and social components that will likely be affected positively or negatively by the project. It describes and analyses the physical, biological and human conditions prevailing in the project area, highlighting relevant environmental and social issues among others.

c) *Beneficial and Adverse Impacts* - This section focuses on beneficial impacts that can be enhanced to improve the project environmental and social performance as well as on adverse impacts that require mitigation measures to be minimized or compensated.

d) *Enhancement/Mitigation Measures and Complementary Initiatives* - This section proposes feasible and cost effective measures to address the impacts previously defined, in order to accrue project benefits through enhancement measures or to reduce potentially adverse environmental and social impacts to acceptable levels (mitigation measures).

e) *Environmental and Social Monitoring Program* - A monitoring program aims to ensure that mitigation and enhancement measures are implemented, that they generate intended results and that they are modified, ceased or replaced when inappropriate.

f) *Responsibilities and Institutional Arrangements* **-** The implementation of enhancement and mitigation measures and the completion of the monitoring program require to clearly establish responsibilities among the various organizations involved in project implementation and operation. The ESMP proposes support to the organizations that may have insufficient capacities to fulfill their obligations. This support could be provided through various means including technical assistance, training and/or procurement.

g) *Estimated Cost* - This section estimates the capital and recurrent cost associated with the various proposed measures (enhancement and mitigation), the monitoring program, consultations, complementary initiatives and institutional arrangements.

Table 29 provides a summary template for Monitoring Requirements.

Table 27: Summary Template for Monitoring Requirements

Phasing	**Mitigation Measure**	**Parameters to be Monitored**	**Location**	**Measurements**	**Frequency**	**Responsibilities**	**Cost**
Pre-Construction Phase							
Construction Phase							

Operation and Maintenance Phase							

A monitoring program aims at ensuring that mitigation and enhancement measures are implemented, that they generate intended results and that they are modified, ceased or replaced when inappropriate. Further, it allows assessing compliance with national environmental and social policies and standards. A monitoring program include two parts:

a) *Surveillance activities* - The surveillance aims to ensure that the proposed mitigation and enhancement measures are effectively implemented during the construction phase.

b) *Monitoring activities* - These activities consist in measuring and evaluating the project impacts on some environmental and social components of concern and to implement remedial measures, if necessary.

The program defines as clearly as possible the indicators to be used to monitor the mitigation and enhancement measures that need to be assessed during project implementation and/or operation. The monitoring program also provides technical details on monitoring activities such as methods to be used, sampling locations, frequency of measurements, detection limits, and definition of thresholds that will signal the need for corrective actions. The process for establishing a monitoring programme consist of the following actions:

- Specific management and monitoring objectives;
- Identification of the scope of monitoring;
- Recommend appropriate monitoring environmental and social aspects and technology;
- Specify how the information collected should be used in decision-making;
- Define the spatial boundaries and select map scales and sites for observation, measurement or sampling;
- Select key indicators for direct measurement, observation or sampling;
- Define how the data will be analysed and interpreted and how it should be presented in monitoring reports;
- Define the precision and accuracy required in the data;
- Consider compatibility of data to be collected with historical data and with related contemporary data;
- Set minimum requirements for monitoring

5 BASELINE CONDITIONS

5.1 Physical Environment

5.1.1 Topography

The elevation in the study area ranges from 1200 to 4000 ft above the sea level. Kakumiro District is a hilly and rocky area and most water sources are located in valleys while people stay on slopes of hills and and hill tops which have no water sources. The nature of terrain contributes to long distances to be covered in order to access water and very tedious for people carrying water on the head. Average walking distance to water source is about 1.5kms while in some communities, people walk as far as 3kms to access safe water. In Igayaza Town Council and Kikwaya Sub County, people are settled on top of the hills but water is found in the valleys. Evidently, the slopes are very steep which are not easy to climb.

Plate 3: Topographical view of the project area

5.1.2 Climate

Kakumiro district has tropical climate with bimodal rainfall patterns due to its proximity to the equator, Lake albert and numerous rain forests. Climatic data for of parameters; temperature, wind, solar, rainfall, relative humidity was obtained from UNAM and analysed.

Records of daily rainfall data for a period of 40 years (1944 to 1983) for Kakumiro weather station (previously in Kibaale district) were extracted and used to calculate average monthly and annual rainfall. Daily rainfall data for every month was summed up and averages obtained over the years for a specific month as seen in Figure 5.

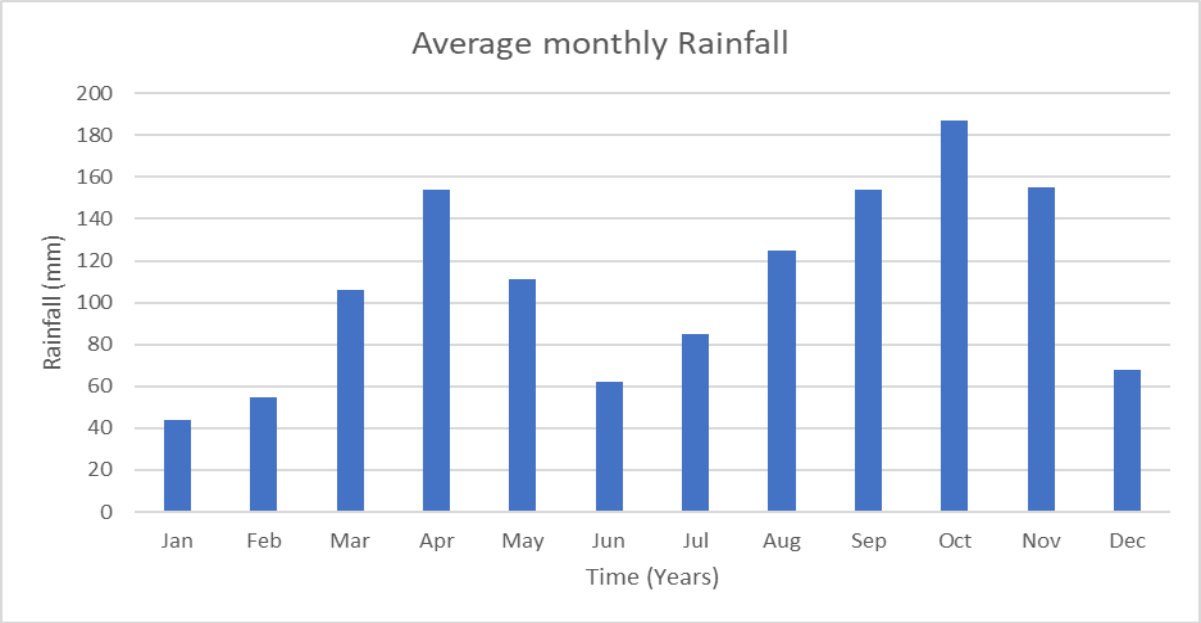


Figure 5: Annual distribution of mean monthly rainfall (P)

In Figure 5, it was observed that the project area experiences a bi modal rainfall pattern receiving peaks of rainfall in April (154 mm) and October (187mm) while lows in January(44mm) and February (55 mm). The wet months receive rainfall of 150mm while during the dry months, the rainfall received is below 60mm.

a) Rainfall

Kakumiro just like Kibaale district experiences extreme seasonal variations in monthly rainfall, falling throughout the year in the district. The most rain falls during the 31 days centred around October 28, with an average total accumulation of 151mm. The least rain falls around January 28, with an average total accumulation of 32mm as seen in figure 6 below.

Figure 6: Average Monthly Rainfall for Kakumiro District

In general, there are two peak rainfall seasons in a year that is March-May and September-November. These two are punctuated with a longer dry season from December-March and a short one from July-August.

b) Temperatures

According to weatherspark.com, the warm season for Kakumiro district lasts from January 27 to March 14, with an average daily temperature above 29°C. The hottest month of the year is February, with an average high of 29°C and low of 16°C. The cool season lasts from, September 26 to December 5, with an average daily high temperature below 26°C. The coldest month of the year is July, with an average low of 14°C and high of 27°C as seen in figure below.

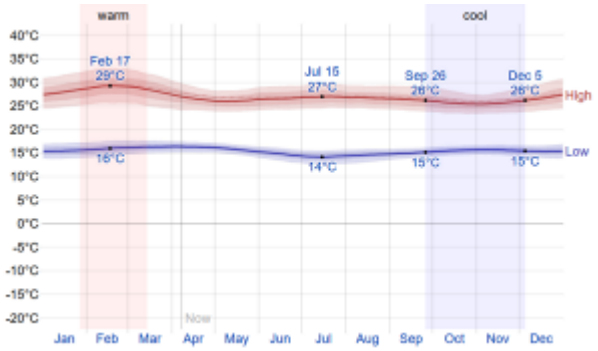


Figure 7: Average High and Low Temperatures for Kakumiro District

c) Sun

The length of the day in Kakumiro district does not vary substantially over the course of the year, staying within 10 minutes of 12 hours throughout. In 2020, the shortest day is December 21, with 12 hours, 5 minutes of daylight; the longest day is June 21, with 12 hours, 10 minutes of daylight as seen in the figure below.

The number of hours during which the Sun is visible (black line). From bottom (most yellow) to top (most gray), the color bands indicate: full daylight, twilight (civil, nautical, and astronomical), and full night.

Figure 8: Hours of Daylight and Twilight

The earliest sunrise is on November 2, and the latest sunrise is on February 11. The earliest sunset is on November 4, and the latest sunset on February 13 as seen in the figure below.

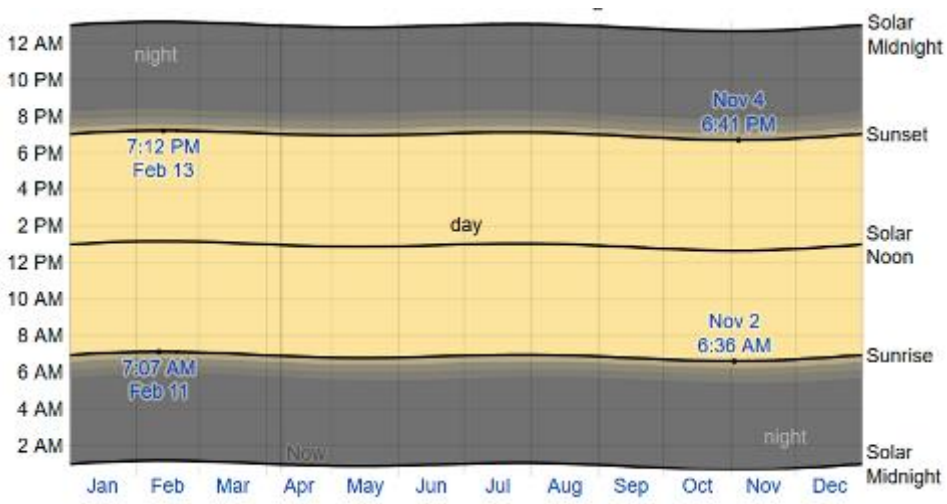


Figure 9: Sunrise and Sun Set with Twilight

The solar day over the course of the year 2020. From bottom to top, the black lines are the previous solar midnight, sunrise, solar noon, sunset, and the next solar midnight. The day, twilights (civil, nautical, and astronomical), and night are indicated by the colour bands from yellow to grey

d) Humidity

Kakumiro district experiences extreme seasonal variation in the perceived humidity. The muggiest month of the year is April, with muggy conditions 63% of the time. The least muggy month of the year is July, with muggy conditions 13% of the time as seen in the figure overleaf.

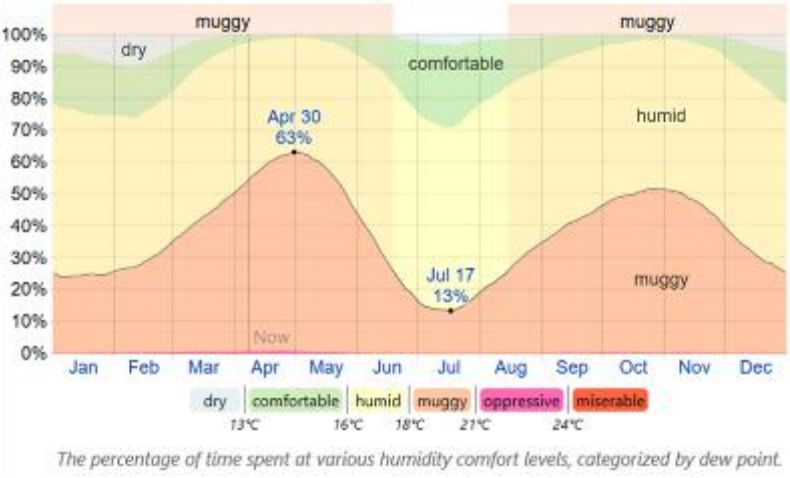


Figure 10: Humidity for Kakumiro

e) Solar Energy

The average daily incident shortwave solar energy experiences some seasonal variation over the course of the year. The brighter period of the year lasts for 1.9 months, from January 13 to March 10, with an average daily incident shortwave energy per square meter above 6kWh. The brightest day of the year is February 10, with an average of 6.3kWh. The darker period of the year lasts for 1.3 months, from October 4 to November 13, with an average daily incident shortwave energy per square meter below 5.1kWh. The darkest day of the year is October 24, with an average of 4.8kWh. Figure below best illustrates the solar energy trend in Kakumiro district.

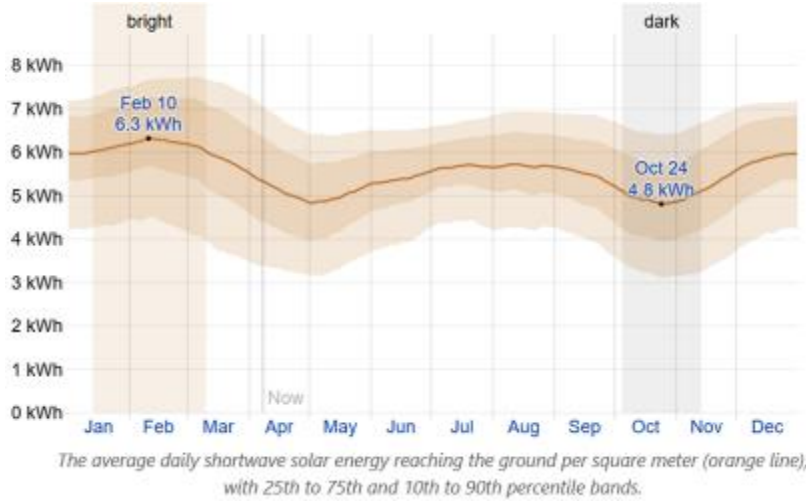


Figure 11: Average Incident Shortwave Solar Energy for Kakumiro District

5.1.3 Geology and Soils

The process of erosion and accumulation that acted on upon the land surfaces gave rise to many types of soils in a Kibaale district. The soil types are mainly volcanic, ferrallitic and peat and productivity of this area largely depends on favourable rain fall.

Plate 4: Examples of the rocks within the project area of Igayaza Town Council

Plate 5: Examples of the soils within the project area of Kikwaya Sub County

5.1.4 Water Resources

The project area generally stands at a low slope gradient running into perennial rivers/streams which forms the water collection points in and around the project area boundary. The major surface water bodies within or close to the project area are streams that feed into Rivers of Nkusi and Myoma. Boundaring the rivers are swamps which form part of the drainage eco-system surrounding the town council. The pictures below show River Nkusi and the swamp at Rubasengura bridge.

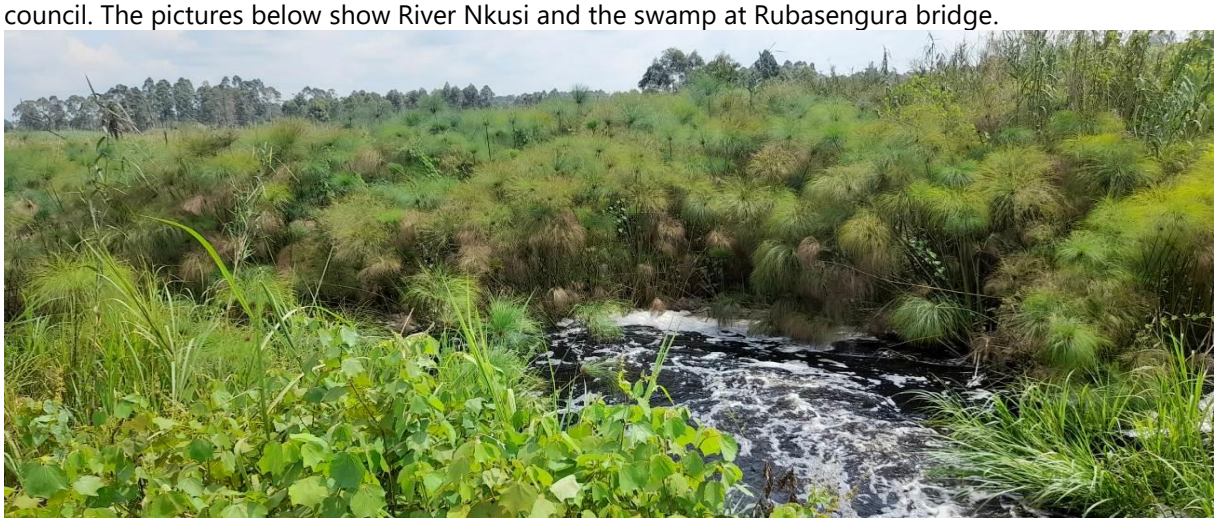


Plate 6: River Nkusi which is the main water resource within the project area

5.1.5 Ground Water Resources

Ground water is one of the main sources of water supply currently in use by the residents in the project area. The project area has point water sources that are currently in use but are inadequate to meet the water demand. A number of the household in the project area access water from unimproved water sources (UBOS, 2014). While access to protected springs seemed to be high, there were several complaints regarding the quality of water from these facilities.

Plate 7: Handpump borehole and hand dug well covered with grass within the project area

5.1.6 Water Quality Analysis

Water quality tests (physical, biological and chemical) were carried out in September 2022 and analyzed at the Government Analytical laboratory (GAL) for the proposed abstraction along River Nkusi during the detailed engineering design stage (Detail Engineering Design Report, October2021). The proposed water source was subjected to water quality tests in order to establish the suitability for domestic use. Both onsite and laboratory water quality assessment was conducted; some of the key onsite water quality parameters tested include Electrical conductivity, Salinity and Dissolved oxygen, while the laboratory tests include Colour, Turbidity, Total suspended solids, alkalinity and chemical composition.

During ESIA stage, in situ water quality measurements were recorded at the proposed water abstraction point and the following parameters were assessed i.e. Colour (28 TCU), temperature (26.6°C), pH (6.54), EC (284µS/cm) and turbidity (24 NTU). A raw water sample was collected at the proposed water abstraction point and delivered to the Government Analytical Laboratory in Wandegeya, Kampala for analysis. **Annex 2** presents the analysis report.

Table 30 below presents a summary of a comparison of the water quality analysis results for the samples that were collected during site visits by the ESIA team in September 2022 from the proposed uptake/abstraction point and compared with those that were taken in September 2020 during the detailed Engineering designs.

Table 28: Water quality analysis during both the Design stage and ESIA process

Parameter	Units	Design Stage	ESIA Stage	National drinking water standards
pH	-	7.1	6.8	6.50 - 8.50
Electrical Conductivity	µS/cm	64	284	2500 Max
Total Dissolved Solids	mg/l	45	1245	1500 Max
Total Suspended Solids	mg/l	6	26	Not detectable
Turbidity	NTU	-	24	25 Max
Calcium	mg/kg	-	32.8	150 Max
Iron, Total	mg/l	-	4.4	0.3 Max
Magnesium	mg/l	-	28.6	100 Max

Manganese	mg/l	-	2.4	0.1 Max
Sodium	mg/l	-	28.2	200 Max
Ammonia	mg/l	0.02	4.2	0.5 Max
Chlorides	mg/l	1.56	223	250 Max
Fluorides	mg/l	-	1.2	1.5 Max
Nitrates	mg/l	0.78	14.4	45 Max
Phosphates	mg/l	0.1	9.6	2.2 Max
Sulphates	mg/l	2.0	232	400 Max
Total Coliforms	Cfu/100ml	-	10	Absent
E-coli	Cfu/100ml	0	6	Absent

From the analysis done, the following parameters were found to be within acceptable limits for potable water: pH, EC, , Calcium, Chromium, Copper, Lead, Magnesium, Sodium, Chlorides, Fluorides, Nitrates and Sulphates. The Sample also had undetectable levels of TSS.

On the other hand, the following parameters exceeded national standards for drinking water: Total Iron, Manganese, Ammonia, Nitrites, Phosphates, Total Coliforms and E.Coli. The interpretation for the existence of these parameters is as follows:

Suspended solids consist of an inorganic fraction (silts, clays, etc.) and an organic fraction (algae, zooplankton, bacteria, and detritus) that are carried along by water as it runs off the land. The geology and vegetation of a catchment affect the amount of suspended solids.

Turbidity in water is due to suspended solids and colloidal matter. It may also be due to eroded soil or growth of micro-organisms.

Iron exists naturally in rivers, lakes, and undergroundwater. It may also be released to water from natural deposits and industrial wastes. Iron can be present in water in two forms; the soluble ferrous iron or the insoluble ferric iron. Water containing ferrous iron is clear and colourless, and when exposed to air the water turns cloudy causing a reddish-brown precipitate of ferric iron. The basic approach to remove iron is to convert the soluble or dissolved forms of iron into insoluble or precipitate forms so that they can be filtered out. The catchment area has no industrial waste generation.

Manganese is one of the most abundant metals in the Earth's crust, usually occurring with iron. Of most importance and concern are the oxidative states Mn2+, Mn4+ and Mn7+. Manganese is naturally occurring in many surface water and groundwater sources, particularly in anaerobic or low oxidation conditions. Levels of manganese in fresh water typically range from 1 to 2 mg/litre, although levels as high as 10 mg/litre in acidic groundwater have been reported; higher levels in aerobic waters are usually associated with industrial pollution. Manganese can be removed by chlorination followed by filtration.

Ammonia includes the non-ionized (NH3) and ionized (NH4+) species. Ammonia in the environment originates from metabolic, agricultural and industrial processes and from disinfection with chloramine. Natural levels in groundwater and surface water are usually below 0.2 mg/litre. Anaerobic groundwaters may contain up to 3mg/litre. Intensive rearing of farm animals can give rise to much higher levels in surface water. Ammonia in water is an indicator of possible bacterial, sewage and animal waste pollution. Ammonia is a major component of the metabolism of mammals. Ammonia in drinking-water is not of immediate health relevance, and therefore no health-based guideline value is proposed (WHO, 2008), but the Guidelines stated that ammonia could cause taste and odour problems at concentrations above 35 and 1.5 mg/litre, respectively.

Phosphates may result from poor agricultural practices, runoff from urban areas and lawns, leaking septic systems or discharges from sewage treatment plants. Phosphates are chemical compounds that

contain phosphorous. Phosphorous is a key nutrient that both plants and animals use for growth and development. Whilst phosphate is essential for plant and animal life, too much of it can cause a form of water pollution known as eutrophication.

Total coliform bacteria (excluding E. coli) occur in both sewage and natural waters. Some of these bacteria are excreted in the faeces of humans and animals, but many coliforms are heterotrophic and able to multiply in water and soil environments. Total coliforms can also survive and grow in water distribution systems, particularly in the presence of biofilms. Total coliforms should be absent immediately after disinfection, and the presence of these organisms indicates inadequate treatment.

Faecal Coliforms in a drinking water sample often indicates recent fecal contamination, meaning that there is a greater risk that pathogens are present than if only total coliform bacteria are detected. This could be as a result of animal waste within the area since the water source is located and surrounded by livestock farm and livestock were observed to be watered directly along the River Nyarwambu.

Sampling for the raw water quality analysis was a one-off after a rain storm. This had the advantage of sampling for the possible worst physical quality parameters i.e. TSS, turbidity and partly colour. It must be noted that seasonal variations in the raw water quality will continue to take place during the life of the proposed water source.

Generally, the water samples from the proposed intake point do not meet the national drinking water standards. **As such, water from River Nkusi is not suitable for direct consumption and would therefore need conventional treatment (aeration, coagulation, sedimentation, filtration and disinfection) and boiling to make it suitable for that primary purpose**. In that regard, a conventional water treatment system is the suitable option given the eminent seasonal variations in the raw water quality. Further still, based on experience, most of the nation's surface water sources can best be treated by the conventional water treatment works, with the proposed source not being exceptional.

5.1.7 Noise Levels

There are no cases of noise pollution at the proposed intake. Thus the project site indicates a generally pristine environment with respect to ambient noise. However, as would be expected due to the increased human activities and construction activities noise levels are likely to increase. Noise levels recorded at selected locations within the proposed project area are presented in Table 31 below.

Table 29: Noise levels measured at the proposed project sites.

Area	**LA_{min} dB**	**LA_{max} dB**	**LA_{Eq} dB**	**Comments**
Intake Point	32	39	35.5	River Water flow, twittering birds, Swishing tree leaves and consultants' conversations
Water Treatment Plant (WTP)	36	45	40.5	Vehicular movement, twittering birds and consultants' conversations
Reservoir site 1 Igayaza	34	38	36	Swishing tree leaves, twittering birds and human conversations
Reservoir Site 2 at Kikwaya	37	47	42	Vehicular movement, twittering birds and human conversations

The levels are based on land use Category D (Residential plus Industry or small scale production and commerce) for which daytime and night limits are 60 and 50 dBA, respectively according to the National Environment (Noise Standards and Control) Regulations 2003. All measurements were conducted during daytime.

5.1.8 Air Quality

The ambient air quality is assumed to be good as there are no major industrial sources of air emissions. The primary sources of air emissions in the area are automobiles (vehicles and motor cycles). Fugitive dust is attributed to vehicular movements along loose surface/murram roads, which dust levels, are exacerbated during dry, sunny and windy periods. Air quality measurements indicated a reasonably clean environment with respect to air quality as presented in Table 32 below.

Table 30: Results of air quality measurements taken in the project area

Area	***O_2 (%)***	***CO (ppm)***	***VOC (ppm)***	***$PM_{2.5}$ ($\mu g/m^3$)***	**Air pollutant**
NEMA (Draft Air Quality Standard for Ambient Air)	*19.5-23.5*	*9.0*	*15*	*25*	
IFC, 2007 Standard				*25*	
Intake Point on River Nkusi	20.9	0.0	0	Max 287 Ave 12	Dust elevated by wind
Water Treatment Plant (WTP)	21.1	0.0	0	Max 407 Ave 6	Dust elevated by wind and moving vehicles
Reservoir site 1 Igayza	21.0	0.0	0	Max 97 Ave 1	Dust elevated by wind
Reservoir Site 2 at Kikwaya	19.0	0.0	0	Max 406 Ave 4	Dust elevated by wind and moving vehicles

All the assessed parameters were within the within permissible values in accordance with the NEMA (Draft Air Quality Standard for Ambient Air) and IFC, 2007 Standard. There were no detectable levels of NO, NO_2, CO, H_2S, Cl_2, ClO_2 and SO_2 at all measurement locations.

5.2 Biological Environment

5.2.1 Flora

Kakumiro District is greatly characterised with tree farming/ man-made woodlands, with a limited range of habitats for plants and animals. Fruit trees especially, mangoes, avocados, jackfruit trees and paw paws are common.

Agricultural crops include coffee, beans, peas, maize, banana, millet, sweat and potatoes. Although the majority of the locals are engaged in peasant farming, there is a significant number of farmers engaged in commercial farming with the most viable economic activities in the project area being the sale of Matooke, beans and sweet potatoes.

Plate 8: The wetland vegetation along the River Nkusi near the proposed intake point

5.2.2 Fauna

There was generally low faunal species diversity and abundance at all the project sites probably due to disturbance that already exists from communities fetching water from those water points, cultivation, watering animals and tree woodlots that provides very few micro habitats for exploitation by different species and communities. The project area lies in a landscape that is heavily influenced by human activities specifically cultivated areas, farmlands and plantation woodlots such as eucalyptus which tend to be poor habitats for birds and other vertebrates. There is a variety of birds; there are no wild animals in the project area basing on the field visits carried out and the interaction with the locals.

Plate 9: Some of the birds within the project area along River Nkusi

5.2.3 Land Use

The major land use in the project area is subsistence agriculture, growing mainly annual crops such as Maize, Irish potatoes, Sweet potato, Sorghum and beans. Eucalyptus woodlot on hilltops and valleys along wetlands. The woodlots are primarily for sale for building materials although sometimes, fuel wood is also harvested. Other crops grown include wheat, barley in the higher areas, vegetables in the wetlands, tree tomatoes (as a fruit) and bananas. Settlements are concentrated on the higher areas or hill tops while gardens are on lower slopes and in the valleys.

Patches of small scale farmlands, woodlots and wetland changed from one use/cover to another from one period to another. Small scale farmland gained from all the land use/covers, but lost to all the land use/cover apart from grassland. Small-scale farmland mainly exchanged its acreage with the woodlots. Patches of small scale farmlands, woodlots, and wetland changed to use/cover form one period to

another. Although the tropical high forest lost more than it gained, it only gained and lost to small-scale farmland and woodlots; while grassland mainly lost to small-scale farmland and woodlots. In order to reduce on land use/cover change, the terraces that used to control land degradation should be rehabilitated and stabilised; while other soil and water conservation practices like trenches and grass bands, should be included within the terrace.

Plate 10: Subsistence crop growing within the project area of Igayaza Town Council.

Plate 11: Cattle grazing within the upstream of the proposed abstraction point

5.2.4 Water resources

The project area generally stands at a low slope gradient running into perennial rivers/streams which forms the water collection points in and around the project area boundary. The major surface water bodies within or close to the project area are streams that feed into Rivers of Nkusi and Myoma. Boundaring the rivers are swamps which form part of the drainage eco-system surrounding the town council. The pictures below show River Nkusi and the swamp at Rubasengura bridge.

Plate 12: River Nkusi which is the main water resource within the project area

5.3 GROUND WATER RESOURCES

Ground water is one of the main sources of water supply currently in use by the residents in the project area. The project area has point water sources that are currently in use but are inadequate to meet the water demand. A number of the household in the project area access water from unimproved water sources (UBOS, 2014). While access to protected springs seemed to be high, there were several complaints regarding the quality of water from these facilities.

Plate 13: Handpump borehole and hand dug well covered with grass within the project area

5.4 Social Environment

5.4.1 Population

Based on the 2014 National Population and Housing Census, Igayaza Town Council had a population of 14,093 in 3,203 households during the baseline survey based on the population of the previous Uganda Bureau of Statistics (UBOS) census of 2014 while Kikwaya Sub county had a population of 10,679 and 2,427 households. The population growth rate in the project area was comparable to the district average population growth rate and has been maintained in the design review. However, the *UBOS Population Projection 2018* growth rate of 8.1% pa for Kakumiro District to 2030 is considered too high. A growth rate of 4.05% pa, which is more in-line with the national average, has been adopted for design period of this Project because the district growth rate will not apply evenly across the sub counties (Census 2014) in the district and should attract lower migration than less populated areas.

Table 31: Domestic Population- 2014 (UBOS Households) for Igayaza supply area

Sub County	Parish/ Ward	Village	UBOS HHs	HH size	Popn 2014	Base Year Popn 2020	Base Year Popn 2020	% Served
Igayaza Town Council	Igayaza	Rubasengura	100	4.4	440	608	608	100%
		Rubasengura Central	66	4.4	290	401	401	100%
		Kabanyoro Central	131	4.4	576	797	797	100%
		Kabanyoro	155	4.4	682	943	848	90%
		Kapoporo	65	4.4	286	395	395	100%
		Rwebigaga	108	4.4	475	657	657	100%
		Buhumuliro	43	4.4	189	261	157	60%
		Parish Project Area Total	**668**	**4.4**	**2939**	**4062**	**3863**	**95%**
	Rubazi	Kibuku A	100	4.4	440	608	608	100%
		Kibuku B	62	4.4	273	377	377	100%
		Rubazi	95	4.4	418	578	578	100%
		Muroba	49	4.4	216	298	179	60%
		Rubazi Central	68	4.4	299	413	413	100%
		Rubazi West	60	4.4	264	365	365	100%
		Kyamulinya	33	4.4	145	201	120	60%
		Parish Project Area Total	**467**	**4.4**	**2055**	**2840**	**2640**	**93%**
	Kaboijana	Kaboijana East	88	4.4	387	535	535	100%
		Kaboijana West	153	4.4	673	930	930	100%
		Igayaza Central	305	4.4	1,342	1,855	1855	100%
		Igayaza A	94	4.4	414	572	572	100%
		Igayaza B	197	4.4	867	1,198	1198	100%
		Nyakagera	103	4.4	453	626	501	80%
		Kyamurara	47	4.4	207	286	229	80%
		Parish Project Area Total	**987**	**4.4**	**4343**	**6002**	**5819**	**97%**
	Buramagi	Buramagi	158	4.4	695	961	961	100%
		Buramagi East	79	4.4	348	480	480	100%
		Buramagi West	158	4.4	695	961	961	100%
		Kingereza	122	4.4	537	742	742	100%
		Parish Project Area Total	**517**	**4.4**	**2275**	**3144**	**3144**	**100%**
	Kiseke	Kikandwa	127	4.4	559	772	463	60%
		Kiseke A	180	4.4	792	1,095	1095	100%
		Kiseke B	96	4.4	422	584	584	100%
		Bweyale A	97	4.4	427	590	413	70%
		Bweyale B	64	4.4	282	389	272	70%
		Parish Project Area Total	**564**	**4.4**	**2,482**	**3,430**	**2,827**	**82%**
TOTAL PROJECT AREA			**3,203**	**4.4**	**14,093**	**19,477**	**18,293**	**94%**
Source: Project Estimates								

Table 32: Domestic Population- 2014 (UBOS Households)

TC / SubCounty	Parish (Ward)	Village	UBOS HHs	HH size	Population 2014
Kikwaya	Kikwaya	Kikwaya	195	4.4	858
		Rutoma	112	4.4	493
		Mbooga	138	4.4	607
		Rwanjale	133	4.4	585
		Kyarukooka	211	4.4	928
		Kanani	106	4.4	466

		Parish Project Area Total	**895**	**4.4**	**3,938**
	Kamuli	Kagezi	143	4.4	629
		Kanyamwabura	98	4.4	431
		Kyatererkera	85	4.4	374
		Kamuli	115	4.4	506
		Parish Project Area Total	**441**	**4.4**	**1,940**
	Kyakajumbi	Kyakajumbi	133	4.4	585
		Katooma	132	4.4	581
		Mburamaizi	257	4.4	1,131
		Ikarabirenge	133	4.4	585
		Parish Project Area Total	**655**	**4.4**	**2,882**
	Kyakabangali	Kigwara	89	4.4	392
		Kemigisa	88	4.4	387
		Kyakabangali	115	4.4	506
		Kiryabukurura	144	4.4	634
		Parish Project Area Total	**436**	**4.4**	**1,918**
TOTAL PROJECT AREA			**2,427**	**4.4**	**10,679**
Source: Project Estimates					

5.4.2 Economic Activities

The majority of the population is engaged mainly in subsistence agriculture. Bananas are the staple food and cash crop in the area and also a source of a local brew from which some of the local people earn income. Additionally, there are small businesses dealing in general merchandise in the trading centres. The area is being connected to power supply by the Rural electrification Agency. The socio-economic survey found commercial (5%) and subsistence (58%) crop farming as the main activities in the area
Animal rearing where main animals reared are cattle, sheep and goats. A few households also reared chicken. The main methods of animal rearing was tethering while in a few places there were paddocks for dairy cows.

Plate 14: The busy Igayaza town with different commercial activities

5.4.3 Sanitation

A lot more waste water is expected to be generated when the piped water supply system is installed and these include;

i. Proposing appropriate technologies for use at household level.
ii. Provision of appropriate, adequate and sustainably managed public water borne sanitation facilities for markets, and community centres
iii. Identify solid waste management strategies

iv. Identification / designing appropriate faecal sludge and solid waste disposal facilities with the accompanying transportation and handling equipment.
v. The technology identification and selection was guided by the national physical planning standards and guidelines[6], current design guidelines in the Ugandan urban centres[7], the urban sanitation implementation manual[8], WHO guidelines on sanitation and health[9] and the compendium of sanitation systems and technologies[10].

Sanitation systems must deal with all products generated within the environment. Thus the design of sanitation systems involves identification of generated wastes and products for end use/ disposal; selection of the most appropriate sanitation system and technologies; and finally the design of individual technologies.

Plate 15: The type of the pit latrines within the project area of Igayaza

5.4.4 Existing Water Sources

The most frequented water sources in the Project area public hand pump and unprotected wells. The other sources of water for households in the communities include private boreholes, public hand boreholes, dam, vender (from borehole) and private stand post.

Plate 16: Some of the existing water source in the project area.

5.4.5 Water Borne Related Diseases

The records obtained from Igayaza He[illegible] Centre III showed evidence of the disease burden from Water borne related diseases such as malaria, diarrhea, dysentery, typhoid, cholera intestinal worms, skin diseases (lice, scabies, giggers ring worms) and bilharzia The diseases occur throughout the year and on average 80 out-patients visit the health facility per day. The diseases were common in the rainy seasons (March to May and from August to December). The age group mostly affected were the children.

5.4.6 Solid Waste Management

As regards solid waste management, there is no clear designated solid waste dump site within the project area thus waste is collected by private individuals and disposed of at locations that are not clear to the residents. There is also indiscriminate dumping of rubbish within the Igayaza town council and Kikwaya Sub County as shown in the plates below.

Plate 17: The irresponsible and indiscriminate solid waste disposal within the project areas

5.4.7 Energy Sources

The project area is connected to the national electricity grid which is the main source of power within and around the project area while solar power is also used in some few homesteads as seen in the pictures overleaf.

Plate 18: Some of the solar panels used by some few homesteads within the project area

5.4.8 Communication Infrastructure and Transport

The project area is well covered with mobile telecommunication network services (AIRTEL and MTN). Various FM radios and Television stations are received as well in the area. The main means of transport are taxis and pickups which connect to the neighbouring towns. Boda bodas are also used within the project area. The project area is largely connected to the Hydro Electric Power from the national grid.

Plate 19: One of the Telecommunication masts within the project area for the network services

5.4.9 Cultural Heritage

No cultural and/or historical sites were identified or reported by stakeholders within the proposed construction project sites. However, a Chance Finds Procedure (CFP) has been prepared and annexed to this ESIA report.

6 PROJECT NEED AND ANALYSIS OF ALTERNATIVES

6.1 Introduction

This Section evaluates available options to the proposed action, so as to arrive at the most environmentally friendly alternative, which maximizes economic, social and technical benefits resulting into minimal or insignificant environmental impacts. Abstraction of surface water and piped water supply system activities need proper and adequate management in terms of construction activities, occupation health and safety, solid waste management, water quality control, biodiversity management plans, socio-economic issues and re-alignment issues. During review of the engineering designs for the Igayaza-Kikwaya WSS, the EIA team was actively involved. The environmental considerations were crucial in the process. The developer has further prepared an ESIA report which would be submitted and approved by NEMA and the funders.

6.2 No Project Alternative

Analysis of the "no project option" as an alternative provides an environmental baseline against which impacts of the proposed action can be compared. This alternative means that the project area will be left in its original state. The alternative ignores all positive impacts likely to be realized in Kakumiro District due to the proposed Igayaza- Kikwaya WSSS like Income to material/ equipment suppliers, consultants and contractors; availability of skilled and unskilled job opportunities for residents, especially youths, in the project area during construction; improved quality and quantity of water supplied; reduced morbidity and increased productivity of households; and increased enrolment of children in educational institutions; better livelihood opportunities and induced development and employment opportunities. Besides, project development and operation will provide considerable economic opportunity for material/ equipment suppliers, construction contractors and other project-relevant professionals. The challenges brought about by using unsafe water like spread of communicable diseases and moving longer distances especially by women and children to collect water from wells and springs will be lessened and Small-scale irrigation schemes development in the area.

This option implies that the existing situation prevails (status quo remains) i.e. no construction of Igayaza- Kikwaya WSSS. This option is mostly applicable in situations where the proposed project area is in ecologically or socially sensitive areas and the negative impacts will be of significance and no proper mitigation measures can be formulated to eliminate or minimize the impacts to manageable or acceptable levels. Igayaza- Kikwaya WSSS runs through less ecologically sensitive and no households will be displaced. The land will be secured by Kakumiro District Local Government in consultation with Igayaza Town Council and Kikwaya Sub-County specifically, the land for the intake points, reservoir tanks, sedimentation tank and for the water offices. The transmission lines will pass along road reserves and to some extent in people's croplands. However, a Resettlement Action Plan (RAP) wil be conducted and the Project Affected Persons (PAPs) will be identified and will be compessated where applicable.

The No Project Option is the least preferred option from both the socio-economic, health and partly environmental perspective because individuals, institutions and the business communities would be subjected to contineuos access to unsafe and unrelaibe water sources and lack of access to sanitation systems. On this basis, the 'No Project Alternative' is rejected as option to be carried forward for the Project and project implementation option is maintained.

6.3 Alternative water sources

Selection of an intake (water source is a complex and lengthy process that involves the examination and balancing of a number of technical and environmental planning issues. One of the most important factors considered here is the yield (amount of water that can sustain supply for a long/specific period of time). The analysis of alternative sites looks at other possible sites that could have suitably been used

to implement the project. The alternative water sources were considered and have been discussed exhaustively in sections below.

6.4 Water Resources Assessment

6.4.1 Groundwater Assessment

Boreholes are always drilled until an appreciably yield of borehole is achieved. Areas with high potentials of groundwater tend to have shallower depths drilled while those with low groundwater potential tend to be drilled deeper. This implies Kisiita and Nkooko sub counties with average drilling depths of 84.74 mbgs and 81.14 mbgs (meters below ground surface) respectively have lower groundwater potential. Indeed, the average yield in both sub counties being less than 1.2 m^3/hr is confirmation of the low water potential. Nalweyo sub county with an average drilling depth of 65.15 mbgs and an average yield of 3.33 m^3/hr is perceived to have a higher potential of water than other sub counties. The project area in Kakindo sub county falls in a region with just an average groundwater potential. The average well depths is deeper than 69.5 mbgs although the sub county on average has the deepest depth to bed rock at 41.94 mbgs while the yield averages 1.68 m^3/hr.

A shallow static water level indicates a higher groundwater potential and vice versa. The static water level is, further, used to distinguish between the confined and unconfined aquifers. In an unconfined aquifer, static water level is at the same level as groundwater table or main water strike while in confined aquifers, the static water level is higher than the water strike level. Almost half of the boreholes have the main water strike is deeper than the first static water level implying the wells are abstracting or drilled into the confined aquifer. With reference to the feasibility report, the static water level are low in the of sub counties of Kasambya and Nkooko although they have a lower groundwater potential as indicated by the average yields. The sub counties have a corresponding shallower depth to the bedrock.

Further, a frequency analysis of yields of 261 boreholes in Kakumiro District shows that 63% of the boreholes drilled have yield between 0 – 2m^3/hr while only 17.3% have yields of 2 – 4 m^3/hr. At least 50 boreholes were classified as dry because the yields were zero or below 0.5 m^3/hr. There were only four boreholes yielding more than 10 m^3/hr. A borehole in Mulingo village, Kyabeya parish in Nalweyo sub county was reported to have the highest yield at 24 m^3/hr.

6.4.2 Shallow wells

No wells were identified as potential water sources for the Igayaza water supply project. Whereas groundwater sources are available, the yields of the available wells are generally low with more than 63% of the wells analysed having a yield of less than 2 m^3/hr. Using these wells for the project would require a battery of at least 30 wells spread in different geographical locations with successful drilling. Although the groundwater is likely to have a minimum water treatment system, the groundwater-based design with a battery of production wells will most likely have a longer transmission pipeline and a generally higher pumping costs because the average static water level is 44 mbgs in the Kakindo sub county (the neighborhood of the project area).

6.4.3 Surface Water Assessment

There are two possible potential surface water sources meant to supply Igayaza TC and the short fall in Kikwaya system. These sources are; Bulamagi swamp and River Nkusi. The swamp was not further considered among the viable water sources due to its small size, the reported significant reduction in its flow during extreme weather and the fact that it drains into a proposed intake point.

River Nkusi can sustain the combined planned abstractions for both the Igayaza TC and Kikwaya Sub County water supply projects in the ultimate design year of 2045 with very minimal risks to the environmental flow. Thus, River Nkusi has been recommended to be the proposed source for Igayaza and the shortfall in the Kikwaya water supply system.

6.5 Field based water resources potential estimates

Based on the information obtained from district water personnel and some of the community, the only reliable sources of water are the nearby swamps which are used for domestic and livestock watering. The area is mountainous with limited potential of groundwater water such as boreholes except protected springs. Protected springs provide good quality water. Some of these are seasonal while others are temporal or remain with very minimal discharge to sustain the water demand even up to a village level.

6.6 Environmental and Social Considerations

The potential impact of the water supply scheme infrastructure on the landscape and ecology were considered, this was mainly from the field studies. These factors have been subsequently addressed within the interactive process of environmental assessment and the findings presented in this ESIA report.

- **Noise and proximity of housing:** The proposed water scheme infrastructure was judged to lie sufficiently distant from dwellings and settlements; that adequate separation distances could be achieved to avoid noise nuisance during both the construction and operation phase given the nature of the development. In addition, apart from the vehicle movements, the noise in this kind of project is minimal.
- **Site Topography:** The project areas especially for the intake is located on a lower altitude compared to the end users. More so the main reservoir will be located on a high altitude compared to end water users.
- **Land ownership:** The proposed site for the intake and other water infrastructure was secured by WSDF-C and Kakumiro District Local Government. The transmission lines will pass along road reserves but where peoples land will be affected, local leaders and the local communities have been engaged. Resettlement Action plan (RAP) shall be conducted for survey, valuation and subsequent compensation for those whose property will be affected during the construction especially the transmission lines and for some of the water infrastructures. They are no resettlement issues.
- **Community Opinion:** Water supply systems elsewhere in Uganda have not attracted local concern and resentment among the local residents. Likewise, in the case of the Igayaza- Kikwaya Water Supply System, the development would not have much significant negative impact on the dwelling and settlements. The communities consulted welcomed the proposed project.

6.7 Technical and Design Considerations

There is a wide range of construction and furnishing materials which can be sourced locally for example sand, aggregates, bricks, etc. During construction, certified equipment and modern technology e.g. Water pipes, Storage Reservoirs, metal bars and fittings that meet the Uganda National Bureau of Standards (UNBS) requirements. Implementing the Water Supply System according to approved designs will be a priority as it will lead to the provision of improved quality and quantity of water supplied, reduced morbidity and increased productivity of households; and increased enrolment of children in educational institutions, better livelihood opportunities and induced development and employment opportunities. Therefore, it will be paramount that WSDF-C and the Operator ensure that the Water Scheme has the following in place:

- The sites are recommended for fencing in order to prevent contamination of the source and for the safety of hydraulic structures and installations for each of the project components.
- Well-designed drainage system at the Water offices
- Consideration of noise and traffic generated by the trucks to and from the site during the construction, solid waste management itself at the site both during construction and operation (especially at the offices premises)
- Security mechanisms including fire safety mechanisms and security guard at all the water infrastructure facilities
- Well-designed access route from the main road.

6.8 The Action Alternative as Described in this ESIA

This option implies that WSDF-C continues with the implementation of the proposed project as per the project designs and recommendations by different stakeholders. We have made a comprehensive Environmental study for the proposed project area. Details of the study are the subject of this ESIA report. The study has found no significant issues (environmental, economic or social) to stop the implementation of the project. Mitigation measures for the identified negative impacts of this alternative have been thoroughly discussed throughout this Report. If they are implemented as proposed, the project will not do any damage to the environment. It is here thus we recommend that this alternative is the most appropriate.

7 STAKEHOLDER ENGAGEMENT

7.1 Introduction

Consultation with relevant stakeholders and regulatory institutions was carried out to ensure participation of relevant stakeholders, as recommended by the National Environment Act, No.5 of 2019, EIA Regulations (2020), and conduct of Environmental Practitioners (2001) and guidelines for EIAs in Uganda. The consultations aimed to identify and take note of environmental and social concerns and views of all the stakeholders at an early stage so that appropriate mitigations are incorporated in the final implementation plan for the proposed project.

Stakeholder meetings were held at Kakumiro District, Igayaza Town Council and Kikwaya Sub County. The consultation process ensured that their concerns were captured and have been addressed during ESIA. A wider intensive consultation process was carried out during the Environmental and Social Assessment.

Informal conversational interviews and observations were the key data collection methods applied. The consultation process ensured that their concerns were captured and addressed. A wider intensive consultation process was carried out during the Environmental and Social Assessment. In general, the majority of stakeholders supported the project and found it to be beneficial.

7.2 Stakeholder Consultations

The primary purpose of the stakeholders' consultations was to provide an overview of the project to the relevant agencies, stakeholders and all the communities where the Igayaza-Kikwaya Water Supply System components are to be located and therefore impact on the communities. It further helps them to understand how the WSDF-C and the project team will operate to the highest possible environmental, social, health and safety standards prior, during and after the construction of the Water Supply System related infrastructure.

The specific objectives of the Consultations were:

i) obtain an understanding of the number and types of stakeholders in the socio-economic study area
ii) To provide information about the project and to tap stakeholders' information on key environmental and social baseline information in the project area
iii) To provide opportunities to stakeholders to discuss their views, opinions and concerns
iv) To manage expectations and misconceptions regarding the project
v) To discuss potential impacts and verify significant or major environmental, social and health impacts identified.
vi) To inform the process of developing appropriate mitigation and management measures as well as institutional arrangements for effective implementation.
vii) inform stakeholders about the engagement process and grievance management
viii) provide a mechanism for ongoing stakeholder engagement and ways in which the stakeholders can continue to participate in the stakeholder engagement process
ix) Ensure regulatory requirements and project standards are met.

Stakeholder consultations and Public participation during the ESIA process were conducted in line with the requirements of the National legislation and regulations. According to the National Environment (Environmental and Social Assessment) Regulations, 2020, Part III under section "*Procedure for Undertaking Scoping and Environmental and Social Impact Study*", Sub-section 16; "*Stakeholder consultation during the environmental and social impact study*", stakeholder consultation is crucial during the ESIA study.

7.3 Stakeholder Identification and Analysis

7.3.1 Stakeholder Identification

A stakeholder may be defined as 'any individual or group who is potentially affected by the project or can

themselves affect the project. To develop an effective stakeholder involvement programme, it is necessary to determine exactly who the stakeholders are based on their roles, influence, objectives and priorities specific to the project. The ESIA team formulated a stakeholder matrix and identified key stakeholders who were engaged during the study. A stakeholder engagement plan was drafted and populated with additional stakeholders during the ESIA study. The study targeted individuals, groups/institutions and communities that have a stake in the priority water project. Thus, only such entities as identified in the stakeholder analysis were selected to participate in the consultation process.

When identifying and prioritizing stakeholders, the following aspects were considered:

- Who could be adversely affected by environmental and social impacts?
- Who are the most vulnerable among the potentially impacted, and are special engagement efforts necessary?
- Which stakeholders can best assist with the early scoping of concerns and impacts?
- Who strongly supports or opposes the changes that the project will bring and why?
- Who is it critical to engage with first, and why?

7.3.2 Stakeholder Analysis

The stakeholder categories and sub categories identified are presented in Table 35 below.

Table 33: Stakeholder Matrix

Category	Stakeholder	Description and key attributes
Funder	African Development Bank (AfDB)	▪ To ensure that the Banks Operational Safeguards have been observed and implemented as appropriate. ▪ Support the project with funding
National Level Stakeholders	Ministry of Lands Housing and Urban Development (MoLHUD)	▪ Approves all reports presented by the consultant regarding valuation
	Ministry of Gender, Labour and Social Development (MoGLSD)	▪ Protection of human rights and vulnerable social groups. ▪ Occupational and community health and safety of roads. ▪ Approval and monitoring of the social safeguards ▪ Approval of permits like workplace permits, OHS
	Ministry of Water and Environment (MWE)	▪ Overall mandate to monitor, assess and regulate water resource ▪ Monitor and guide the use of wetlands for sustainability and other water bodies within the project areas ▪ Approval of the Water abstraction permits ▪ The implementer of the Project ▪ Overseeing and monitoring the project activities

	NEMA	▪ Regulation of the environmental aspects of the project(s). ▪ Legally mandated to handle certain critical environmental issues ▪ Provide the necessary permits and approvals for quarries, borrow pits and other auxiliary sites ▪ Work closely with the project team to handle all matters related to environmental protection ▪ Overall clearance of ESIA and other project briefs about the project facilities. ▪ Monitor and supervise the ESIAs compliance
Local Governments	District (Kakumiro District Local Government)	▪ Mobilize various stakeholders including the communities/beneficiaries ▪ Monitoring and supervision support for the implementation of the projects. ▪ Offer security to the project team (RDCs Office) ▪ Review the ESIA and give comments (Environment Office)
	Igayaza Town Council and Kikwaya Sub County (Technical and political staff)	▪ Make decisions that may affect the project, ▪ Offer support and supervision of the project ▪ Help in the identification of the location of the water and sanitation facilities.
	Local Councils	▪ Mobilize communities ▪ Offer support in the planning, implementation and operation of the project ▪ Offer support in the identification of the locations of the water and sanitation facilities ▪ Monitoring of the projects ▪ Provide social justice to vulnerable communities ▪ Incorporate information about the project in their teachings, gatherings/meetings for acceptance especially regarding water and hygiene-related information.
Different Community groups	Traders, landlords, tenants, business people, affected persons (Landowners who offered land for the project facilities' installation)	▪ Develop construction (works) schedules in their respective areas. ▪ Participate in the scheduled meeting regarding the project activities and progress ▪ Identify mitigation measures of the environmental and social issues ▪ Monitor the progress of the project activities ▪ Input in the planning and identification of water and sanitation facilities.

7.3.3 Formal Meeting with the Stakeholders

The project had an inception workshop where all the stakeholders were invited as a start meeting to inform all the stakeholders about the project. WSDF-C organized the meeting to inform all stakeholders about the project, its objective, the intended activities, the project extent, and the related studies to be undertaken,

including ESIA, water-related studies, source of water among others. The main object was to solicit, potential impacts and possible mitigation measures and also solicit initial community responses. The stakeholders were able to express comments and queries during these meetings as seen in the minutes under annex 3.

Plate 20: The Consultants, the MWE Team (WSDF-C) meeting with the Igayaza Town Clerk and his team

Plate 21:MWE (WSDF-C) team, consultants and local members at the proposed abstraction point

7.3.4 Key informant interviews

Key informant interviews (KIIs) were held with individuals who were assumed to have specific information related to the project. Some of these were pre-set while others were identified during the interactions with other stakeholders. Some of such stakeholders included; The LCV Chairperson's office of Kakumiro, the District Engineers office, the Office of Public Health, CDO, Environmentalist among others.

7.3.5 Community Meetings

Communities were sensitized about the project to ensure the participation and active involvement of the local community members in the baseline survey and subsequent water interventions. Mobilization of the communities was done through the chairpersons of the respective villages. Both women and men attended these meetings and a number of issues were raised. All the community meetings were conducted in local and understandable language.

7.3.6 Feedback from the Stakeholder Consultations

In relation to the project, the main findings from the engagements and public participation were largely categorized into two parts; the envisaged impacts (Both negative and positive) and general concerns on the

project. The main findings from the engagements are presented below; For example, according the local leaders and community members, the establishment of the water scheme is expected to have the following benefits:

- Improved access to clean and safe water
- Improved health conditions due to access to safe clean water
- Employment during construction and operation of the water scheme
- Eradication of poverty and improved livelihoods of the local people
- Reduced expenditure on water and medical bills due to diseases
- Reduced time spent walking long distances to wells and Springs
- Reduction of child mortality
- Ensure environmental sustainability

However, some concerns were raised as regards to the project and these include:

- Poor waste management practices at construction sites
- Destruction of existing vegetation especially when establishing the intake
- Soil erosion due to loss of vegetation
- Land degradation,
- Dust and vehicle emissions,
- Increase in noise and injuries on duty,
- Increased spread of communicable disease,
- Visual impacts, Issues of land use and destruction of peoples crops along distribution lines.

However, there were issues that cut across during the community consultation meetings and these are:

- *Signing of the Compensation Data Capture Forms by the PAPs* - Signing such forms does not relinquish one's rights to land and improvements. It only depicts that such PAP was present during the data collection and affirms all that is recorded on such form.
- *Property to be assessed* - Land, structures (or improvements) and Perennial crops will be assessed. However, the project designs were developed in such a way that there is no physical displacement of PAPs.
- *Payment of compensation awards whether in cash or at bank accounts* - This varies with the magnitude of the compensation awards. However, bank accounts are preferred for safety and easier accountability.
- *Connection to water for households far away from the built system* - Upon completion of the water system, households will be encouraged to apply to the operator for water connection and water pipes will be extended.

Stakeholder engagements will continue throughout the implementation and operational stage with different stakeholders. It is likely that more relevant agencies and stakeholders will be identified during these phases, and will be engaged accordingly.

Many of the comments captured from stakeholders presented views on the expected benefits and concerns on the adverse impacts the proposed project may have on the environment and the existing activities. A summary of key environmental and social issues and recommendations raised by stakeholders are presented in the Table 36 below.

Table 34: A summary of key environmental and social issues raised by stakeholders

NAME AND POSITION	ISSUES RAISED
Ms. Sarah Sociologist MWE/WSDF-C	• The MWE through WSDF-C is looking for funding from AfDB in order to implement the project • WSDF-C engaged the Design Consultant (SGI) to undertake the feasibility study and designing of both Igayaza and Kikwaya town water supply systems • The present members/officers are part of the Project Implementation Team (PIT)

Eng Angella Kyomuhendo Water Engineer MWE/ WSDF-C 0781420971	• The design Consultant undertook the feasibility study and a number of options looked at • River Nkusi is the considered source • Boreholes/ production wells were also considered but River Nkusi has enough water to supply the project area. • The designs will be presented to the different stakeholders and then submitted to the relevant authorities for approval
Ms. Teddy Gwoyazika Senior Environmental Health Officer (SEHO) MWE/WSDF-C 0784876664	• The Ministry of Water and Environment under WSDF-C hired another consultant (WSS Services (u) Ltd) to undertake the Environment and Social Impact Assessment (ESIA) and develop a sub catchment protection plan for the project area • The anticipated impacts will be predicted and mitigation measures to avoid or minimise such will be proposed.
Mr. Paul Kyabaggu Engineer with SGI 0782446897	• SGI undertook the feasibility study and detailed designs where different options were looked at. • River Nkusi has sufficient water to supply the project area • Other options like boreholes in Kikwaya were also considered • These designs have been reviewed by the MWE and will be presented to the different stakeholders.
Mr. Mark Tumusiime Lubowa 0782174717 Town Clerk Igayaza Town Council	• Aware of the project and the office has been involved so far. • The project is welcome in the area and it will help to extend safe water to the community members. • People are willing to welcome and accept the project in the area • A number of projects (water Supply systems) have been proposed in the Town Council and there is need to clarify on the specific one. • All the necessary support will be accorded whenever required • Consult all the relevant stakeholders including district leaders, Sub County offices and where necessary Town Council leaders • It is okay if you want us to be part of the project team • Has been involved in the implementation of the project so far
Ms. Caroline Kobusinge 0779865636 CDO, Igayaza Town Council	• The project is welcome in the area • It will minimize health hazards related to water challenges • The community will be more productive and this will increase the standard of living and incomes of the people • The contractor should employ local people within the project areas to enable communities have a sense of ownership of the project. • During project implementation gender issues should be incorporated and women should be protected. • Children should not be employed • The contractor should provide workers with Personal Protective Equipment and enforce their use • Contractor should ensure workers are paid at the right time • First aid kits should be place in case of an emergency • Working conditions should be pleasing • We are willing as district leaders and local communities to work together to benefit from this project
Mr. Alex Ssentongo Health Assistant 0785526220 Igayaza Town Council	• Has been involved in the design since the consultants have been engaging him from time to time • Been the contact person so far for the project
Mr. Siprano Byamukama 0774978394	• The system will support the livelihoods of people

Chairperson LCI Kigwara Village, Kikwaya Sub County	• The system will provide water for two purposes; domestic consumption and production. • It should supply public institutions like schools, hospitals and churches. • Will land owners be compensated especially those whose land will be taken for the project developments? • Mobilize and sensitize the communities to understand the benefit of the water system • Stakeholders should be identified at an early stage so as to get to know the project and the benefits • Sub county consultations are important
Local Community Members	• The project is welcome in the area • It has taken even long to start • People are really suffering to long distances and unsustainable water sources • Water borne related diseases are common in the area since people use unsafe water • Will the project serve all the villages in the RGC of Igayaza-Kikwaya? • The names of the villages were charged since Itek is now a Sub County of its own. • Water should be used to enhance value in the community. • Issues on land consent should be clear (consent letter should be signed) • Gender issues should be incorporated while implementing the project • Sustainability should be considered (will the water be for free or at a fee, and if at a fee, how much will it be, it should be affordable)

All the stakeholders consulted supported the project on the basis that it would induce development in their area/district and lead to the establishment of more related projects. However, it was mentioned that the developer should be able mitigate all project related negative impacts such as waste generation, noise, destruction of crops during trench digging and pipe installations and any other negative impact as would be realized.

7.4 Public Disclosure and Consultation Plan

Public Consultation and Disclosure Plan (PCDP) is a key element in the engagement and essential for collective involvement of stakeholders in the proposed development. Disclosure refers to the provision of relevant and adequate project information to enable stakeholders understand risks, impacts and opportunities of the project. Consultation is an inclusive and appropriate process that provides stakeholders with opportunities to express their views which should be considered, responded to and incorporated into the decision-making process. In the context of the proposed development, stakeholder consultation aimed at:

- Generating good understanding of the project;
- Enabling stakeholders to engage and participate in proposed project design;
- Understanding what local community expect throughout the life of the project;
- Optimizing local benefits of the project;
- Developing effective mitigation measures and management plan;
- Characterizing environmental, health and socio-economic impacts of the project.

The proposed project is within the jurisdiction of Kakumiro District Local Government headed by a Local Council V (LCV) Chairman and Chief Administration Officer (CAO) who is the political head and technical

head respectively. Various district offices whose functions would be relevant to the project include offices of Natural Resources/Environment, District Health Inspector, District Planner, Community Development Officer, District Health Officer, District Water Officer and District Engineer. Equally important are village-level local council administration (LC I and LC III). Leaders at these levels of local administration are closer to residents and therefore important in effective community mobilization, sensitization and dispute resolution given that the proposed project is going to benefit communities.

Like stakeholder identification, public consultations and information disclosure is a continuous process throughout the ESIA exercise. KIIs and FGDs were utilized for PCDP. A scoping exercise was undertaken on 8th and 9th February 2022, and then the consultative meetings on 06th September 2022 at both Igayaza Town Council and Kikwaya sub county and were aimed at disclosing key project information and to generate a master list of Stakeholders to be consulted. Key stakeholder concerns were also identified so that they could be considered in the implementation of the project. Key issues identified are outlined in Table 36 above.

Grievance Redress Mechanism (GRM) as a key element of the PCDP to actively identify, manage and follow up grievances received to ensure that appropriate resolutions and actions are taken by relevant authorities especially WSDF-C, Kakumiro District Local Government and Igayaza Town Council and Kikwaya Sub County. In order to ensure transparency and accountability, a GRM shall be established by the Project Support Team in line with the guidance provided in the ESMF. The GRM shall have a clear set of goals and objectives and a well-defined scope for its interventions, especially geographical area coverage to ensure its accessibility and effectiveness. A set of procedures for receiving, recording, and handling complaints shall be available in the GRM. This will be managed by a National Grievance Redress Committee (GRC) consisting of a WSDF-C Chair, the assigned Resettlement Social Development Specialist, the Project's Environmental Focal Point, the chair of the community mediation board, a member of a recognized non-government organization, and a community leader. The GRC members shall be qualified, experienced, and competent personnel who can win the respect and confidence of the affected communities.

GRCs shall also be established at District and Lower Local Government Levels as appropriate. For easy accessibility, GRCs shall also be formed at or closer to project implementation site at Kakumiro District. Grievances shall be first reported and handled at the lowest level or project site, and referred to the next level if not resolved. The GRM shall include procedures for:

- Recording, registering, and sorting grievances;
- Conducting an initial assessment of grievances;
- Referring grievances to appropriate units or persons;
- determining the resolution process;
- Making decisions, including parameters and standards for accurate and consistent decision making;
- Directing relevant agencies responsible for implementing decisions;
- Notifying complainants and other affected parties of eligibility, the resolution process, and outcomes;
- Tracking, monitoring, documentation, and evaluation; and
- A Grievance Log, that shall summarize all grievances registered, resolution reached, and feedback provided.

Depending on the nature and the severity of the complaint/s, the GRC in consultation with the Project Affected Persons (PAPs) or Complainant, shall identify and decide on an approach for grievance resolution. Where appropriate, complainants shall be given the choice of selecting an affordable approach with which they are comfortable and confident and that is beneficial to them. For construction-related complaints, it will be the Contractor's responsibility to address them. Usually these kinds of complaints are described as environmental and social impacts and include issues related to dust, flooding, blasting (noise, vibration, and evacuation), lost access, and dangers to life, damage caused to public roads from heavy machinery, deteriorating water quality and quantity, damage to property and crops, soil erosion, workers misbehaviour, defilement/child abuse, and others.

8 ANTICIPATED ENVIRONMENTAL AND SOCIAL IMPACTS

8.1 Introduction

Key potential environmental and social impacts of the project for each stage of the project cycle are assessed in this chapter and an Environmental and Social Management Plan (ESMP) is provided in the Chapter 9. The ESMP seeks to translate mitigation measures into actions. Prediction and analysis of possible positive and negative impacts of construction of the water treatment plant and intake works at River Nkusi in Rubasengura Central LCI, Igayaza parish are discussed. Impact analysis involved determination of nature of impact, its magnitude, extent, duration of potential impacts. For the proposed development, potential positive and negative impacts were identified both for the construction phase and operation phases. Throughout this report, impacts have been characterized as:

a) "Positive" when they;
   - Enhance socio-economic welfare e.g. health, employment,
   - Enhance quality of existing environment.

b) "Negative" when they;
   - Reduce socio-economic welfare of people,
   - Reduce quality of existing environment,
   - Reduce economic value e.g. of surrounding property.

An improvement in potable water supplies and sanitation may generate interrelated improvements in health, economic and social welfare of the community. However, in addition to the many possible beneficial impacts, adverse impacts may arise from these improvements. The impact of potable water supply and sanitation on health depends on the quality and quantity of the piped water supply; the proportion of population covered; and the utilization of the water and sanitation facilities by the population. In this chapter, prediction and analysis of possible positive and negative impacts of construction and operation of the water extraction and treatment system, water reservoir and establishment of transmission lines is presented, with main focus on the proposed construction of the water treatment plant and intake works at River Nyarwambu. Table 37 below provides a summary of the Positive benefits that will be realised as a result of implementation of this project.

Table 35:Positive Impacts of the Proposed Project

No.	Impact	Remarks
1.	Increased access to clean water	▪ Elimination of current water shortages. ▪ Improvement of water quality. ▪ Reduce the time spent and distance travelled to fetch water, which would signify an improvement in the general living conditions of the people. ▪ Improvements in public and household sanitation. ▪ Awareness of personal hygiene. ▪ Overall improved health conditions for the beneficiary population. ▪ Income generating activities for the poor will increase as result of availability of reliable supply of water in public places e.g. commercial water service providers.
2.	Employment opportunities and increased household incomes and revenues	▪ The use of appropriate labour intensive methods for some of the construction activities (e.g. construction of the intake point and Reservoir and sanitary facilities) would present employment opportunities for local people and generate direct income benefits to local households. ▪ Some people will be employed in the digging of the

		transmission and distribution network, sand and stone quarries, and sale of earth materials to the proposed project and in the service sector around the project site.
3.	Income to material/ equipment suppliers and contractors	▪ Earth materials needed for construction, for example, aggregate (stones and sand) will be obtained from quarry operations. ▪ Number of equipment and materials (such as gravel, bricks, plumber, steel reinforcement and cement for civil works) will be sourced locally within the district and the neighbouring districts.
4.	Increased Public Revenue / Taxes	▪ People who have never worked on such projects would acquire such skills, which they would use to seek employment in future. ▪ The Project would provide grassroots management opportunities for the local people to both be involved in the management of the water supply and protect their local environment.
5.	Boost to the local Economy	▪ Provision for direct employment opportunities to the workforce thus contributing towards alleviation of poverty and income generation for the local community; ▪ Stimulation of business activities related to contracting works for local entrepreneurs (sub-contractors); ▪ Providing trading opportunities for local communities and other small enterprises in the area; ▪ Providing opportunities for provision of basic and other services for the contractors and immediate community. The project will consider employment of locals.
6.	Gender Benefits	▪ The expected reduction in water collection distances and times will be particularly beneficial to women and children, especially girls, who bear the burden of fetching water and have to walk long distances or queue for long periods. ▪ It will mean more opportunities for girls to attend schools and more time for women to engage in other economically and educational beneficial activities.
7.	Health Benefits	▪ Direct health benefits of the project to the affected population will result in a reduction in the incidence of water-related diseases particularly diarrhoea, typhoid, intestinal worms, skin and eye problems, and dysentery and cholera. ▪ Loss of productivity resulting from sickness related to water-borne diseases and expenditure on related medical care will therefore reduce.
8.	Improved service delivery	▪ The proposed project would result in bringing improved water and sanitation services closer to the people.
9.	Eradication of poverty and improved livelihoods of the local people	▪ The proposed project would result in an increase in the volume of water for production which could result in improved livelihoods of the local people. ▪ Water is indispensable for survival and improving the quality of life – for health (drinking, eating and bathing) and for economic development (agro-processing and business). The project would, therefore increase productive activities through reduced sick days and time saved in fetching water.

10.	Combat HIV/AIDS, malaria, typhoid, and other diseases	▪ The awareness campaigns for public health, hygiene and sanitation particularly targeted at women and girls would be widened to include measures for tackling HIV/AIDS and other diseases such as schistosomiasis and diseases related to excreta contaminated water and poor hygiene (cholera, typhoid, and diarrhoeal diseases).
11.	Ensure environmental sustainability	▪ Implementation of catchment and water source protection measures would ensure reliability to the water source.
12.	Develop a global partnership for development	▪ The Project would provide opportunities for the GoU and the different Implementing Agencies (IAs) to work together to achieve the sustainable development goals (SDG) specifically SDG 6.
13.	Increase in investment in the area standard of living	▪ WSDF-C will invest heavily in the construction of the water supply systems 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 safe piped water.

8.2 Anticipated Potential Benefits

8.2.1 Positive Impacts during Construction Phase

Impacts of construction phase for of the proposed water supply system may be permanent but majority of the environmental impacts attributed to construction works are temporary in nature, lasting mainly during the construction phase or quite often little beyond the construction period. However, if these issues are not properly addressed, the impacts (positive or negative) may continue even after the construction phase for longer duration.

a) Employment opportunities

The design, feasibility and planning phase provided financial benefit and employment for local consultants. This is a positive but short-term and reversible socio-economic impact. Contract provisions for the construction works require most of the labour force (at least 50%) to be drawn from the local population with particular emphasis on youth and women. Since construction is estimated to take a certain number of months, this phase will provide short-term job opportunities for local people. The project is estimated to employ around 100 workers during the construction phase.

Furthermore, indirect opportunities for employment will be stimulated in the other sectors related to construction, such as manufacturers of local raw materials and finished products and providers of services. It is also anticipated that indirect employment opportunities will be created within local communities through the provision of services to the construction teams, such as the sale of food and beverages.

Enhancement measures

- The contractor should involve local leaders in recruitment process to ensure full and fair participation of local communities. Wherever feasible, local people should be considered for job opportunities commensurate with their level of skills. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive. A training programme for artisans (builders, plumbers) in the project area could be facilitated by the project to ensure skills transfer during the construction period.

b) Income to material/ equipment suppliers and contractors

The scale of construction works is moderate in the proposed project area. Although some of the equipment and materials required for the project will be sourced nationally or even internationally to ensure quality is achieved, a number of equipment and materials (such as gravel, bricks, plumber, steel reinforcement and cement for civil works) can be sourced locally within Kakumiro district and the neighbouring districts. Local suppliers of materials and equipment involved in the project will benefit financially. This is a positive but short-term and reversible impact.

Enhancement measures

- Earth materials needed for construction, for example, aggregate (stones and sand) will be obtained from quarry operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly promotes environmental degradation at illegal quarry sites and can cause medium to long-term negative impacts. It should therefore be a contractual obligation for contractors to procure construction materials from quarries legitimately licensed by the respective district authorities.

c) Acquisition/improvement of skills

People who have never worked on such projects would acquire such skills, which they would use to seek employment in future, and as a benefit from the capacity building incorporated in the program, the implementing authorities would have adequate capacity for managing the environmental and social assessment and permitting processes. The Project would provide grassroots management opportunities for the local people to both be involved in the management of the water supply and protect their local environment.

Enhancement measures

- The Local leaders will play a vital role in screening and recommending those seeking for employment to weed out wrong elements who may instead cause serious setbacks to the project in terms of offering labour both skilled and unskilled.

d) Increased Public Revenue / Taxes

The implementation of the project will increase revenue and taxes for both the central and local authorities. This includes indirect taxes resulting from the construction project such as Value Added Tax (VAT) on materials and services, Pay As You Earn (PAYE) for construction workers and other formally employed persons who will form by far the majority of created employment opportunities) as well as revenue to pension funds such as National Social Security Fund (NSSF).

e) Impacts on Local Capacity

The scale of the construction of the project with the logistics involved and speeds of construction that will be required, while maintaining construction, health and safety standards will involve considerable management and planning skills and will contribute to capacity building within the country's engineering and construction sector. Co-operation between international suppliers of specialized equipment and contractors and local contractors and sub-contractors and companies will result in the transfer of skills and will also build additional local capacity.

f) Boost to the Local Economy

The workforce will get most of their food and other necessities from the surrounding area and this will provide a market for the local agricultural producers, and craft producers and other small businesses (local shops). This will in turn increase the incomes of the local people, which can be invested in other (productive) activities and be used for paying school fees, medical expenses and other domestic needs. The project will stimulate local economic activities by:

- Provision for direct employment opportunities to the workforce thus contributing towards alleviation of poverty and income generation for the local community;
- Stimulation of business activities related to contracting works for local entrepreneurs (sub-

contractors);
- Providing trading opportunities for local communities and other small enterprises in the area;
- Providing opportunities for provision of basic and other services for the contractors and immediate community. The project will consider employment of locals.

g) Capacity Building

It is expected that for the construction of the proposed water supply system, some degree of capacity building will be provided (organised and un-organised) through the transfer of new technologies and new skills to (un-skilled) labour. This will happen through on-the-job training as well as through exposure to modern water quality practices, management and logistics procedures. Local sub-contractors and companies will also benefit from the transfer of skills and will also build additional local capacity.

Enhancement measures

- To maximise capacity building for local communities, programs and technical training courses as well as on-the- job training will be provided in specific skills areas for suitable candidates from local communities to enhance minimum levels of education and the possibility of being employed during operational phase.

8.2.2 Positive Impacts during Operational Phase

a) Improved health status of households in the project communities

The provision of an adequate, safe water supply and sanitation facilities has positive impacts on the health of users by greatly reducing the incidence of communicable enteric and infectious related diseases, which, in many instances occur in communities due to lack of adequate sanitation and potable water supply. Both potable water supplies as well as safe disposal of human excreta are needed to break the chain of transmission of diseases. Changes in water supply may affect different groups of disease in different ways; one group may depend on changes in water quality, another on water quantity and availability and another on indirect effects of standing water which is related to sanitation. Therefore, improvement in water supply in several of the poor informal settlements will directly contribute to improved public health in the proposed project area.

Enhancement measure

- Educate users on the proper use, regular cleaning and effective maintenance of both the household and public facilities.

b) Educational enrolment and attendance

Construction and Operation of the proposed water system will lead to considerably increased and consistent access to safe water for the proposed project communities. In relation to increased provision of potable water supply, time savings are the most immediate and easily measured benefits although its magnitude will depend on the conditions prevailing before constructing the piped water supply. Consequently, time spent on searching and waiting for water by women and children will be saved. This will enable children, especially the girl child to regularly and promptly attend school, while mothers will get more time to prepare their children for school. Assuming other factors are available (such a scholastic material, teachers) school attendance and performance will improve.

c) Acquisition of new skills

Most water supply and sanitation projects are built through the labour of local residents who are directed by a small cadre of sub-professional or supervisory personnel from outside the community. Community participation can also have a great impact on the effectiveness and sustainability of water supply and sanitation programs. It can also help to minimize many of the potential negative environmental impacts associated with them.

Enhancement measure

- Where the required skills are available locally, the local people should be given first priority commensurate to their level of training.

d) Improvement in household economic status

The increased provision of potable water supply and sanitation has positive beneficial impact on health and ultimately directly and indirectly on productive and economic benefits.

- Livestock and poultry keeping: Improved water supply would lead to an increase in poultry and livestock keeping in homesteads. A permanent water source near or on the farm will permit an increase in cattle and improve the production of milk and beef. Those farmers who previously felt water to be a crucial constraint preventing them from keeping such livestock as grade cows and pigs, poultry like chicken or expanding their activities in this regard, may find it feasible to do so.
- Small scale gardens: The increased provision of piped potable water supply may have positive beneficial impact on the irrigation of small scale gardens if there is excess water available and it can be used for irrigation of small scale garden plots near each household or tap. This will have positive beneficial impacts on increasing agricultural productivity and perhaps also improving nutrition status of households.
- Small scale industries: The ample availability of piped potable water supply may lead to improvements in the small scale industrial development and increased production.

Enhancement measure

- Water supply should be set taking into consideration the different levels of users. The users should also be educated to avoid wasteful use of the resources.

e) Employment opportunities

Operation of the constructed water supply system will create additional long-term technical and non-technical job opportunities for professionals, casual labourers, etc. Staffing will be required in the area to operate the constructed water supply system by: Operating the system in accordance with the service standards; Maintaining the system; Developing the system; Billing the consumers; Collecting revenue; Receiving applications for and making new connections; Making extensions to the system or assets; Attending to all customers; Keeping records of the operations of the system; and Writing status reports for the operations of the system.

Enhancement measure

- Wherever feasible, local qualified people will be considered for job opportunities. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive.

f) Promotion of gender equality and empowerment of women and the girl child

The proposed project would free women and girls of the burden of having to spend a lot of their time collecting and carrying water almost on a daily basis often from sources distant from their houses. This reduction in burden would allow women and girls time for other activities including involvement in economic ventures that could contribute to reducing poverty and furthering their education (thus increasing school enrolment).

g) Attainment of the Sustainable Development Goals; SDGs

The effect of providing safe water and hygienic sanitation services would help in the attainment of all other Sustainable Development Goals (infant mortality, poverty reduction, improved health and increased school enrolment rate).

h) Increase in investment in the area

Through the WSDF-C investing heavily in the construction of the proposed water system which would involve use of locally available materials, the business community will take advantage of the proposed development to establish businesses that would otherwise be impossible without piped water.

i) Environmental sustainability

The skill for managing water supply and sanitation facilities would result in building social capital which could be extended to better manage the local environment and water resources. The project would include environmental awareness which could be deployed to manage the environment better.

j) Combat HIV/AIDS, malaria, and other diseases

The Project would result in prevention of vector borne diseases related to water sources (such as guinea worms, Onchocerciasis, and schistosomiasis) and diseases related to excreta contaminated water and poor hygiene (cholera, typhoid, and diarrhoeal diseases) due to the increased provision of safe and clean water. Safe drinking water, personal/household hygiene and improved sanitation would reduce infant/child morbidity and mortality; improve their nutritional status and their ability to perform better in schools. The marginal price of improved hygiene and sanitation promotion would make them cost effective health interventions.

8.3 Anticipated Negative Impacts

8.3.1 Negative Impacts during Construction

A) Soil Degradation

The laying of water pipeline from the water treatment plant and associated facilities will result in direct disturbance of soil. Site preparation will involve clearing of strips of vegetation to allow for excavations to begin. Soils excavated may be heaped besides the trenches hence exposed to agents of erosion such as wind and storm water. However, prolonged storage of topsoil can lead to a loss in fertility of the soil as nutrients become leached out by rainfall. This process can lead to impaired vegetation growth once the soil is reinstated. In addition, prolonged topsoil storage can lead to the loss in viability of the seed bank contained within this soil. Also equipment engaged in activities might cause light contaminations of soil due to leakage of fuels and lubricants from equipment. Topsoil stripping during levelling and grading of the right of way (ROW) and the excavation of subsoil during trenching will break up the soil structure. Depending on the nature of the soil, this may lead to a temporary increase in erosion.

Impact significance: These are short term and direct impacts. Given that similar activities have already taken place and considering the project footprint, receptor ***sensitivity*** is assessed to be ***very low***. The impact ***intensity*** is ***low*** given that WSDF-C will employ a well-qualified contractor to carry out the construction activities of the project giving rise to ***minor*** impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- Topsoil and subsoil will be stockpiled for re-use in backfilling and reinstatement;
- To preserve soil structure: there will be minimum handling of soils; loose tipping of soils, that is, without compaction will employed and temporary spoil heaps will not be higher than 3m;
- Contractor will avoid use of old equipment or even damaged equipment that is most likely to have oil leakages thus contaminate the soils;
- The contractor will be required to develop a waste management plan prior to start of construction activities;
- Contractor will ensure that equipment is properly maintained and fully functional in accordance with the manufacturer's recommendations;
- During reinstatement, the trench back-fill material will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rain water channelling.
- Recreation of a stable landform that mirrors the pre-disturbed condition as this will minimise the risk of preferential erosion and therefore facilitate natural re-vegetation.
- Topsoil will be protected through separation from subsoil and storage in a manner that, as far as possible, retains the soil structure and minimises the risk of topsoil loss. The trench will be subsequently backfilled with subsoil, followed by topsoil. In order to prevent loss of fertility and degradation of the seed bank within stored topsoil (where present), the topsoil will be stored for as short a time as possible, allowing for engineering constraints.
- In the re-establishment of the pre-construction condition, vegetation cover particularly the variety and distribution pattern of plant species that existed before will be used.
- Wherever practical, the subsoil will be graded during reinstatement to reflect the original profile across the working width and all other construction areas. In steep areas with highly erodible soils, the ground will be carefully profiled to ensure that the integrity of the pipeline is not compromised.
- Upon completion of subsoil and topsoil reinstatement, disturbed areas will be inspected jointly by the construction contractor and MWE personnel for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities, and compaction.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of negligible significance.

b) Generation of Noise

Due to the nature of the construction process, noise levels will fluctuate in line with the combination of machinery or equipment being used at any one time. Noise and vibrations will mainly result from use of equipment like excavators and including bulldozers, graders and dump trucks during site preparation and construction activities. However, noise levels will also vary depending on time and distance as the construction spread progresses along the pipeline route thus the local residents will not, therefore, be continually exposed to the noise levels for extended periods.

Construction traffic associated with the pipeline construction will be routed via main roads and along the ROW as far as is possible. Some minor roads will have to be used for access to the pipeline spread itself and some new access roads will be created.

The increase in traffic movements on minor roads may cause a noticeable increase in daytime noise levels through small villages; this effect will be localised and temporary, and will, for the most part, be restricted to the construction phase of the project. A number of roads will require repair prior to use for construction vehicle access. These repairs will help to reduce noise levels generated by such access, and other vehicular movements.

Impact significance*:* 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 ***medium***, given that most of the proposed routes for the water pipelines are located in relatively noisy mixed residential and commercial areas of

the project area and its neighbourhood. This results into ***moderate*** impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- Contractor will be careful when selecting the working equipment to avoid use of old equipment or damaged equipment with high level of noise emissions that would have a negative impact in the environment.
- Contractor will ensure that equipment is properly maintained and fully functional in accordance with the manufacturer's recommendations.
- The contractor should ensure that noise levels emanating from machinery, vehicles and noisy excavation and construction activities are kept at a minimum for the safety, health and protection of people in the nearby areas.
- Regular maintenance, monitoring and, where necessary, the use of silencing equipment will be employed with the aim of reducing noise emissions.
- The selected contractor will be required to submit detailed information on the noise levels which will be generated by the specific methods and equipment proposed and to identify actions required to minimise the noise impact.
- Pumps, generators and other mobile equipment will be sited as far as practicable from housing and other noise sensitive locations, work will not be carried out Sunday during service time or hours.
- During periods of inactivity, equipment will be switched off whenever possible. A limited number of construction activities may have to continue on a 24-hour basis. These include horizontal direction drilling, pipeline cleaning and hydrostatic pressure testing which are relatively low noise activities.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

C) Improper Management of Construction Waste

Solid waste and spoil will be generated at the site during site preparation and construction phases. The waste may consist of timber or metal cuttings, excavated materials, paper/cement bags and solvent containers among others. Some of the waste materials such as cement, adhesives and cleaning solvents contain hazardous substances, while some of the waste materials including metal cuttings and plastic containers are not biodegradable and can have long-term and cumulative effects on the environment. Other wastes which will be generated by non-construction activities because of the presence of the workers at the site include food debris, contaminated water from washing, cleaning equipment, construction tools and vehicles.

Impact significance*:* Extent of this impact will be local to areas where waste is dumped or their immediate neighbourhoods. The impact ***intensity*** is assigned ***low*** due to the lack of a well streamlined waste management system in Kakumiro. The ***sensitivity*** of receptors is assessed as ***'low'*** given that similar

activities have and are taking place in the area and that an experienced contractor will be hired. This gives rise to minor impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- The wastes will be properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated material can be used as backfills.
- The contractor and WSDF-C will work hand in hand with the District to facilitate sound waste handling and disposal from the site. All wastes must be taken to the approved dumpsites and proof of safe disposal should be secured.
- Hazardous wastes such as paints, cement, adhesives will be managed through a third party contractor certified by NEMA. The contractor and MWE should work hand in hand to facilitate sound waste handling and disposal from the site.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

D) Contamination of Water Resources

There is a potential for pollution from chemical contaminants at all stages of the project. Spillage of fuel, lubrication oil or wastewater is potentially important at the watercourse crossings, pump station, and block valves during construction and testing. Contaminants introduced by construction could migrate into key receptors such as the Nkusi River/wetland. Activities associated with construction have the potential to produce groundwater and surface water contamination. The principal potential contaminants associated with the construction activities are as follows: Fuels and lubricating oils, Domestic wastes, Welding wastes and field welding and coating materials, Paints and solvents, Hydro testing chemicals if used (e.g. biocides, oxygen scavengers and corrosion inhibitors).
Removal of vegetation whose root systems bind the soil may increase the rate of erosion by water or wind in the area. During heavy rainfall, the loss of the moisture retaining function of the vegetation may lead to increased surface run-off, carrying with it eroded soil particles into the Nkusi River. During construction, there may be need to stockpile assorted materials on site. There is a potential pollution risk if construction materials are not stored or handled responsibly such as to lead to stockpiles wash away. The fuels (mainly diesel) and lubricating oils required by the construction equipment have the potential to contaminate nearby water resources (Nkusi River) if they leak or are spilled during handling or use. Transportation of pollutants with runoff would affect the water quality hence the communities/ livestock depending on it. General wastes may have the same effect if not handled properly.

Impact significance: The gently sloping terrain makes soil erosion and sedimentation likely impacts. The ***sensitivity*** of the receptor is ***medium*** because of the Nkusi River close to the site. The ***intensity*** of the impact is assessed as ***medium.*** Given the size of Nkusi River, intensive sedimentation would have far reaching effects in addition to its flooding nature during the rainy season but the activities taking place in its catchment already largely contribute to the sediment transport. This results in moderate impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

The contractor will have a contractual obligation to develop and implement a Construction Management Plan (CMP) to include the following:

- Equipment, materials and chemicals must not be stored within 30 m of a watercourse bank;
- Construct a proper drainage system around the site and to the final storm water retention or disposal point to stop direct run off into the nearby land and water courses;
- All construction equipment will be kept in good operating condition to avoid oil or fuel leakages that might contaminate water resources;
- Materials like sand and aggregates will be kept in bounded areas to avoid being washed away into water resources by runoff;
- WSDF-C will ensure the contractor complies with its environmental management policies e.g. the National Environment (Wetlands, River Banks and Lakeshore management regulations, 2000).
- River crossing points have already been determined through pipeline routing surveys to ensure that the crossing points minimise the impact on sensitive hydrological and ecological features. This includes adequate design controls to minimise the impact on the hydraulic regime of the rivers. The contractor will put in place temporary crossings to minimise the impact.
- Any cleaning and hydro test water which could cause contamination of surface (or ground) waters will be tested and treated as necessary prior to discharge, including debris and sediment removal.
- Washing will not be done along the working area but will be restricted to workers' camps and on paved areas to control runoff;
- The pipeline construction activities at certain river crossings, in particular the Nkusi River, will reflect their highly seasonal flow regimes. Wherever possible, construction of the pipeline crossings will be undertaken during periods of low flow.

Adoption of the above mitigation measures will reduce impact intensity to "low" resulting in a residual impact of moderate significance.

E) 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. The principal sources of combustion gases are the exhausts of vehicles and construction equipment, power generation at the work camps and pipe storage yards and waste incineration. Dust will be generated as a result of vehicle movements and typical construction activities (e.g. stripping, compacting and trenching etc.).

Construction activities and vehicle movements can cause dust agitation in addition to that already caused by the wind. It is likely that this will be exacerbated as a result of clearance of the ROW. Once airborne, dust will generally travel downwind before resettling. The distance travelled depends primarily on wind speed and particle size. For example, smaller particles and strong winds result in greater dilution effects but mean that the dust is deposited over a larger area. Dust may cause nuisance on a local scale in certain

areas along the pipeline due to the nature of the fine clayey, silty and sandy soils that are present. The potential impacts are nuisance to people in the area, coverage of crops (possibly leading to reduced yields) and deposition on natural vegetation and small animals, including bees.

Although emissions of carbon dioxide (CO_2) and methane (CH_4) are generally accepted as contributing to global warming the effect has not been quantified. To reduce the threat of global warming it is widely agreed that emissions of greenhouse gases need to be reduced on a global scale. Each individual greenhouse gas has a different potential effect on climate per unit released. Global Warming Potential (GWP) provides a means of equating the potential contribution to global warming arising from different process units/activities which can generate different emissions. GWP is measured in terms of equivalent emissions of CO_2; hence the GWP factor of CO_2 is 1. CH_4 has a GWP factor of 21 –that is, an emission of 1 kg of methane (CH_4) is defined as having 21 times the GWP of an emission of 1 kg of CO_2. Construction vehicles/activities are unlikely to contribute significantly to greenhouse gas emissions due to their relatively small scale, intermittence and temporary nature, and as such are not considered further in this assessment.

The long-term impact of nuisance dust will decline as stripped areas of land re-vegetate. Due to the temporary nature of construction, dust emissions are not anticipated to have a long-term impact on local air quality. The above impacts would mostly be linear and spatial in extent limited to road routes. They would therefore affect roadside communities, communities neighbouring the proposed site and road users. 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 going on in the area.

Impact significance: 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*** resulting in ***minor*** impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled using humps and travel speeds will not exceed 30km/h;
- Trucks will be covered during haulage of construction materials to reduce on spillage of materials;
- Wherever dust suppression is necessary, water will be sprayed over dusty areas;
- It will be ensured that all equipment leaving the site, clean up their tires in case they are dirty;
- Construction work will be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility;
- Workers will be provided with PPE (dust masks, safety googles) and the use of PPE shall be enforced;
- All construction equipment and trucks will be kept in good operating condition by regular servicing to reduce noise and exhaust emissions; and
- As part of the bidding processes, contractors will be required to provide their environment

management plans that meet mitigation actions proposed in this ESIA.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

F) Occupational Health and Safety Risks for the Workforce

Construction traffic, excavation machinery, blasting of rocks 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. Inadequate Occupational Health and Safety (OHS) could also result from insufficient medical capability at the construction site; or neglect of safety equipment, precautions and procedures.

Impact significance**:* Accidents could cause considerable ecological damage, financial loss and harm to human life. While largely reversible, some impacts such as loss of human life are irreversible. The receptor ***sensitivity is considered ***high*** given that such impacts may be irreversible once they occur. The impact ***intensity*** is considered to be ***low*** since MWE will procure a qualified contractor who is aware of OHS measures. Nevertheless, this gives rise to an impact of ***moderate*** significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- All construction workers will be oriented on safe work practices and guidelines and ensure that they adhere to them.
- 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 constantly follow 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 the case of incidences.
- Signage will be used to warn staff and/ or visitors that are not involved in construction activities of dangerous places.
- Personnel will only undertake tasks for which they are trained/ qualified. A formal 'permit to work' system will be in place and strict instructions will be given for operators of equipment.
- Supervision of works will be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work equipment.
- Communication line shall be ensured in between workers and drivers of heavy equipment.
- Evacuation procedures will be developed by the contractor to handle emergency situations.
- Adequate OHS personnel protective gear will be provided for the employees. The guide below should be useful:

Hearing (Over 85 dB(A) for 8 hours a day requires hearing protection)

- Ear Muffs: One size fits all, comfortable, less ear infection risk
- Ear Plugs: Small, lightweight, can get dirty and cause infection

Face/Eye (Working with any chemical or using any mechanical equipment)

- Face Shield: Protect face from splashing and particles
- Safety Glasses: Protection from solids (cutting, sanding, grinding)
- Safety Goggles: Protects eyes from splashing

Hand (Use correct gloves for the job)

- Chemical Gloves: (Nitrile, Latex, PVC)
- Gloves for other use: special gloves for cutting, burning, abrasions/ blisters

Body

- Overalls: Can protect against dust, vapours, splashes

Foot Protection

- If electrical hazard present, ensure boots offer protection
- Safety Toe/Steel Toe Boots: Always worn when potential for falling hazards exists
- Water/Chemical Resistant Boots: Use in a spill situation
- Non-slip boots for working on wet/slippery floors.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

G) Risk of Accidents

The water pipelines will have to be laid across existing roads that are used by motorist and cyclists in addition to pedestrians. The trenches created for the pipe crossing can lead to accidents if proper signage is not put in place. Construction traffic accidents would be a significant social impact and likely to affect public members like children, women, disabled, elderly people and livestock, etc. The duration of the risk will be short-term occurring only during the construction phase. Although some effects of the accidents (e.g. minor injuries) may be reversible, some, for example, loss of human life are irreversible.

Impact significance: The receptor sensitivity is ***medium*** given the number of pedestrians and commercial activities along the roads while the intensity is ***medium*** given the temporary nature of the construction activities, however, some of the impacts may be irreversible. The impact significance is thus assessed to be ***major***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- Best transport safety practices will be adopted with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public by: employing safe traffic control measures, including road signs and flagmen/traffic guides to warn of dangerous conditions and children crossings; and setting speed limits on all access roads in the project area will be 30km/h for

light vehicles and 20km/h for heavy vehicles.

- Service ducts installed by the road contractor will be used where applicable to avoid cutting through roads that have just been upgraded.
- All workers, including sub-contractors and casual labour, will undergo an environmental, health and safety induction before commencing work on site. This will include a full briefing on site safety and rules.
- The affected communities will be informed of the timing and duration of the construction activities across access roads and any uncertainties or potential for change and also sensitised on the dangers of construction sites and the need to keep away.
- Identifying optimum routes from pipe storage areas to the ROW to avoid sensitive receptors such as schools and hospitals, wherever possible and putting in place journey management plans.
- Restrictions on hours of driving (including night time restrictions where sensitive receptors may be affected) and timing of vehicle movements to avoid busy periods in urban areas, particularly the start and end of school and the working day
- Control over routes used by vehicles to avoid construction traffic using inappropriate roads and other road users gaining access to the pipeline spread and access roads.
- Ensuring adequate vehicle maintenance to ensure that vehicles do not produce significant emissions and that all safety features including brakes, lights etc. are in good condition.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

H) Landscape and Land Use Impacts

The aspects of the project that will impact on the landscape of the area are the temporary use of land for construction (right of way (ROW), roads, construction camps and pipe yards) and the permanent adoption of land for the pump station, block valves and access roads, etc. During construction, the ROW and the temporary facilities will be visible from the time of vegetation or topsoil removal until reinstatement is complete and vegetation has re-established fully. This will inevitably have visual impact in the area that is surrounded mainly by subsistence farming activities.

Impact significance: Duration of the impact will be long-term and the extent of the impact will be local. The ***intensity*** of the impact is ***low*** given that the kind of the proposed sewage treatment system, that is, waste stabilisation ponds, blends well with the environment. ***Sensitivity*** of the receptor is rated ***high*** given that no such system has ever been established in the area and its neighbourhood. Therefore, significance of the impact is ***moderate***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- The contractor will be required by MWE to develop and implement a Reinstatement Plan.
- Reinstatement of the water pipeline will be done in such a way as return the visual integrity of the landscape as closely as possible to its previous condition.

- In areas where grading of the working width impacts on the local topography, reinstatement will be undertaken in a manner which is generally sympathetic to the existing contours. However, at locations along the route where extensive grading will be required to provide a level working area, it may not be possible to return the topography to its pre-existing form as this may exacerbate erosion risks given the type of soils in these areas and would preclude access to the sewer line for inspection, maintenance or emergency response.
- Wherever possible the removal of existing mature trees will be avoided, provided that the integrity of the pipeline is not jeopardised.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

I) Social Misdemeanour by Construction Workers

While most workers may originate from the local community where they have families, there might be others from distant places and working away from their families. With some disposable income to spend, this might induce illicit sexual relationships, with attendant risk for spread of HIV/AIDS. Irresponsible sexual relationships in project communities can break families and heighten risk of contracting HIV/AIDS. Illicit sexual relationships can be short-term but have long-term and irreversible effects. The Code of Conduct for Contractors has to be signed by contractor upon award of contract and copies displayed for workers to view. It ought to be translated into predominant local language of the workforce.

Impact significance: Duration of the impact will be short-term or long-term depending on whether HIV/AIDS is contracted and the extent of the impact will be local or national depending on origin of construction workers. The ***intensity*** of the impact is ***very low*** given the small size of the project and other similar construction activities like for roads are already taking place in the area. ***Sensitivity*** of the receptor is rated ***high*** given that some of the outcomes have a long-term effect. Therefore, significance of the impact is ***minor***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- As a contractual obligation, contractors shall be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during project execution.
- A sensitisation programme for the would-be affected local communities will be conducted prior to commencement of and during the project implementation.
- A code of conduct (appropriate to behaviours in workplace and with respect to relations with local community) will be developed and approved by WSDF-C which will be signed by all workers on the project.
- Local workers will preferentially be employed, paid directly through their banks and access to bars by workers from outside the project area in the local communities controlled.
- All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities.

J) Slope Failure due to Earthworks

In steep areas, earthworks could lead to slope instability and accelerated erosion or gullying resulting into scarring of landscapes and increased sediment transport to surface waters or wetlands or gardens. Slope failure would affect downhill property and land uses. Risk of this potential impact actually occurring will be more prevalent in sections along the roads to the construction sites characterised by hilly terrain.

Impact significance**:* The likelihood of the impact occurring is high in the steep area. Duration of the impact will be short-term and effects reversible hence ***intensity of the impact is ***low*** and ***sensitivity*** of the receptors ***medium***. Impact significance is therefore ***moderate***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- Weak slopes should be protected using engineered structures.
- Areas susceptible to erosion and slope failure are protected using temporary or permanent drainage works.
- The eroded channels will be backfilled and restored to natural contours.

When mitigation recommendations are instituted, significance of residual impact will be minor.

K) Impact on Ecological Environment

Overall, the wider project area is lies in a landscape that is heavily influenced by human activity; with human settlements, cultivated areas and farmlands and eucalyptus plantations as the major components of the landscape. The habitats in the area are represented by disclimax successional vegetation types which develop in areas of relatively high human influence. Such disclimax communities result when human modified systems supplant natural ecosystems and undergo continuous cycles of burning, clearing, cultivation, grazing followed by regrowth. They do not provide stable habitats for fauna. Although agricultural landscapes are generally much more simplified habitats than natural habitats, they continue to support considerable amounts of biodiversity as they provide food sources for birds for example.

All fauna encountered and recorded are listed as Least Concern (LC) on the IUCN Red List of Threatened species. The Grey crowned crane (*Balearica regulorum*) was reported by the locals to have dispeared from the project area overtime (not encountered during the transect walks) and is listed as Endangered (EN) on the IUCN Red List of Threatened Species. It is the only species in this category that was reported by locals to have existed within in the project area. Its generalist feeding strategy makes it highly adaptable and has allowed it to persist in human modified habitats. The most significant threat to its survival is the loss of critical nesting sites which occur in wetlands (most wetlands have been converted into farmlands).

***Impact significance**:* The likelihood of the impact occurring is high and duration of the impact will be

long term as long as the plant is constructed and remains operation. Given that the natural habitats have reduced in extent and the project could eat into some semi natural areas resulting in reduction in diversity and abundance of species found in the immediate vicinity by way of direct destruction or displacement, the ***intensity*** of the impact is ***medium*** and ***sensitivity*** of the receptors ***low***. Impact significance is therefore ***moderate***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- Clearing of vegetation in the natural habitat (wetland areas) will be minimised or avoided. If this cannot be avoided, then restoration of areas not needed for permanent project activities will be done.
- Unnecessary human presence in the natural habitats and project site will be minimised;
- Invasive species if observed along the revegetation sites will be removed.
- Environmental awareness programs for the construction workers, with special focus on threatened species will be conducted.
- Hunting and poaching of wild life will be strictly prohibited.
- Prevention and minimization of pollution (e.g. noise, water) through strict implementation of planned pollution control measures will be exercised.

L) Impacts of Project Construction on Climate Change

Vehicle emissions containing greenhouse gasses will be generated during construction activities. Quantities generated will depend on type, age and number of equipment used during construction. These emissions would have a cumulative negative effect on local air quality and global climate change. Though emissions of carbon dioxide (CO_2) and methane (CH_4) are generally accepted as contributing to global warming the effect has not been quantified. Global Warming Potential (GWP) provides a means of equating the potential contribution to global warming arising from different process units/activities which can generate different emissions. GWP is measured in terms of equivalent emissions of CO_2; hence the GWP factor of CO_2 is 1. CH_4 has a GWP factor of 21 – that is, an emission of 1 kg of methane (CH_4) is defined as having 21 times the GWP of an emission of 1 kg of CO_2. Construction vehicles/ activities are unlikely to contribute significantly to greenhouse gas emissions due to their relatively small scale, intermittence and temporary nature, and as such are not considered further in this assessment.

Impact significance: The above impacts would mostly be local and would be small on a global scale though cumulative in nature. 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 similar construction activities have ever taken place in the area. The ***intensity*** of impact is assessed as ***low*** and ***sensitivity*** of the receptors as ***low***. The impact significance is therefore ***minor***.

	Sensitivity of receptor

		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:
During construction, mitigation actions recommended for minimisation of project impacts on climate are:

- Optimizing workzone traffic management: Proper traffic management practices will limit GHG emissions due to traffic congestion caused by road construction works.
- Managing overloading: Trucks hauling construction materials will be optimally loaded in order to lower GHG emissions than over-loaded ones.
- Use of existing material sources: Wherever feasible use will be made of existing borrow pits rather than opening new sites will reduce embodied carbon associated with opening up new areas.
- Use of equipment in good mechanical condition: The contractor will ensure that all motorised equipment is in good mechanical condition and regularly services to reduce emissions hey generate.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

M) Impact of Climate Change on Project Construction

Climate change would impact on construction activities both during the dry spells for activities that are water demanding. These would be slowed down and alternative sources will have to be sought increasing the cost and related impacts of hauling water from a distance. During intense rainfall, some project areas may be inaccessible given the terrain and some of construction activities may be delayed.

Impact significance: The manageability of the impact is high since typical impacts are well understood in conventional infrastructure construction industry. Considering that a competent contractor will be hired by MWE, the ***intensity*** of impact is assessed as ***low*** and ***sensitivity*** of the receptors as ***low***. The impact significance is therefore ***minor***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:
Construction activities will be rescheduled depending on the prevailing weather conditions in order to keep within the project construction period as much as possible.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

8.3.2 Anticipated Negative Impacts during Operation Phase

A) Stress of Water Resources

The provision of a potable water supply may increase the consumption of water. Provision of taps or household connections may increase water use significantly. This may consequently lead to a drop in the amount of water received by downstream users on Nkusi River and its water quality as a result of establishment of a water intake and treatment plant. However, an assessment of water use and demand was done as part of the detailed design and dry spells effects were factored into the water requirements. Thus the abstraction of water resource for the purpose of the project should not have a heavy impact on available global water resource.

Impact significance: Duration of the impact will be long-term depending on the recharge from the catchment and the extent of the impact will be local. The ***intensity*** of the impact is ***low*** given that there are also plans to put in place catchment management measures that would contribute in recharging the affected water resources. ***Sensitivity*** of the receptor is rated ***low*** resulting in a ***minor*** impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- WSDF-C will acquire water abstraction permits with conditions to guide the amount of surface water to be abstracted.
- A water source protection plan is being prepared to protect the catchment areas for the water source.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

B) Land Pollution, Waste and Drainage Problems

Improved water supply comes with an increase in the amount of wastewater and sullage generated from the water treatment plant (domestic waste and backwash water, etc.), households and industrial or commercial facilities. Poor disposal or management of the wastewater generated will lead to land and/ or water pollution and related drainage problems. In cases where household are connected to piped water and not to sewerage system, they may use septic tanks whose cesspool or soak pit overflow may lead to contamination of soil and/or groundwater.

Impact significance*:* This is a direct negative impact, short-term and local in extent since there are plans to establish wastewater treatment and disposal systems in the project area. The likelihood of the impact

occurring is high if water users are not educated on techniques for safely disposing of wastewater or sullage from their households especially in informal settlements. The ***intensity*** of the impact is ***medium*** and ***sensitivity*** of the receptor is rated ***medium*** given that the water treatment plant is located close to the Kitagata swamp resulting in a ***moderate*** impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- WSDF-C will acquire a wastewater or effluent discharge permit from DWRM with conditions to control discharge of untreated or partially treated effluent to the environment.
- A good drainage system should be built around the water supply site, public stand pipe and water treatment plant. The drainage and/ or soak pit as often as needed should be cleaned by the respective households or user-communities. Households or user-communities will be sensitised about proper drainage systems and their use.
- Households and commercial facilities will be encouraged to render sanitation waste like food waste free of pathogenic organisms through composting technique and so make it useful as agricultural fertilizer.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

C) Negative Impacts on Water Vendors

In many developing countries due to the great distance to traditional water source waters, fetching water is done by water vendors. The same conditions exist in Kakumiro District where some community members rely on water vendors for water supply with a 20-litre jerry can costing between Ug. Shs 200 and 500. By introduction of piped potable water supply project, those people previously engaged in fetching water for others as a paid occupation, are thrown out of their job.

Impact significance: The ***intensity*** of the impact is ***very low*** given that there will still be households not connected to the piped water and with increasing population of Kakumiro, there will be more alternative jobs. ***Sensitivity*** of the receptor is rated ***low*** resulting in a ***minor*** impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategy: Identify such people and encourage them to work as causal labourers at the proposed project facilities.

D) Occupational Health and Safety Risks

During maintenance of the water transmission network and water treatment plant, occupational health and safety problems may arise. These may include: lifting of heavy and sharp objects and transportation of materials for maintenance, storage as well as handling and use of dangerous substances.

- Inadequate lighting and ventilation in workplaces when the intervention has to be done late in the day;
- 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; and
- Eye hazards such as splashes.

Impact significance: Duration of the impact would be long-term lasting entire life of the affected person or short-term depending of the hazard exposed to. The ***intensity*** of the impact is ***low***. However, ***sensitivity*** because it may involve loss of life or permanent damage of a person's limb on the receptors will be ***high***, thereby giving a ***moderate*** impact significance.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- The primary measure to mitigate OHS impacts is prevention which entails identification of risks and instituting pro-active measures to avoid them. In part this can be achieved by following GIIP or national guidelines. For unavoidable risks, personal protective equipment (PPE) will be provided to workers.
- All staff will be oriented on safe work practices and guidelines and ensure that they adhere to them.
- Staff will be trained 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.
- Regular safety drills will constantly follow on various possible incidences.
- Signage will be used to warn staff and/ or visitors that are not involved in facility work of dangerous places.
- Evacuation procedures will be developed to handle emergency situations.
- Adequate OHS protective gear will be provided for all laboratory staff.
- The treatment plant will be provided with a first aid kits shall be provided.
- In addition to tree planting around the site, the facility will be fenced off with a razor wire to stop unauthorised people from accessing the site and to keep out animals and for avoidance of vandalism at the site.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

E) Risk of Accidents

The development is expected to increase the traffic along the access roads due to maintenance vehicles carrying workers as well as tools and equipment for construction and maintenance of the pipeline. These impacts would mostly be linear and spatial in extent limited to road routes. They would therefore affect roadside communities, communities neighbouring the proposed site and road users.

Impact significance: The ***intensity*** of impact is assessed as ***low*** and ***sensitivity*** of the receptors as ***low*** given that there will be a few vehicles at the beginning of the project and the community will get used as the number increases in addition to the fact that the road network is being improved on. Therefore, significance of the impact is ***minor***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- Travel speeds of vehicles along the road especially at trading/ business centres will be controlled using humps and setting travel speeds not exceeding 40 km/h;
- All construction equipment and trucks will be kept in good operating condition by regular servicing to reduce noise and exhaust emissions;
- Adequate and appropriate signs including speed limits will be installed along the roadway in proximity to the access roads.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

f) Impacts of Project Operation on Climate

The water treatment plant requires energy and in the event that the grid power is not available, diesel generators will be used to supply energy. The generators will contribute to gases like CO_2, CO and CH_4.

Impact significance: The above impacts would mostly be local extent and intermittent in nature only happening when the generators are running. Therefore, the ***intensity*** of impact is assessed as ***very low*** and ***sensitivity*** of the receptors as ***low***. The impact significance is therefore ***minor***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Inte nsit	**Very low 1**	1	2	3	4

		Negligible	Minor	Minor	Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies: WSDF-C will ensure that the generators are well serviced and maintained to minimise GHG emissions.

g) Impact of Climate Change on Project Operation

A changing climate would impact water supply through changes precipitation patterns and storm-related damages. Dry spells will lead to an overall decrease in the availability of water and communities may revert to unsafe water sources. Changes in climate may also result in more intense rainfall events resulting into heavy storms. Stormwater-related effects include surge damage, wind damage and flooding which could pose a direct threat to the water infrastructure.

Impact significance: The water shortage may force communities to use unsafe sources leading to impacts some of which are irreversible, for example, death resulting from water borne diseases and poor sanitary conditions. The ***intensity*** of impact is assessed as ***low*** and ***sensitivity*** of the receptors as ***high***. The impact significance is therefore ***moderate***.

		Sensitivity of receptor			
		Very low 1	**Low 2**	**Medium 3**	**High 4**
Intensity of impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation strategies:

- Catchment management and source protection plan is being developed to ensure that in cases of extreme weather conditions, the water resources are not greatly affected.
- The communities will be encouraged to use the toll-free calling line to report any damages during extreme weather conditions.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

8.3.3 CUMMULATIVE IMPACTS

Cumulative effects can be defined as "the impacts on the environment that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions" (Council on Environmental Quality, US 1978). Below are some of the envisaged cumulative effects:

a) Physical Impacts

Predicted physical impact is increasing recession area and water pollution. Also, activities like clearing of vegetation may increase the intensity and frequency of erosion/land degradation. This results in increased sediment concentration in the nearby valley-like seasonal swamp during the rainy season hence hindering other water usage purposes downstream.

b) Biological Impacts

Changes in the physical and chemical characteristics of water from increased runoff inevitably affect distribution and abundance of aquatic biota. This can be attributed to increased nutrients leached from flooded soils and vegetation, enhanced productivity throughout the food chain.

c) Socio–economic Impacts

The development of proposed project over the time would generate many employment opportunities directly as well as indirectly in the form of various service providers e.g. operation and maintenance.
.
A reliable drinking water supply would generate long-term economic benefits, including benefits to the local economy and spur up development in the area. Construction activities would generate short-term economic benefits and residents of Kakumiro District in the project area will benefit from this and once the earnings received are well utilised, the benefactors' livelihood would have been transformed for the better.

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 Introduction

This environmental and sociol management plan (ESMP) for proposed construction works and operation of the water supply and sanitation facilities under this project, identifies the potential environmental and social aspects that should be monitored. It identifies parties responsible for monitoring actions, associated costs, indicators and training or capacity building needs and reporting. Various aspects of the ESMP are detailed in sections below.

9.2 Institutional Arrangements

9.2.1 Institutional Structure and Responsibilities

There will be three parties involved with the ESMP, that is, the client (WSDF-C - and a project manager will lead the client team) with ultimate responsibility for E&S performance on the project; the Supervising Engineer (with an Environment and Social Specialist on their team) responsible for monitoring and supervising the implementation of the ESMP and contract requirements; and the the Contractor (with an Environment and Social Officer) who has responsibility for implementing the ESMP.

Therefore, the institutional responsibility of ensuring that this ESMP is implemented will rest with MWE having a key role of reviewing consultants' reports for compliance with the ESMP, among others. The Project Manager shall have the ultimate responsibility for implementation of ESMP and will therefore ensure that resources are duly provided. Other roles will be:

- Monitoring implementation of mitigation actions by contractors
- Coordinating training and capacity building where planned

MWE should ensure that all its personnel to be involved in implementation of this ESMP are adequately qualified and were appointed based on their qualification and suitability for respective roles. There is thus no training provided for them under this ESMP.

Monitoring of the implementation of this ESMP is the responsibility of the Contractor under the guidance, supervision and monitoring by the Supervising Engineer. The Environmentalist and Social Specialist for the Supervising Engineer will supervise the contractor's monitoring activities.

The Contractor's Environment and Social Officer will ensure that the provisions in this ESMP are implemented within the sites under their supervision and to collect and transmit relevant information to the Supervising Engineer.

Subcontractors will be required by a condition of their subcontract with the main contractor to actively manage environmental and social issues associated with their subcontract works and comply fully with all the applicable statutory regulations and the main contractor's environmental and social management plans. For significant aspects of work such as earthworks, the contractor may require subcontractors to provide their own Environmental and Social Management Plans and/or Method Statements for review by the Contractor's Environmental consultant/Officer. These ESMP's shall be approved by the Resident Engineer in consultation with MWE for adequacy before being implemented.

The Kakumiro District Environmental Officers (DEOs) are responsible for overseeing environmental protection on behalf of NEMA. The DEO will have implementation and monitoring roles during execution of this ESMP. Usually, these officials lack adequate facilitation so the project will need to provide auxiliary financial assistance for them to have effective participation in this project.

9.2.2 Monitoring and Reporting Arrangements

Monitoring will verify if predicted impacts have actually occurred and check that mitigation actions recommended in the ESIA are implemented and their effectiveness. Monitoring will also identify any unforeseen impacts that might arise from project implementation.

Monitoring will be undertaken by MWE and Environmental Officers who represent NEMA at local administrative level. Monitoring by NEMA in this case can be considered "third party monitoring" but this is its regulatory mandate according to National Environment Act (2019).

Another government agency that may undertake "third party monitoring" is the Occupational Health & Safety Department in Ministry of Gender, Labour& Social Development (MGLSD). This unit has authority to inspect any facility for compliance with national requirements on safety in workplaces. The project shall make no funding to MGLSD since this is provided for in its annual budget.

Monitoring will be done through site inspection, review of site records (Accident Log, issuance of PPE, waste records, trainings and inductions, permits and approvals, etc.) review of grievances logged by stakeholders and *ad hoc* discussions with potentially affected persons (construction workers, residents near the project facilities). At each monitoring, a discussion with a chairperson of environment committee of the area's local council (LC) could provide insight into views and grievances community has about the project.

Monitoring will be undertaken continuously on a daily basis over the construction period.

Environmental Cmpliance Audits will be necessary both during construction and project operation. While construction audits will aim to verify compliance to impact mitigation requirements, post-construction audits are a regulatory requirement within 12 months and not more than 36 months after completion of construction, according to ESIA Regulations (2020).

Since construction duration is estimated to be 1½ years, this ESMP has included a budget for 1½ year's construction audit and a separate provision so that from year 2 to year 5 full environmental audits are done as per Uganda requirements.

Both construction and post-construction audits can be conducted internally (by WSDF-C) or by a consultant hired by WSDF-C. If undertaken by a hired consultant, a budget has been proposed for both in this ESMP.

Concise monthly monitoring reports should be compiled by the Contractor. The report will highlight the 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. The report will be discussed during the monthly progress meetings. The Environmentalist and Social Specialist for the Supervising Engineer will approve the Contractor's monthly environmental and social monitoring report that will then be transmitted to MWE for final approval. MWE's Environmental Management and Social Specialist will also independently monitor the implementation of the ESMP and/or verify the accuracy and content of the Contractor's monitoring report and then report to MWE. The report will also be shared with The AfDB and other relevant stakeholders. Approval of the environmental monitoring report will be the basis for the Supervising Engineer to approve payment of the respective environmental and social BoQ items.

Construction- and post-construction phase auditing should culminate in reports that MWE shall share with AfDB, NEMA or other interested stakeholders. Note that while WSDF-C is under no obligation to disclose construction phase audits, annual post-construction audits must be submitted to NEMA as a regulatory requirement as per ESIA Regulations (2020).

9.2.3 Grievance Redress Mechanism

This section describes avenues for affected persons to lodge a complaint or express a grievance against the project, its staff or contractors during project implementation. It also describes the procedures, roles and responsibilities for addressing grievances and resolving disputes. Every aggrieved person shall be able to trigger this mechanism to quickly resolve their complaints.

The objectives of the grievance process are:

- Ensure that appropriate and mutually acceptable corrective actions are identified and implemented to address complaints;
- Verify that complaints are satisfied with outcomes of corrective actions;
- Avoid the need to resort to judicial proceedings.

The grievance mechanism will be fed from three main sources:

- Community residents and the respective local leaders.
- Supervising engineer, clerk of works or contractor.
- Monitoring team who will forward issues/concerns identified in the field.

Steps of the grievance process are described below.

a) ***Step 1: Receipt of complaint***

A verbal or written complaint from a complainant will be received by the Clerk of Works or Supervising Engineer and recorded in a complaints log s(he) keeps on site. The log will indicate grievances, date lodged, action taken to address complaint or reasons the grievance was not acted on; information provided to complainant and date the grievance was closed. Grievances should be lodged at any time, either directly to the Clerk of Works'/ Project Office or through the Local Council Chairperson. The process for lodging a complaint is outlined below:

- Supervising Engineer receives complaint(s) from complainant and records it in log (in English).
- Supervising Engineer reads the recorded complaint translating it into local language for the complainant to confirm correct detail of complaint has been documented.
- Complainant signs the log to confirm grievance was accurately recorded.

Written complaints will be received and person delivering the complaint fills in log with his or her details (name, contact, etc.); date of delivery and then the person receiving the complaint also signs against the record.

b) ***Step 2: Determination of corrective action***

If in his/her view, a grievance can be solved at this stage, the Clerk of Works/ Project Office will determine a corrective action in consultation with the aggrieved person. Remedial action(s) and timeframe within which they must be accomplished has been described and the party responsible for implementing them will be recorded in the complaint log.

Grievances will be resolved and status reported back to complainants within 5 days. If more time is required, this will be communicated clearly and in advance to the aggrieved person. For cases that are not resolved within the stipulated time, detailed investigations will be undertaken and results discussed not more than 1 month from lodging a grievance.

c) ***Step 3: Meeting with the complainant***

The proposed corrective action and the timeframe in which it is to be implemented will be discussed with the complainant within 5 days of receipt of the grievance. Consent to proceed with the corrective action will be sought from the complainant and witnessed by a local council chairperson (LC Chairman).

d) ***Step 4: Implementation of corrective action***

Agreed corrective action will be undertaken by the project or its contractor within the agreed timeframe. The date of the completed action will be recorded in the log against the complainant's grievance.

e) ***Step 5: Verification of corrective action***

To verify satisfaction, the aggrieved person will be asked to return if not satisfied with the corrective action.

f) ***Step 6: Action by MWE/WSDF-C and project contractors***

If the Clerk of Works cannot solve the grievance, he will refer it to MWE/WSDF-C (and contractor) through the Supervising Engineer. If MWE (and Contractor) or cannot solve the grievance, then it can be referred to the local government structures ranging from LC I to LC V or the Courts of Law.

Table 36: Environmental Management and Monitoring Activities and Criteria

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
Construction Phase							
CP1	Construction activities	Orienting all construction workers on safe work practices and ensure that they are adhered to	Contractor & Supervision Consultant	Ongoing	Routine inspection and maintenance records	Included in Contractor's cost	Daily
CP2	Traffic Disruptions	Preparing a Traffic Management Plan to minimize the risk of traffic disruption, especially in areas where the major roads will require re-construction of culvert crossings. Using Appropriate safety signs during construction (e.g. 'Heavy Trucks Turning', 'Road	Contractor, Supervision consultant & Police	Throughout the Construction period	Presence of the Traffic Management Plan with the contractor and on site	Included in Contractor's cost	Daily
CP3	Vegetation Removal	✓ Minimize vegetation clearance and protect water & soils from pollution ✓ Landscaping and re-vegetation after construction along the channel	Contractor	Monthly	Visual inspection	11,000,000	Daily

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP4	Soil erosion and degradation	✓ Clearance of vegetation will be limited to areas that will be required for construction purposes. This will serve to minimize land disturbance as much as possible. ✓ Excavation of trenches will be done in a phased manner such that soil is not exposed for a long time before the channel is lined. ✓ Excavated material will be collected routinely such that heaps of exposed soils are not left in the Project area for long.	Contractor, Supervision Consultant & MWE	Throughout the Construction period	Evidence of sedimentation of eroded soil downstream of construction site. Number of complaints from neighboring communities regarding deposition of eroded soil.	11,600,000	Daily

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP5	Flow Diversions during construction	✓ Phasing of the rehabilitation and expansion works such that the majority of works are undertaken during the dry season to reduce the risk of constrictions in the drainage system during the rainy season. ✓ Construction will not be started where critical access roads or channel sections cannot be completed before the start of rainy season and the bidding documents shall reflect this emphasis. ✓ The Contractors will use best available methods of construction to minimize the risk of blockages and constrictions during construction. Some of the methods that can be employed for channel diversion include: a) controlled release of flow through a pipe to downstream of the section under rehabilitation and expansion after damming; b) restriction of the flow to one proportion of the flow channel area as construction is completed in the other flow area	Contractor & Supervision Consultant	Throughout the Construction period	Occurrence of flooding in Project area during construction period	Included in Contractor's cost	Daily

CP6	Generation of Wastes	✓ The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle. ✓ A waste management plan should be developed by the Construction Contractors, and approved by MWE to ensure that measures for handling all Project-generated waste are in place. ✓ Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage. ✓ Construction waste shall not be left in stockpiles along roads, but removed and reused or disposed of on a regular basis. ✓ Human waste will be properly managed through provision of onsite portable toilets, with consideration for the number of workers on site during construction. Separate toilets will be provided for female workers. ✓ Any hazardous wastes generated by construction activities (e.g. emptying pit latrine contents) will be collected and transported off site to the appropriate licensed waste storage facility	Contractor, Supervision Consultant & WSDF-C	Throughout the Construction period	Submit waste management plan with adequate acceptable measures. Records from licensed waste contractor with logs on source of waste, weight, final destination of waste, handling of waste at final disposal point.	Included in Contractor's cost	Daily

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP7	Accidents and Construction hazards	✓ Preparation and approval of a Health and Safety Plan that sets out the measures to be taken to ensure the safety of the workers and the local community during the works. ✓ Orient all construction workers on safe work practices and ensure that they are adhered to. ✓ Safety training will be conducted routinely on how to prevent and manage incidences on site, and measures to protect the general public from construction site hazards ✓ Use of PPE for different work environments. ✓ Procedure for reporting and/or responding to incidents. ✓ Emergency evacuation procedure ✓ All tasks will be performed by qualified and authorized personnel.	Contractor, Supervision Consultant	Throughout the Construction period	Records of incidents and accidents on site. Observance of site safety rules by workers. Use of requisite PPE by workers. Response to emergency incidents on site. Availability of first aid kits on the various sites.	13,650,000	Daily

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP8	Air quality and pollution	✓ Sensitization of local residents will be undertaken prior to the start of the rehabilitation and expansion works. ✓ Delivery vehicles will be switched off when not in use so as to minimize the release of fugitive emissions; ✓ Contractor's vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimize potential emissions. ✓ Trucks delivering materials will be covered with tarpaulin to reduce the risk of fugitive dust emissions, especially in busy residential and commercial areas; ✓ Waste from site to be transported by licensed companies for waste transportation ✓ Regularly monitor air quality to truck changing parameters and inform timely interventions	Contractor, Supervision Consultant & WSDF-C	Throughout the Construction period	Number of complaints of excessive fumes or dust registered. Levels of dust and fugitive emissions released to the atmosphere as a result of construction activities	6,900,000	Daily

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP9	Noise Pollution and Vibrations	✓ Sensitisation of local residents prior to the start of the rehabilitation and expansion works. It will be particularly important to: ✓ The Contractors on site made aware of, and adhere to, the regulatory noise limits for a construction site ✓ Construction workers provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise. ✓ Construction activities limited to daytime, especially in residential areas to minimize disturbance of residents. ✓ Construction works near public institutions such as schools should be harmonized with school programmes to consider works during holidays and weekends. ✓ Project machines and vehicles will be turned off when not in use.	Contractor, Supervision Consultant & MWE.	Throughout the Construction period	Number of complaints of excessive noise and vibration. Routine inspection and maintenance records	9,730,000	Daily

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP10	Water Pollution	✓ Planning and management of stockpiles to minimize potential for "wash-out" and generation of sediment-laden runoff during rainy seasons. ✓ Fuel handling and oil spill measures will be implemented to prevent, control and address spill or leaks. ✓ All equipment and vehicle repairs will be carried out under shelter to minimize potential soil and oil pollution during rainy seasons. ✓ Regular maintenance of operating machinery to keep it in good working condition, and hence minimize oil and lubricant spills	Contractor, Supervision Consultant & WSDF-C.	Throughout the Construction period	Occurrences of impediment to water flow, especially in wetland areas	Included in Contractor's cost	Monthly

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
	Public Health Issues	✓ All Contractors shall be required to develop guidelines for behavioral conduct, including penalties. This should be reflected either as independent document or component to the Contractor's Human Resource Manual ✓ Workers must be sensitized on proper social behaviour and conduct with reguard to community norms prior to starting work; ✓ workers should be sensitized to avoid engaging in sexual relations with underage girls and married women; ✓ In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; ✓ Similarly, in liaison with local leaders, contractors should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities ✓ Contractors will be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during Project execution. This will include a reporting procedure in the event that the community members have any issues to report as a result of the Project workers' behaviour and/or negligence.	Contractor, Supervision Consultant & WSDF-C.	Throughout the construction phase	Guidelines for behavioral conduct, and No. of penalties awarded to workers for misbehavior	15,860,000	Monthly

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP11	Disruption of Socio-economic Activities and utility services	✓ Project implementation will be done in close consultation with the respective utility service companies such as MWE, UNRA, UMEME and telecommunication companies. ✓ All identifiable utility service lines in the right of way will be relocated in the pre-construction phase prior to the commencement of works to avoid interruptions from damage during the construction phase. ✓ During construction, the Contractor will have to prepare a work schedule, which will be closely monitored and supervised by MWE. ✓ The communities to be affected by any interference in service provision (water, road, electricity, or telecommunication signals); will be given ample warning and alternatives provided by service provider.	Contractor(s) /MWE/WSDF-C and service providers	Before construction phase kicks off	All the utility service lines in the right of way are relocated and communities are informed in advance, Recorded number of service infrastructure damaged as a result of Project implementation. Number of complaints recorded from community members regarding interference with service infrastructure due to Project activities.	36,500,000	Monthly
		OPERATIONAL PHASE					
OP1	Occupational Health and Safety Risks	✓ The channel crossings will be clearly demarcated to indicate the ones that are meant for only pedestrian traffic, those that can be used by bicycles and motorcycles and general traffic. The crossings for only pedestrians should have bollards with reflective strips installed at the ends to strict access to other traffic. ✓ Side rails will be installed along the channel crossings to enhance community safety and minimize the risk of falling into the channels. ✓ Community sensitization to allow proper usage of the crossing points and avoid accidents when	MWE under the Engineering and Technical Services Directorate	Throughout the O&M phase	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Included in the WSDF-C annual operational budget	Per Quarter

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
		crossing after a heavy downpour. ✓ Community sensitization to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings.					
OP2	Loss of income from Project-related activities	✓ All people taken on to work on this Project will be informed about its duration and phasing beforehand, so that they can plan accordingly. ✓ The MWE Supervising Engineers will take note of Consultants, Contractors and sub-contractors that produce quality work, in line with their contracts and industry best practice during the construction phase, and prioritize them for available maintenance work during the life of the Project. ✓ Unskilled labourers taken on from the local communities surrounding the Nakivubo drainage channel will be kept on for maintenance works of	MWE/WSDF-C under the Engineering and Technical Services Directorate	Throughout the O&M phase	Number of O&M workers from the local communities surrounding the Nakivubo drainage channel	Included in the MWE/WSDF-C annual operational budget	Annually

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
OP3	Risk of accidents	✓ Side rails will be installed along the channel crossings to enhance community safety and minimize the risk of falling into the channels. ✓ Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour. ✓ Community sensitization to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings	MWE under the Engineering and Technical Services Directorate and Directorate of Gender and Labour	Throughout the O&M phase	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities	Included in the MWE annual operational budget	Annually
OP4	Air pollution	✓ The vehicles will be switched off when not in use so as to minimize the release of fugitive emissions. ✓ The vehicles and machinery will be regularly serviced and maintained to optimum working	MWE under the Engineering and Technical Services Directorate	Throughout the O&M phase	Number of complaints of excessive fumes registered. Levels of emissions released to the atmosphere as a result of	Included in the MWE annual operational budget	Quarterly
OP5	Disturbance due to noise pollution and vibrations	✓ The Contractors and workers for operation and maintenance should be especially mindful when carrying out construction near sensitive receptors such as business centres. ✓ Maintenance activities will be limited to daytime, especially in residential areas to minimize disturbance of residents. ✓ Regular care and maintenance of vehicles and equipment must be undertaken to ensure they run smoothly so as to minimize emissions of	MWE under the Engineering and Technical Services Directorate	Throughout the O&M phase	Number of complaints of excessive noise registered. Noise level measurements	Included in the MWE annual operational budget	Quarterly

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
OP6	Improper waste management from the channel maintenance	✓ A waste management plan will be developed by the Maintenance Contractors, and approved by MWE to ensure that measures for handling all operation and maintenance waste (dredged material and waste debris) are in place. ✓ The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reduce, reuse and recycle ✓ Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage.	MWE under the Directorate of Public Health and Environment The local authorities where the Nkusi River traverses	Throughout the O&M phase	Number of complaints of dumping Project waste in unlicensed areas registered Sediment and waste debris deposition in the wetlands and receiving water bodies	Included in the MWE annual operational budget	Weekly
OP7	Impact on water resources and the receiving habitats	✓ The quantity and quality of storm water reaching the channels must be reduced within the catchment. Implementation of an integrated catchment management plan (ICMP) would be an effective undertaking. ✓ The designed channel corridors need to be protected from encroachment. ✓ The channels must be regularly and adequately maintained – including replacement of damaged lining, vegetation clearing, de-silting, garbage/debris removal and dredging. ✓ MWE/WSDF-C will closely engage NEMA and WMD in programmes aimed towards protection of natural wetland systems, since the storm water from the sites will have an impact on the downstream receiving bodies.	MWE under the Directorate of Public Health and Environment The local authorities where the Nkusi River traverses	Throughout the O&M phase	Monitoring locations water quality trends (water quality tests). Waste collected from the channel as wet earth materials shall be temporarily stockpiled at a gazetted location around project site to drain before they are transported to the final disposal site	Included in the MWE annual operational budget	Annually

Ref. No	Anticipated Imp	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
PO8	Traffic Disruptions	✓ Preparing a Traffic Management Plan to minimize the risk of traffic disruption, especially in areas where the major roads will require re-construction of culvert crossings. Using Appropriate safety signs during construction (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.)	Contractor, Sub Contractor, Supervising Consultant, MWE/WSDF-C, Kakumiro Traffic Office	Contractor	Daily	-	

Note: External Monitor can be a lead Agency and or Authorities like NEMA, District Environment Officers or a NEMA Certified Consultant whom the developer and Contractor will contact on matters arising like noise, biodiversity, air and water quality monitoring. Lead Agencies will make their own arrangements on inspections on site to ensure compliance with set guidelines and standards.

CONCLUSIONS AND RECOMMENDATIONS

The Igayaza-Kikwaya WSSS is being proposed by the Ministry of Water and Environment/WSDF-C for Igayaza and Kikwaya Sub Counties both in Kakumiro district. This is envisaged to bring an end to water stress and overreliance on a few low yielding boreholes within the project area of Igayaza and Kikwaya Sub-Counties and neighbouring community. It is also envisaged that, the area experiences scarcity of safe clean water and high growing population. Further still, the project will also address the focal area of access to clean water as stipulated under the Uganda Vision 2040 and the National Development Plan III. The project also contributes towards achieving SDG *(specifically SDG 6 on clean water and sanitation)*. Several beneficial impacts envisaged will include:

- Improved quality of water supplied to communities.
- Reliable water supply to the communities.
- Provision of employment opportunities during construction and operation phases.
- Improved health and sanitation due to improved water quality and quantity.
- Improved local economies and induced development especially sourcing of raw materials for construction activities and tree seedling growing business boost during operation phase.
- Small scale irrigation farming especially in vegetables and flowers since most household heads are involved in subsistence agriculture.
- An increase in revenue for the sub counties from water project collections.
- Initiate the move away from the status quo of rural women and children's perpetual carrying of water on their heads from unprotected and distant point water source and allow them to engage in income generating activities and to improve the image of the woman and children.
- Improved image of the Sub Counties and parishes in terms of providing good services to its people hence more funding from potential funders.

However, the ESIA findings indicate that direct impacts will be fairly compassionate and limited to the project area where construction works will be undertaken. Direct negative impacts will include:

- Soil erosion during construction phase.
- Destruction of vegetation and crops during construction phase.
- Increased noise nuisance during construction phase by workers and equipment.
- Increased sediment loads into the downstream beyond water sources especially during construction phase.
- Improper disposal of cut out spoil and other construction wastes.
- Other concerns include occupational safety hazards, and HIV/AIDS risk associated with construction labour.

A RAP will be undertaken to address all compensation issues that are anticipated and an ESMP has also been presented in the preceding Chapter to ensure positive impacts are enhanced while negative impacts are mitigated. Resettlement issues are not anticipated. The current designs did not consider the need for a wastewater treatment plant. The water source being surface water based, a substantial amount of wastewater and sludge will be generated in sedimentation tanks thus there is need to put in place a wastewater treatment plant to enable wastewater to be treated before final disposal especially if water treatment chemicals are to be used.

During this ESIA study, comprehensive stakeholder consultations were conducted with relevant stakeholders and WSDF-C will liaise with them to ensure effective implementation of the proposed mitigation measures for the anticipated negative impacts as indicated in the ESMP. WSDF-C should work closely with the local leaders and Local Government to ensure smooth implementation of the EMMP and if impacts not contemplated during this ESIA arise, the management of WSDF-C should immediately address them in consultation with NEMA. If any other structures/ expansion not described in this report

takes place, it will be considered separate and an ESIA Report/Project brief will be prepared by WSDF-C or the Contractor and submitted to NEMA for approval before implementation.

The following mitigation measures should be considered as conditions of approval as they are regarded as being essential in so far as rendering potentially significant impacts acceptable. Implement the ESMP for all provided project phases with special attention being given on:

- Undertake Annual Environmental Audits and submit reports to NEMA.
- Maintaining good house-keeping through the duration of the construction phase.
- Screening unsightly aspects from public view including excavations (where practical), construction material storage areas, waste storage areas and ablutions.
- Erect fencing around construction sites to act as screens minimizing the effect of wind in generating dust emissions.
- The re-vegetation of all areas of natural vegetation with indigenous species that have been disturbed as a result of construction activities and maintain the 200m buffer zone.
- Designation of construction materials and fuel storage areas.
- Effective control of waste and containment of storm water especially during rainy season.
- Implement dust suppression measures (use of water) when appropriate.
- Train workers on issues of HIV/AIDS and child labour should not be permitted.
- Adhere to Occupational Health and Safety Act, 2006 provisions e.g. monitoring noise levels and provision of protective equipment to staff.
- At least 75 % (subject to availability) local labour from Kakumiro district should be used and 95% (subject to availability and skills levels) local contractors should be used.
- The Developer (DWD) monitors compliance together with stakeholder wide monitoring group comprising technical staff from local government institutions.
- Fencing is recommended in order to prevent contamination of the water source and for security of hydraulic structures and installations for the intake on River Nyarwambu.
- Prepare a water source protection plan for the catchment area of the water sources.

Therefore, the proposed Water Supply System is environmentally and socially feasible for implementation provided the recommended mitigation and monitoring measures are implemented, and the proposed implementation arrangements are upheld.

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ANNEXES

Annexe 1. Approved Terms of Reference for ESIA by NEMA

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

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NEMA/4.5

20th October, 2022

The Branch Manager,
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RE: REVIEW OF THE SCOPING REPORT AND TERMS OF REFERENCE FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED IGAYAZA-KIKWAYA PIPED WATER SUPPLY AND SANITATION SYSTEM IN IGAYAZA TOWN COUNCIL, KAMUMIRO DISTRICT

This is in reference to the above mentioned Scoping Report and Terms of Reference (TOR) (EIATOR 9739) that were submitted to the Authority for consideration for approval. This Authority has finalized review of the scoping reports and TOR and grants Formal approval of the TOR.

Please, note that approval of the Scoping Report and TOR, DOES NOT CONSTITUTE PERMISSION to start implementing any of the proposed project activities, before a decision is made by this Authority.

In addition to the scope of work provided in the ToR, ensure that the key aspects highlighted below are taken into consideration during the conduct of the Environment and Social Impact Assessment and preparation of the ESIA report.

(a) Give clear elaboration of the proposed Sanitation System component and that of the Piped Water Supply of the project. Note however, the cumulative impacts of both projects components should be evaluated and mitigation measures provided in the respective reports.

(b) Provide a clear description of the water supply scheme, including the designs, treatment processes and a detailed lay-out plan for the project and the water

treatment plant, location of the different infrastructure and geographic coordinates for the different infrastructure;

(c) Undertake a comprehensive assessment of the potential impacts of the project its associated components, particularly the options for water abstraction on the hydrology and ecosystem of the water source;

(d) Evaluate the risks associated with the project and emergency preparedness options in case of breakdown of the system and discuss these options in the ESIS;

(e) Undertake comprehensive consultations with the key stakeholders and develop a clear stakeholder engagement plan for the entire project cycle to regularly respond to stakeholder concerns in a timely manner. Ensure that the views/concerns of the stakeholders consulted are well documented and addressed in the report and lists of persons consulted appended to the ESIA report;

(f) Provide detailed description of site specific baseline information of the project sites for the different project components;

(g) Assess the different types of waste streams likely to arise from the project activities and propose measures for managing such waste;

(h) Ensure that detailed soil and water analyses are carried out for the project site, and the results provided in ESIA report;

(i) Include in the ESIA report **comprehensive mitigation and environmental management and monitoring plans**, respectively *(preferably in table matrix format)*, that related to the identified potential environmental impacts and risks;

(j) Assess any other critical environmental aspects/ concerns which may have not been initially foreseen during the preparation of the scoping report and ToR are addressed, and include an evaluation of such concerns in the ESIA report;

(k) Indicate the estimated cost of the project evidenced by a certificate of valuation of the project (investment) cost, issued by a qualified and registered valuer, in accordance with Regulation 18(1) of the National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.

(l) Accompany the ESIA submission with evidence of payment of the 30% ESIA fees, in accordance with Regulation 49 of the National Environment (Environment and Social Assessment) Regulations, S.I. No. 143 of 2020;

You may proceed with carrying out the ESIA for the proposed Project.

Waiswa-Ayazika
FOR: EXECUTIVE DIRECTOR

Annexe 2. Records of Stakeholder Engagement

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR IGAYAZA-KIKWAYA TOWN WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT.

Date: 06/09/2022 **DISTRICT:** KAKUMIRO

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	LUBOWA Tumusiime MARK	Town Clerk	0782174717	[signature]
2.	Kobuzinge Caroline	CAO	0779865636	[signature]
3.	SSENTONGO ALEX	H/A	0785326220	[signature]
4.	KYABAGGU PAUL - E -	ENGINEER / SG1	0782446897	[signature]
5.	Eng. Kyomuhendo Angella	Engineer WSDF	0781420971	[signature]
6.	Pr Karuru John	Pr	0781165466	[signature]
7.	TUMWEKI GAD	Peasant	0780884270	[signature]
8.	BYAKWIKAMA SIPRIANO	KIGWARA	0774978394	[signature]
9.	Tumusiime william	Pesant	0774376512	[signature]
10.	munyentoranamaF	mutuge	0786990395	[signature]

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: **CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR IGAYAZA-KIKWAYA TOWN WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT.**

Date: 06/09/2022 **DISTRICT:** KAKUMIRO

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	TUSUBIRA YAFESI		0704805472	
2.	ASINAURA JOHNSON		0782428413	
3.	MASASIRA ISAYA		0785808755	
4.	Peter Morris		0787555[illegible]9	
5.	Siteven Friday		0759490952	Friday
6.	KATO FRED		0789835193	
7.	Tulinawe Baguma		0789509174	Baguma
8.	MUSINGE Sa[illegible]		0789539063	
9.				
10.				

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: **CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR IGAYAZA-KIKWAYA TOWN WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT.**

Date: 06/09/2022 **DISTRICT:** KAKUMIRO

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	D. Mukwenda	SEC, LC I	0773377467	[signature]
2.	Biryomumisho Pauson		0784907225	Pauson
3.	Musinguzi Benon		078071186l	Benon
4.	KIZZA YAKOBO	Speaker Lwentulege	P/C 0781201637	[signature]
5.	SSAAZI EDWARD		0781012580	[signature]
6.	[illegible]			
7.	Sseempijja Ronald		0774579722	Ssempijja
8.	KWENGYE JULIUS		0709516788	JULIUS
9.	Nsinikweri Brian		0771890617	[signature]
10.	SSEGUYA CHARLES		0761102268	[signature]

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: **CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR IGAYAZA-KIKWAYA TOWN WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT.**

Date: 06/09/2022 **DISTRICT:** KAKUMIRO

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Resty Kamulari	mulimi	0789734045	Resty
2.	Cissy Kavuma	Sec Lcl I	0751011970	cissy
3.	Sirivia Manyonyi	mulimi		sirivia
4.	NANTONGO	F		
5.	Ainemy Gurbt			
6.	TUMWEBAZE TADEO		0785336646	
7.	boy WiLiBa			
8.	Mwanje Peter	Mulimi	0774966731	Mwanjo
9.	Nakakeeto mariya	mugawo	077378761	
10.	Kagwa pita	muvubi	0778923252	

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: **CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR IGAYAZA-KIKWAYA TOWN WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT.**

Date: 06/09/2022 **DISTRICT:** KAKUMIRO

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Mugerwa Aggrey	Farmer	0703868961	mugerwa
2.	MUTEBI PAUL	BODA BODA	078216580	[signature]
3.	Kambenkwine . Benard.	farmer	0782951395	Kambenkwine
4.	Tubihingmeho patrick	KAMPOSI	0777096935	Tubihingmeho
5.	BASASIA JAMES	Builder.	0786878721	[signature]
6.	Tugume jackson	Farmer	0776625960	[signature]
7.	Ssebirala Batesta	Trader	0703653982	[signature]
8.	Mwebembezi Robert	Farmer	0772066526	mwebembezi
9.	TUMUSIME	ROBERT		[signature]
10.	BWAMBALE	WYCLIFF	0772864131	[signature]

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR IGAYAZA-KIKWAYA TOWN WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT.

Date: 06/09/2022 **DISTRICT:** KAKUMIRO

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	NABAGEREKA MADINA		Kampisi	0784979934
2.	Nabayinda JUDITH		mwelulca	
3.	NAILA TO FLOCE		mw-elulca	
4.	Vanoyili rola		KAMPISI	0777284397
5.	BABUEYAKA Shabani			
6.	NANTONGO MIRIAMY		Kampisi	0706691400
7.	Nakatoogo Mary		kampisi	0708276442
8.	NIASamba pasikazy		kampici	0773810756
9.	ARINAITYE RACHEAL		Kampisi	0789905947
10.	KASOKSNS A EMI		KASMKSNEC	

Annexe 3. Water Quality Analysis Results

Telephone
+256 (0) 414 250 464 (Gen)
+256 (0) 414 250 474
Email: dgal@mia.go.ug
Website: www.mia.go.ug

In any Correspondence on this subject GE0026/2022
quote No.....
September 19, 2022

THE REPUBLIC OF UGANDA

MINISTRY OF INTERNAL AFFAIRS
DIRECTORATE OF GOVERNMENT ANALYTICAL LABORATORY
Plot No. 2 Lourdel Road
Wandegeya,
P.O.BOX 2174
Kampala - Uganda

REPORT OF ANALYSIS

Description of Sample

One water sample from River Nkusi, Rubasengura Village, Igayaza Parish Igayaza Town Council for Environment and Social Impactof the proposed Igayaza- Kikwaya Town Water Supply System, Kakumiro District was received on September 14, 2022 for conformity to **US EAS 12:2014 Specifications for Natural Potable Wate.**

Methods of Analysis

Metal ions were quantified from an acidified sample, at respective wavelengths, using Atomic Absorption. Spectrometry technique, Shimadzu 6300. A five-point calibration curve was used to get the concentration of each metal ion. Nitrates, phosphates, sulphates, chlorides and ammonia were determined by UV-VIZ Spectrometry technique, Shimadzu, 1601 at respective absorption wavelengths. Coliforms and *E. coli* were determined by Membrane Filtration Technique at 37ºC and 44ºC respectively. All determinations were done in duplicate.

Results of Analysis

The mean analysis values are as below;

Parameter	Result	Limits/Authority
Color, TCU	28	50 Max
Conductivity(µS/cm)	284	2500 Max
Total Dissolved Solids (mg/L)	1245	1500 Max
Total Suspended Solids (mg/L)	26	Not Detectable
Turbidity (NTU)	24	25 Max
Calcium (mg/kg)	32.8	150 Max
Iron, Total (mg/L)	**4.4**	0.3 Max
Magnesium (mg/L)	28.6	100 Max
Manganese (mg/L)	**2.4**	0.1 Max
Potassium (mg/L)	35.4	Not Indicated
Sodium (mg/L)	28.2	200 Max
Ammonia (mg/L)	**4.2**	0.5 Max
Chlorides (mg/L)	223	250 Max
Fluorides (mg/L)	1.2	1.5 Max
Nitrates (mg/L)	14.4	45 Max
Nitrites (mg/L)	**0.1**	0.003 Max
Phosphates (mg/L)	**9.6**	2.2 Max
Sulphates (mg/L)	232	400 Max
Total Coliforms cfu/100ml)	**10**	Absent
E. coli (cfu/100ml)	**6**	Absent
Fats, Oils and Grease (mg/L)	4.2	Not Indicated
Detergents (mg/L)	0.8	Not Indicated
BOD5 (mg/L)	38.6	Not Indicated
COD (mg/L)	78.2	Not Indicated

Remarks

1. * Detection Limit, AAS technique, Shimadzu 6300
2. Parameters in bold are in excess of the Standard
3. Results relate to sample and are reported on as received basis

Justus Mike Ochom
Senior Government Analyst

"Go Scientific for a Safe and Just Society"

Republic of Uganda

MINISTRY OF WATER AND ENVIRONMENT
NATIONAL WATER QUALITY REFERENCE LABORATORY - ENTEBBE

Certificate of Analysis

Client Name : Alinea (U) Limited
Client Address : Ntinda, Nakawa, P.O.Box 8755,Kampala
Sample type & Location : Surface Water Sample from R. Nkusi, Kikwaya village ,Kakumiro District
Date received : 25th September 2020
Analysis Completion data : 10th October 2020

TEST RESULTS

Parameter	Units	Test results	Potable water standards (DEAS12:2018 Maximum permisible for Natural potable Water)
		River Nkusi	
		Kakumiro district	
Lab No		E42827	
pH	pH units	7.1	5.5-9.5
Electrical Conductivity	us/cm	64	2500
Total Dissolved Solids	mg/l	45	1500
Biological Oxygen Demand	mg/l	1	_
Chemical Oxygen Demand	mg/l	44	_
Total Organic Carbon	mg/l	26	_
Total suspended solids (TSS at 105)	mg/l	6	<1
Total Nitrogen-N	mg/l	0.78	10
Total Phosphate-P	mg/l	0.15	0.7
Reactive Phosphorus-P	mg/l	0.1	0.7
Nitrates-N	mg/l	0.15	10
Ammonium-N	mg/l	0.02	10
Sulphates	mg/l	2.0	400
Sodium	mg/l	5.5	200
Potasium	mg/l	4.3	50
Chloride	mg/l	8.1	250
Manganese	mg/l	0.25	0.1

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

Checked by

LABORATORY MANAGER 30 OCT 2020 NWQRL NATIONAL WATER QUALITY REFERENCE LABORATORY -ENTEBBE

Water Quality Management Department
Directorate of Water Resources Management
Waterquality.laboratory@mwe.go.ug
P.O Box 19, Entebbe
Tel: 041-321342

Issued by

PRINCIPAL ANALYST LABORATORIES 30 OCT 2020 NATIONAL WATER QUALITY REFERENCE LABORATORY –ENTEBBE

003 01

SAMPLE NAME. WATER SAMPLE FROM NKUSI

Table1: The raw water quality

Raw water parameters results			
pH	6.67	TSS (mg/l)	50
Colour (Ptco)	666	T. Alkalinity (mg/l)	40
EC (µs/cm)	86.7	T. Hardness (mg/l)	68

Table 2: The jar test of alumunium sulphate as coagulant

Jar	No	1	2	3	4	5	6
Alum dose	mg/l	50	60	70	80	90	100
Floc formation order	-	6	5	4	3	2	1
Floc settlement order		5	4	3	2	1	1
Supernatant temp.	^{0}C	23.9	24.1	24.6	23.9	23.7	23.8
Supernatant pH	-	6.10	5.96	5.79	5.21	4.82	4.69
Supernatant EC	(µs/cm)	90.4	100.9	95.6	107.9	118.7	132.7
Supernatant Col.	(Ptco)	45	12	8	8	9	13
Supernatant TSS	(mg/l)	2	0	0	0	0	1
Supernatant Alk.	(mg/l)	-	12	8	8	4	2
Filtered Res alum	(mg/l)	-	0.042	-	-	-	-

The water formed big and good flocs which settled fast with clear supernatant water of the water, the best aluminium sulphate dose working is 60mg/l.

LABORATORY MANAGER
30 OCT 2020
NATIONAL WATER QUALITY REFERENCE LABORATORY -KENYA

Annexe 4. Chance Finds Procedure on Physical Cultural Resources Management

The Physical Cultural Resources Policy (PCRs) would be triggered because of the excavation/rehabilitation works that may encounter PCRs. To meet the requirements of this policy, a Chance Finds Procedure has been developed to indicate a real risk of causing undesirable adverse environmental and social effects on the physical and intangible cultural resources, and that more substantial planning may be required to adequately avoid, mitigate or manage potential effects. Chance find procedures will be used as follows:

i. Stop the construction activities in the area of the chance find;
ii. Delineate the discovered site or area;
iii. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the Directorate of Museums and Monuments (DMM) take over;
iv. Notify the project/ supervisory Engineer who in turn will notify the responsible local authorities and the Directorate of Museums and Monuments under the Ministry of Tourism, Wildlife and Antiquities (within 24 hours or less);
v. The Directorate of Museums and Monuments would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the Directorate of Museums and Monuments (within 24 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
vi. Decisions on how to handle the finding shall be taken by the Directorate of Museums and Monuments. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
vii. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the DMM;
viii. Construction work could resume only after permission is given from the responsible local authorities and the Directorate of Museums and Monuments concerning safeguard of the heritage;
ix. These procedures must be referred to as standard provisions in construction contracts, when applicable. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed;
x. Construction work will resume only after authorization is given by the responsible local authorities and the National Museum concerning the safeguard of the heritage.
xi. Relevant findings will be recorded in MWE Implementation Supervision Reports (ISRs), and Implementation Completion Reports (ICRs) will assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

Annexe 5. Outline of the Spill Management Plan

The plan should be developed in order to specify the procedures of handling spills during the rehabilitation of the Nakivubo drainage channel in Kampala. The plan will ensure enhancement of the ability to handle spills, prevent the impacts of the spills and reduce loss resulting from spills, protect the safety of lives of personnel working in the project area and maintain social stability. The plan will include detailed spill management information for all areas of the Project i. Including Project site, storage areas, site offices and camps where required. The Spills Management plan should be a working document used in training and practice. The Contractor must submit the Spill Management Plan as part of their safety management plan to MWE/Supervising consultant for review and approval.

The Spill Management plan should be prepared to establish a Spill Management system based on an environmental risk assessment undertaken in accordance with the National Environment (Waste Management) regulation of 2020, part XII- Section 98(1), the National Environment (Environmental and Social Assessment) Regulations, 2020, the oil spill regulations made under the Act, the Occupational Safety and Health act of 2006 Part XII- Section 86 (a, b) which calls for adequate and readily accessible means of drenching with water for any employee who is splashed with corrosive liquids and sufficient means of flashing or irrigating the eyes. A lead agency shall, in consultation with the Authority, provide for Spill Management systems, contingency plans and other plans for minor incidents of acute pollution that may occur or cause damage within the jurisdiction of the lead agency in accordance with the National Environment Act NO.5 of 2019, Part VII Section 92 (1). The Plan must include, though limited to the following Objectives:

Objectives

- To ensure sufficient measures of controlling and preventing any spill along the construction areas
- To train all the workers in safety drills and spills management for quick and efficient response to scenarios that can lead to pollution or damage to the environment

Mitigation measures

- The contractor should draw prevention plans for all areas of work in the Spill Management Plan. Prevention plans must include training requirements, procedures and prevention equipment locations. Prevention equipment must meet the requirements of National Safety and Health Act and Regulations and be on site and readily available.
- Identify existing and potential dangers to spills at site and the measures that will be taken to reduce, eliminate or control those dangers, including procedures to be followed in case of spill.
- Identify internal and external resources that may be required to respond to the spill at site.
- Develop a Spill Management Plan for all physical areas of its performance of the work at site as well as its site office and storage areas.
- Test Spill Management Plans prior to commencing the work and at a minimum annually throughout the performance of the work.
- All contractor employees on the project must be trained and aware of their responsibilities in the prevention of spill and in the event of a spill.

Roles and responsibilities

- The contractor must at all times take all precautions appropriate to maintain the health and safety of all the sites.

- The contractor is responsible for the adequacy, stability and safety of all site operations and construction methods and must comply with workplace safety and health laws in accordance with the OSH Act 2006.
- Before commencing the work, the contractor must identify their dedicated on site safety supervisor, who must attend a pre-job meeting at the MWE's office to review safety measures for the work and be approved by the Supervising consultant/ safety representative.
- The safety supervisor of the consultant must have no other duties assigned. The dedicated on site safety supervisor will be responsible for, but not limited to, the identification and control of potential safety hazards including spills at the work sites.
- All contractor employees on the project must be trained and aware of their responsibilities in preventing spills and in the event of a spill.

The Health, Safety and Environment Coordinator is responsible for the following roles;

- Responsible for providing risk, health, safety and environmental information.
- Responsible for compliance with legislation and obtaining authority from the Supervising Consultant to inform and liaise with National Government and Regulatory authorities.
- Responsible for providing OHSE advice & support and information to the contractor and the Incident Response Team (IRT) at the spill site.
- Responsible for advising and maintaining the spill management responses in line with the Contractor emergency response procedures.

Means of verification

- Well-developed site spill management measures to protect the public from the hazards present on the project which contain hazards to the public, post the required signage to inform the public of the hazards present, maintain good housekeeping as required.
- Records of spill accidences in and around the project sites
- Presence of weekly health and safety performance report including safety information and statistics on spill management
- A write up of risks facing contractors' personnel and their responses.
- A list of dates for annual testing of Spill Management plans
- Records of safety drills and Spill Management trainings undertaken.

Annexe 6.

General Layout and Layouts of the Transmission and Distribution System

MWE - MINISTRY OF WATER AND ENVIRONMENT

DIRECTORATE OF WATER DEVELOPMENT

WATER AND SANITATION DEVELOPMENT FACILITY - CENTRAL

Bidding Document for the Procurement of Works

Consultancy Services for Feasibility Study and Detailed Engineering Design for Water Supply and Sanitation System for towns in the Albertine Region Under Framework Contract - Call Off order No. 1: Igayaza and Kikwaya Town, Water Supply and sanitation system

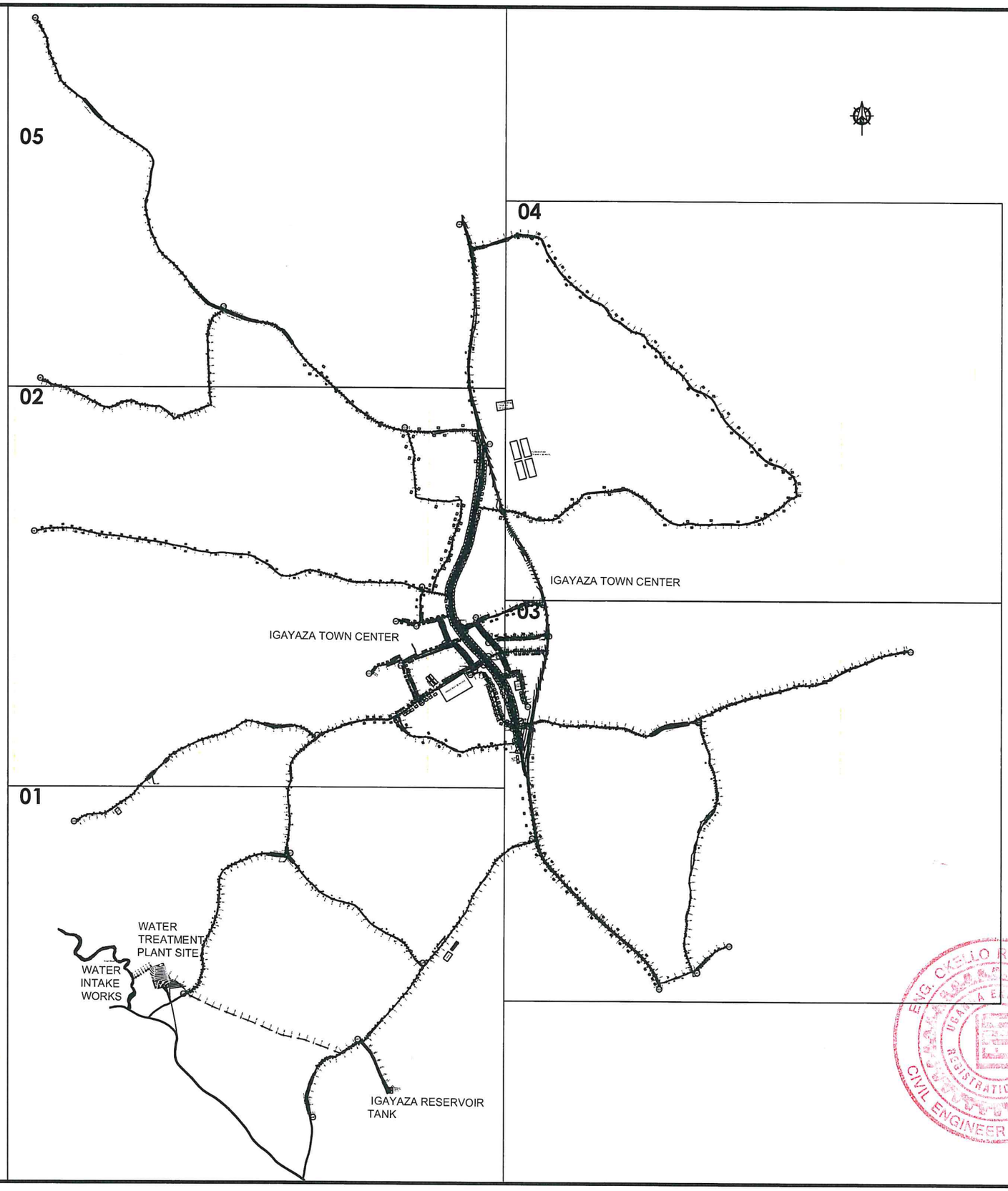
CONSTRUCTION OF IGAYAZA WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT

Procurement Reference Number : .....

VOLUME IV - BOOK OF DRAWINGS

OCTOBER, 2021

ENG. OKELLO RONALD DANIEL
UGANDA ENGINEERS REGISTRATION BOARD
CIVIL ENGINEER ERB NO: 850



NOTES

1. All dimensions are in metres unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg. SGI/WSDF_C/W/0.0.0
4. For Node details, see Dwg. SGI/WSDF_C/W/6.0.0
5. For Standard details see sheets as follows

Level Indicator	Sd 220
Outfall Chamber	Sd 116
Marker Post	Sd 117
Thrust Blocks	Sd 118
Pipe beddings	Sd 121

6. All valves, hydrants and washout locations are identified by marker post in positions.

LEGEND

- Transmission Mains
- Distribution Mains
- Building/House
- Contours
- Road
- Tree
- DAV — Double Orifice Air Valve
- WO_2 — Type 2 Washout
- (10) — Node detail No. 101

CLIENT:

MWE - MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT
WATER AND SANITATION DEVELOPMENT FACILITY - CENTRAL
Plot 3-7 Kabalega Crescent - Box 20026, Kampala - Uganda
Phone: +256 414 505942 - mwe@mwe.go.ug - www.mwe.go.ug

PROJECT:
Consultancy Services for Feasibility Study and Detailed Engineering Design for Water Supply and Sanitation System for towns in the Albertine Region Under Framework Contract - Call Off order No. 1: Igayaza and Kikwaya Town, Water Supply and sanitation system

IGAYAZA WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
Head office:
Via della Provvidenza, 15
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 784

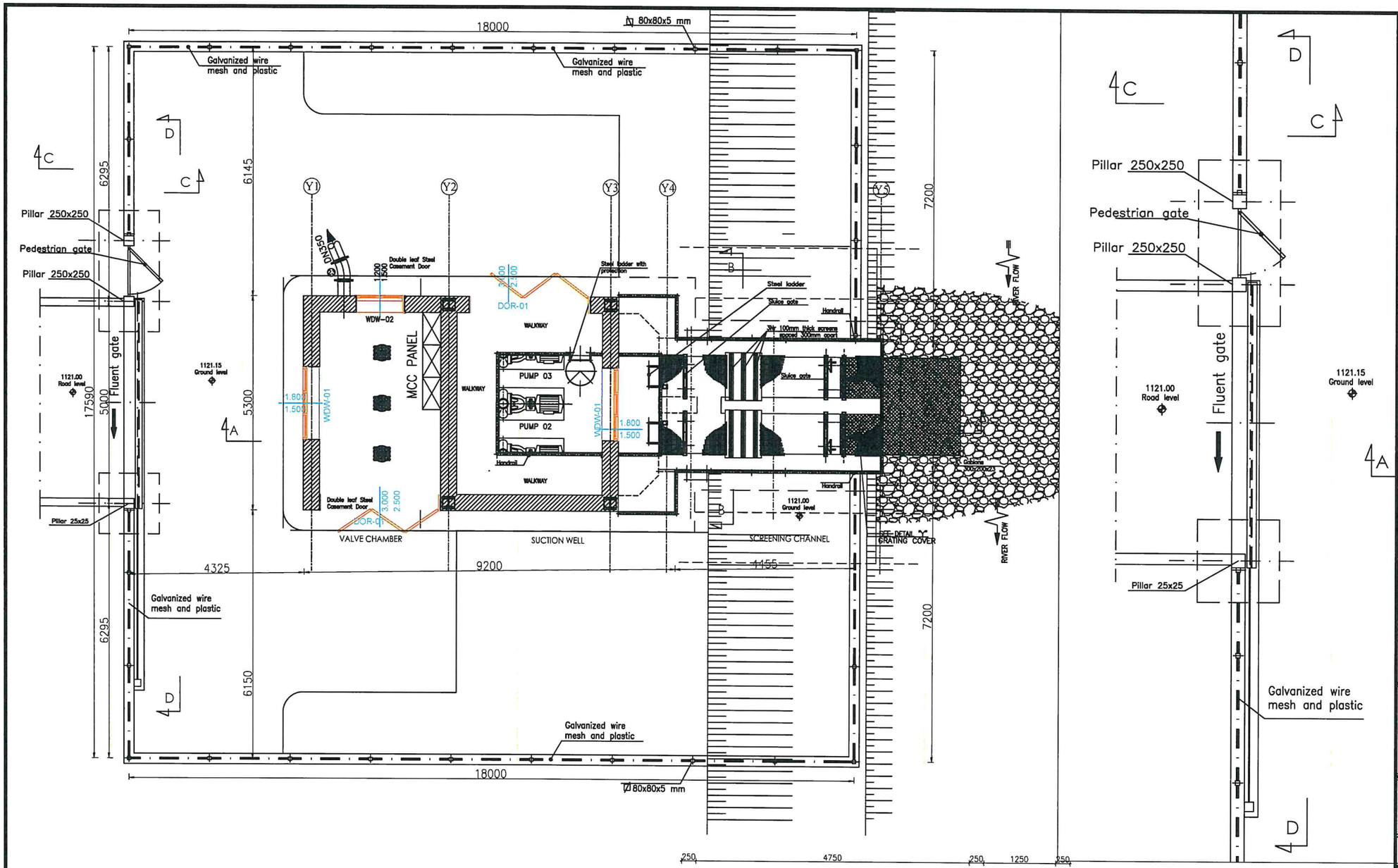
ENG. OKELLO RONALD DANIEL — UGANDA INSTITUTION OF PROFESSIONAL ENGINEERS — REGISTRATION BOARD — CIVIL ENGINEER ERB NO: 850

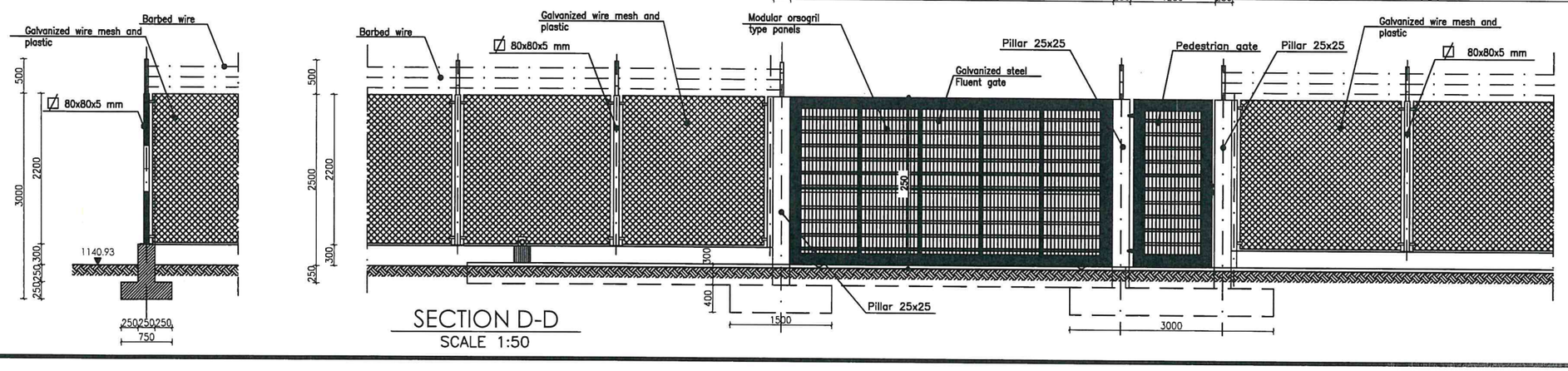
DRAWING TITLE:

General Layout
Transmission and Distribution Mains

DATE:	DRAWING NUMBER:	REV.	SHEET No.
2021	SGI/WSDF/W/0.0.0	A	01 OF 06

REV	DATE	DESCRIPTION	PROJECT ID	MWE/WSDF/CONS/xxxx
A	Oct_2021	Design Drawings	DRAWN:	Eyamu P.S
B	-	Approval	DESIGNED:	Okello R.D
C	-	Construction	CHECKED:	Eng. Okello R.D
D	-	As Built	APPROVED:	Eng. Okello R.D
E			SCALE A3: As Shown	SCALE A1: As Shown
F				





SECTION D-D
SCALE 1:50

NOTES

1. All dimensions are in metres unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg. SGI/WSDF_C/W/0.0.0
4. For Node details, see Dwg. SGI/WSDF_C/W/6.0.0
5. All valves, hydrants and washout locations are identified by marker post in positions.

ENG. OKELLO RONALD DANIEL
UGANDA ENGINEERS REGISTRATION BOARD
CIVIL ENGINEER ERB NO: 850

CLIENT:
MWE - MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT
WATER AND SANITATION DEVELOPMENT FACILITY - CENTRAL
Plot 3-7 Kabalega Crescent - Box 20026, Kampala - Uganda
Phone: +256 414 505942 - mwe@mwe.go.ug - www.mwe.go.ug

PROJECT:
Consultancy Services for Feasibility Study and Detailed Engineering Design for Water Supply and Sanitation System for towns in the Albertine Region Under Framework Contract - Call Off order No. 1: Igayaza and Kikwaya Town, Water Supply and sanitation system

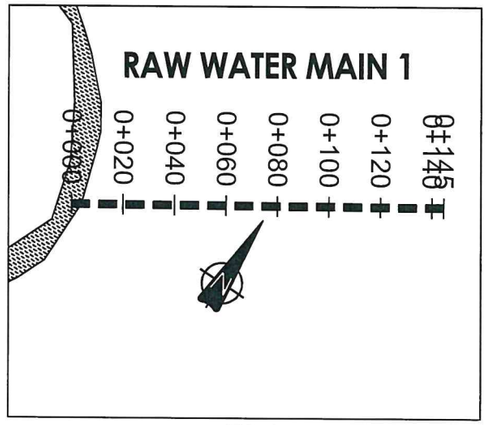
IGAYAZA WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
Head office:
Via della Provvidenza, 15
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 784

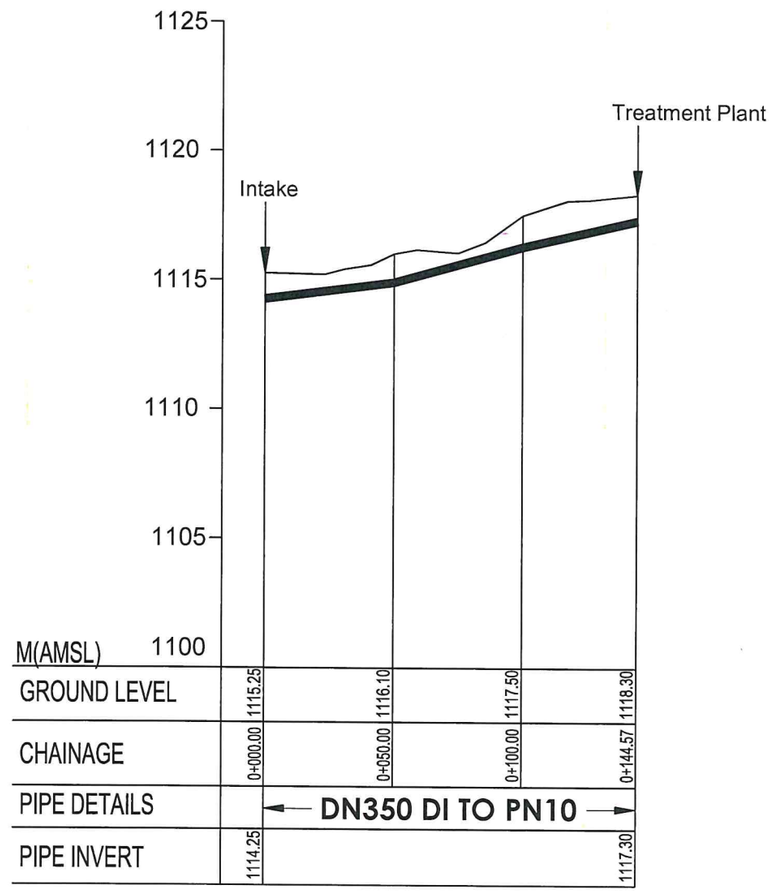
DRAWING TITLE:
Intake Structure
Site Plan

DATE:	DRAWING NUMBER:	REV.	SHEET No.
2021	SGI/WSDF/W/1.0.1	A	01 OF 05

REV	DATE	DESCRIPTION	PROJECT ID	MWE/WSDF/CONS/xxxx
A	Oct_2021	Design Drawings	DRAWN:	Eyamu P.S
B	-	Approval	DESIGNED:	O.G.D & O.R.D
C	-	Construction	CHECKED:	O.R.D
D	-	As Built	APPROVED:	C.P
E			SCALE A3:	As Shown
F			SCALE A1:	As Shown



PLAN LAYOUT



M(AMSL)				
GROUND LEVEL	1115.25	1116.10	1117.50	1118.30
CHAINAGE	0+000.00	0+050.00	0+100.00	0+144.57
PIPE DETAILS		← DN350 DI TO PN10 →		
PIPE INVERT	1114.25			1117.30

LONGITUDINAL PROFILE

NOTES

1. All dimensions are in metres unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg. SGI/WSDF_C/W/0.0.0
4. For Node details, see Dwg. SGI/WSDF_C/W/6.0.0
5. For Standard details see sheets as follows

Level Indicator	Sd 220
Outfall Chamber	Sd 116
Marker Post	Sd 117
Thrust Blocks	Sd 118
Pipe beddings	Sd 121

6. All valves, hydrants and washout locations are identified by marker post in positions.

LEGEND

- Transmission Mains
- Distribution Mains
- Building/House
- Contours
- Road
- Tree
- DAV — Double Orifice Air Valve
- WO_2 — Type 2 Washout
- (10) — Node detail No. 101

0 8.0 16.0
Vertical Scale: 1:250 Metres
0 80 160
Horizontal Scale: 1:2500 Metres

CLIENT:

MWE - MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT
WATER AND SANITATION DEVELOPMENT FACILITY - CENTRAL
Plot 3-7 Kabalega Crescent - Box 20026, Kampala - Uganda
Phone: +256 414 505942 - mwe@mwe.go.ug - www.mwe.go.ug

PROJECT:
Consultancy Services for Feasibility Study and Detailed Engineering Design for Water Supply and Sanitation System for towns in the Albertine Region Under Framework Contract - Call Off order No. 1: Igayaza and Kikwaya Town, Water Supply and sanitation system

IGAYAZA WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
Head office:
Via della Provvidenza, 15
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 784

DRAWING TITLE:

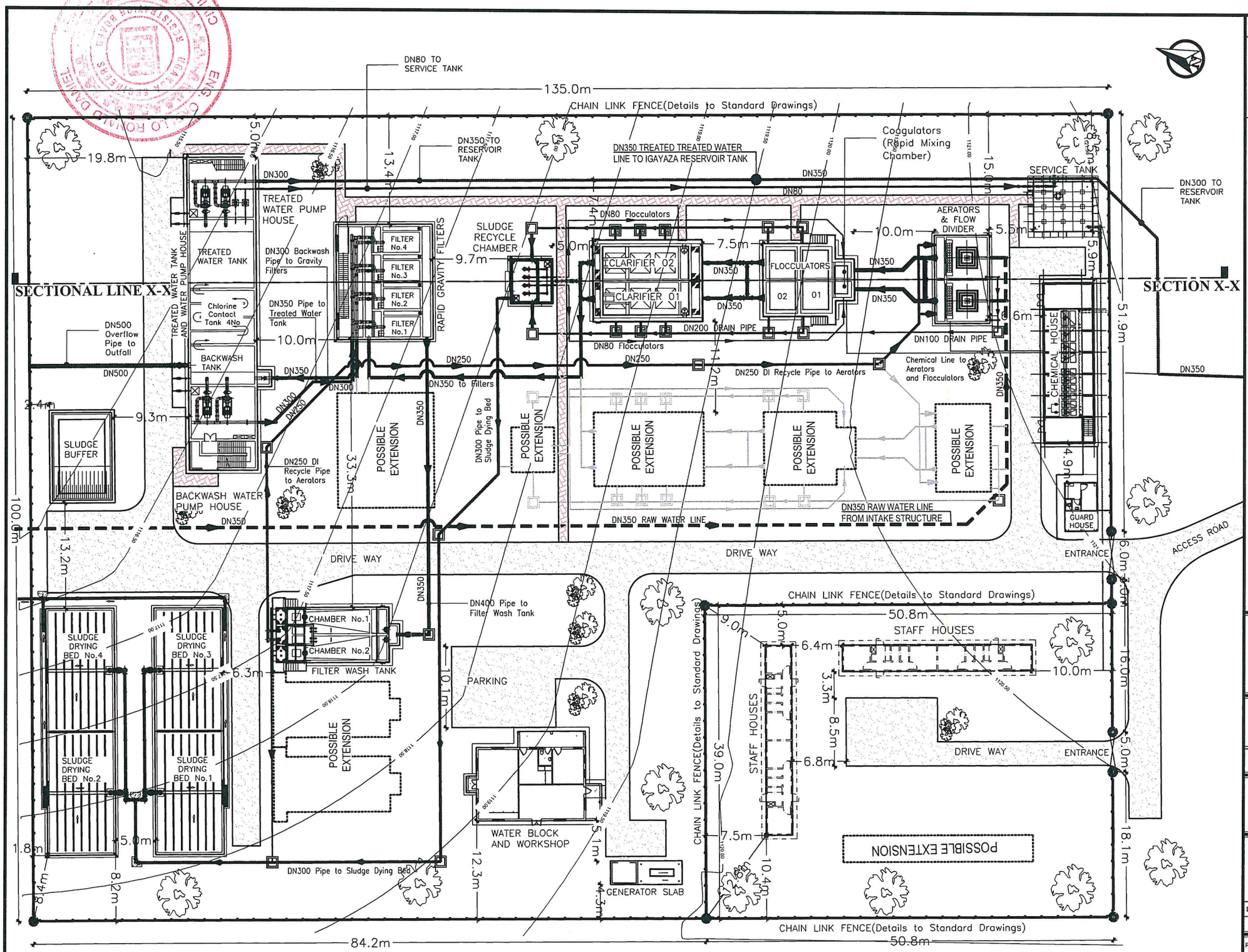
Raw Water Main

Raw Water Line (CH 0+000.00 - 0+144.57)

DATE:	DRAWING NUMBER:	REV.	SHEET No.
2021	SGI/WSDF/W/1.1.0	A	01 OF 01

REV	DATE	DESCRIPTION	PROJECT ID MWE/WSDF/CONS/xxxx	
A	Oct_2021	Design Drawings	DRAWN: Eyamu P.S	
B	-	Approval	DESIGNED: O.G.D & O.R.D	
C	-	Construction	CHECKED: O.R.D	
D	-	As Built	APPROVED: C.P	
E			SCALE A3: As Shown	SCALE A1: As Shown
F				

ENG. OKELLO RONALD DANIEL
REGISTERED ENGINEER
UGANDA ENGINEERS REGISTRATION BOARD
CIVIL ENGINEER ERB NO: 559



NOTES

1. All dimensions are in metres unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg. SGI/WSDF_C/W/0.0.0
4. For Node details, see Dwg. SGI/WSDF_C/W/6.0.0
5. All valves, hydrants and washout locations are identified by marker post in positions.

CLIENT:

MWE - MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT
WATER AND SANITATION DEVELOPMENT FACILITY - CENTRAL
Plot 3-7 Kabalega Crescent - Box 20026, Kampala - Uganda
Phone: +256 414 505942 - mwe@mwe.go.ug - www.mwe.go.ug

PROJECT:
Consultancy Services for Feasibility Study and Detailed Engineering Design for Water Supply and Sanitation System for towns in the Albertine Region Under Framework Contract - Call Off order No. 1: Igayaza and Kikwaya Town, Water Supply and sanitation system

IGAYAZA WATER SUPPLY AND SANITATION SYSTEM IN KAKUMIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
Head office:
Via della Provvidenza, 15
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 784

DRAWING TITLE:

Water Treatment Plant
General Site Layout

DATE:	DRAWING NUMBER:	REV.	SHEET No.
2021	SGI/WSDF/W/2.0.1	A	01 OF 02

REV	DATE	DESCRIPTION	PROJECT ID	MWE/WSDF/CONS/xxxx
A	Oct_2021	Design Drawings	DRAWN:	Eyamu P.S
B	-	Approval	DESIGNED:	O.G.D & O.R.D
C	-	Construction	CHECKED:	O.R.D
D	-	As Built	APPROVED:	C.P
E			SCALE A3: As Shown	SCALE A1: As Shown
F				

Annexe 7. Land Ownership Documents

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I...KYOMUKAMAEVARINI...of...RUBASENGURA...
...cell declare that I have accepted to offer land in...RUBASENGURA...cell,...IGAYAZA...
ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign ...Kym...

Name...KYOMUKAMA EVARINI...

Contact ...0786421232...

Witnessed by:

1. LC1 chairperson

Sign...MUGABI...

Name...MUGABI ROBERT...

Contact...0762908...

Office Of The Chairperson L.C.I RUBASENGURA CELL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

2. LCIII Chairperson

Sign...

Name...Baruli John...

Contact...0777470266...

3. Town clerk

TOWN CLERK IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

Ategeka Daniel

REPUBLIC OF UGANDA
NATIONAL ID CARD

SURNAME
KYOMUKAMA

GIVEN NAME
EVALINE

NATIONALITY	SEX	DATE OF BIRTH
UGA	F	18.08.1981

NIN	CARD NO.
CF81027103K4LA	018047969

DATE OF EXPIRY
22.09.2025

HOLDERS SIGNATURE
Kyomukama

LEFT THUMB

VILLAGE: RUBASENGURA
PARISH: IGAYAZA
S.COUNTY: BIREMBO
COUNTY: BUGANGAIZI WEST
DISTRICT: KIBAALE

```
IDUGA0180479690CF81027103K4LA<
8108186F2509220UGA150922<<<<<9
KYOMUKAMA<<EVALINE<<<<<<<<<<<<
```

Motber of
Twesigye Evas
Nantunda Justine
Nantamba Justine

REPUBLIC OF UGANDA
NATIONAL ID CARD

SURNAME
NATUKUNDA

GIVEN NAME
JUSTINE

NATIONALITY	SEX	DATE OF BIRTH
UGA	F	12.09.2004

NIN
CF041141004QHL

CARD NO.
021289993

DATE OF EXPIRY
30.06.2032

HOLDERS SIGNATURE
NATUKUNDA

RIGHT THUMB

VILLAGE: RUBASENGURA
PARISH: IGAYAZA
S.COUNTY: BIREMBO
COUNTY: BUGANGAIZI WEST
DISTRICT: KAKUMIRO

IDUGA0212899937CF041141004QHL<
0409120F3206308UGA220630<<<<<7
NATUKUNDA<<JUSTINE<<<<<<<<<<<

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I....Nyamahunge Justine.....of...Kabo'Liana.....East.....cell declare that I have accepted to offer land in....Rubavenguru.....cell,.....Igayaza.....ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign .....

Name...NYAMAHUNGE JUSTINE.....

Contact ....0752382178.....

Witnessed by:

1. LC1 chairperson

Sign...NWGABI R.....

Name...NWGABI ROBERT.....

Contact...0762908200.....

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

2. LCIII Chairperson

Sign.....

Name...Baguli John.....

Contact...0777470646.....

3. Town clerk

TOWN CLERK IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

Ategeka Daniel

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I...NYAMAHUNGE JUSTINE...of...KABOIJANA EAST...cell declare that I have accepted to offer land in...RUBASENGURA...cell,...IGAYAZA...ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign ...[signature]...

Name...NYAMAHUNGE JUSTINE...

Contact ...0752382178...

Witnessed by:

1. **LC1 chairperson**

Sign...[signature]...

Name...Bapuuli John...

Contact...07774702 6[illegible]...

CHAIRPERSON L.C. III
IGAYAZA TOWN COUNCIL
15 FEB 2023
KAKUMIRO DISTRICT
P.O. BOX 522, KAKUMIRO

2. **LCIII Chairperson**

Sign...

Name...

Contact...

3. **Town clerk**

[signature]

Ategeka Daniel

TOWN CLERK
IGAYAZA TOWN COUNCIL
15 FEB 2023
KAKUMIRO DISTRICT
P.O. BOX 522, KAKUMIRO


REPUBLIC OF UGANDA
NATIONAL ID CARD
NYAMAHUNGE
JUSTINE
UGA
F
CF9001610534NE
08547820
09.05.2025


RIGHT THUMB
IGAYAZA B
IGAYAZA
BIREMBO
BUGANGAIZI WEST
KIBAALE
IDUGA0085478204CF9001610534NE<
9010037F2505093UGA150509<<<<<5
NYAMAHUNGE<<JUSTINE<<<<<<<<<<<

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I Nkarasimbi Harima of Rubasengura cell declare that I have accepted to offer land in Rubasengura cell, Igayaza ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign Nkarasimbi Harima

Name Nkarasimbi Harima

Contact 0782403354/0756442259

Witnessed by:

1. LC1 chairperson

Sign MUGABI

Name MUGABI Robert

Contact 0762908700

Office Of The Chairperson L.C.I RUBASENGURA CELL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

2. LCIII Chairperson

Sign

Name Bamuli John

Contact 0777470206

3. Town clerk

TOWN CLERK IGAYAZA TOWN COUNCIL 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

Ategeka Daniel

REPUBLIC OF UGANDA
NATIONAL ID CARD

SURNAME
WALUSIMBI

GIVEN NAME
HAKIM

NATIONALITY	SEX	DATE OF BIRTH
UGA	M	23.04.1975

NIN
CM751011000Z9E

CARD NO
000246166

DATE OF EXPIRY
11.09.2024

HOLDERS SIGNATURE

RIGHT THUMB

VILLAGE:	IGAYAZA CENTRAL
PARISH:	IGAYAZA
S.COUNTY:	BIREMBO
COUNTY:	BUGANGAIZI WEST
DISTRICT:	KIBAALE

IDUGA0002461663CM751011000Z9E<
7504231M2409113UGA140911<<<<<9
WALUSIMBI<<HAKIM<<<<<<<<<<<<<<

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I......KALIISA ANDREW......of......Igayaza (A) LC I......cell declare that I have accepted to offer land in......Igayaza (A) LC1......cell,......KABOIJANA......ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign ....

Name......KALIISA ANDREW......

Contact ......0784102103......

Witnessed by:

1. LC1 chairperson

Sign............

Name......TIBAGALIKA EPIMACHUS......

Contact......0785516202......

2. LCIII Chairperson

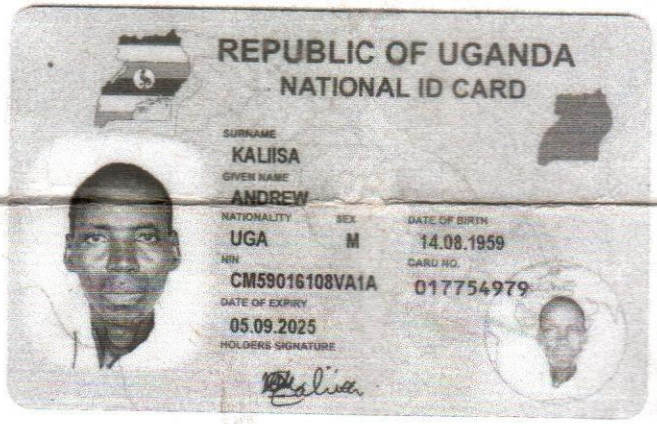
Sign............

Name......[illegible]......

Contact......0777[illegible]266......

3. Town clerk

Ategeka Daniel



REPUBLIC OF UGANDA

NATIONAL ID CARD

SURNAME
KALIISA

GIVEN NAME
ANDREW

NATIONALITY
UGA

SEX
M

DATE OF BIRTH
14.08.1959

NIN
CM59016108VA1A

CARD NO.
017754979

DATE OF EXPIRY
05.09.2025

HOLDERS SIGNATURE

RIGHT THUMB

VILLAGE: IGAYAZA A
PARISH: KISIIJA
S.COUNTY: BIREMBO
COUNTY: BUGANGAIZI WEST
DISTRICT: KIBAALE

IDUGA0177549791CM59016108VA1A<
5908145M2509057UGA150905<<<<<2
KALIISA<<ANDREW<<<<<<<<<<<<<<<

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I. Bashabire John ..... of. Rubasengura .....cell declare that I have accepted to offer land in Rubasengura .....cell,..... ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign .....

Name. Bashabire John .....

Contact .0781165466.....

Witnessed by:

1. LC1 chairperson

Sign.....

Name. Mwebaza Robert .....

Contact.0762908700.....

Office Of The Chairperson L.C.I RUBASENGURA CELL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT

2. LCIII Chairperson

Sign.....

Name. Daniel .....

Contact.0777470266.....

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

3. Town clerk

Ategeka Daniel

TOWN CLERK IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I..Bishabire John.....of.Rubasengura
.....cell declare that I have accepted to offer land in.Rubasengura.....cell,.Igayaza..... ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign .....

Name..Bishabire John.....

Contact ..0781165466.....

Witnessed by:

1. LC1 chairperson

Sign.....

Name..MUGABI ROBERT.....

Contact..0762908794.....

2. LCIII Chairperson

Sign.....

Name..Bamuli John.....

Contact..0777470266.....

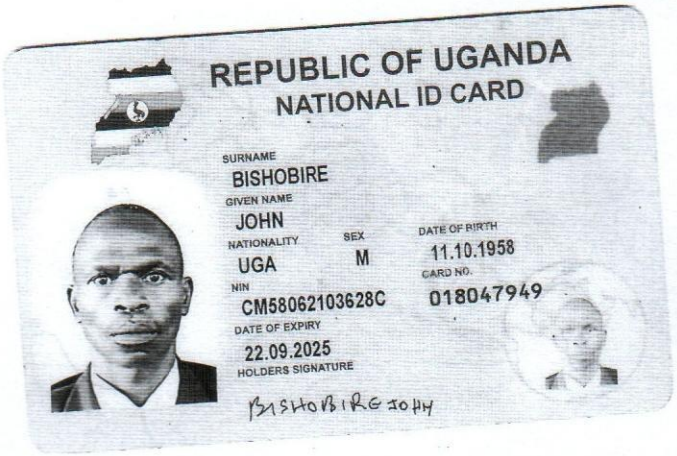
3. Town clerk

Ategeka Daniel

Office Of The Chairperson RUBASENGURA CEL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

TOWN CLERK IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO



REPUBLIC OF UGANDA

NATIONAL ID CARD

SURNAME
BISHOBIRE

GIVEN NAME
JOHN

NATIONALITY
UGA

SEX
M

DATE OF BIRTH
11.10.1958

CARD NO.
018047949

NIN
CM58062103628C

DATE OF EXPIRY
22.09.2025

HOLDERS SIGNATURE
BISHOBIRE JOHN

RIGHT THUMB

VILLAGE: RUBASENGURA
PARISH: IGAYAZA
S.COUNTY: BIREMBO
COUNTY: BUGANGAIZI WEST
DISTRICT: KIBAALE

IDUGA0180479494CM58062103628C<
5810114M2509220UGA150922<<<<<2
BISHOBIRE<<JOHN<<<<<<<<<<<<<<

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I Narubega airini of Rubasengara cell declare that I have accepted to offer land in Rubasengara cell Igayaza ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign Narubega

Name Narubega airini

Contact 0775a67182

Witnessed by:

1. **LC1 chairperson**

Sign MUGABI

Name MUGABI Robert

Contact 07629087

2. **LCIII Chairperson**

Sign [signature]

Name Bapuli John

Contact 0777470266

3. **Town clerk**

[signature]

Ategeka Daniel

OFFICE OF THE CHAIRPERSON L.C.I RUBASENGURA CELL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

TOWN CLERK IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

REPUBLIC OF UGANDA
NATIONAL ID CARD

SURNAME
NALUBEGA

GIVEN NAME
IRENE

NATIONALITY	SEX	DATE OF BIRTH
UGA	F	21.07.1959

NIN
CF59034109DEFD

CARD NO.
009814746

DATE OF EXPIRY
29.05.2025

HOLDERS SIGNATURE
Nalubega

RIGHT THUMB

VILLAGE: KIZINGA
PARISH: KABYUMA
S.COUNTY: KITENGA
COUNTY: BUWEKULA
DISTRICT: MUBENDE

IDUGA009814746 9CF59034109DEFD<
5907218F2505299UGA150529<<<<<7
NALUBEGA<<IRENE<<<<<<<<<<<<<<

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I. Ahimbisibwe Adam .... of Rubasitengura .... cell declare that I have accepted to offer land in Rubasegura .... cell, Igayaza .... ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign ....

Name Ahimbisibwe Adam ....

Contact 0781199027 ....

Witnessed by:

1. LC1 chairperson

Sign Mwirabi R ....

Name Mwirabi Robert ....

Contact 0762908700 ....

2. LCIII Chairperson

Sign ....

Name Baruli John ....

Contact 0777207006 ....

3. Town clerk

Ategeka Daniel

Office Of The Chairperson L.C.I RUBASENGURA CELL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

TOWN CLERK IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

REPUBLIC OF UGANDA
NATIONAL ID CARD

SURNAME
AHIMBISIBWE

GIVEN NAME
ADAM

NATIONALITY	SEX	DATE OF BIRTH
UGA	M	08.08.1969

NIN
CM69062104TGDF

CARD NO.
008518145

DATE OF EXPIRY
09.05.2025

HOLDERS SIGNATURE
Ahimbisibwe Adam

RIGHT THUMB

VILLAGE: RUBASENGURA
PARISH: IGAYAZA
S.COUNTY: BIREMBO
COUNTY: BUGANGAIZI WEST
DISTRICT: KIBAALE

IDUGA0085181458CM69062104TGDF<
6908083M2505093UGA150509<<<<<1
AHIMBISIBWE<<ADAM<<<<<<<<<<<<<

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I..NYAKOJJO Taremwa.....of..Rubasingura.....cell declare that I have accepted to offer land in..Rubasingura.....cell,..1994020..... ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign ..KOJO.....

Name..NYAKOJJO Taremwa.....

Contact ..0771613934.....

Witnessed by:

1. LC1 chairperson

Sign..NWGABI.....

Name..NWAGABI ROBERT.....

Contact..0762908700.....

Office Of The Chairperson L.C.I RUBASENGURA CELL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT

2. LCIII Chairperson

Sign.....

Name..Barirwa.....

Contact..0777467026.....

CHAIRPERSON L.C. III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

3. Town clerk

Ategeka Daniel

TOWN CLERK IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

REPUBLIC OF UGANDA
NATIONAL ID CARD

SURNAME
NYAKAJO

GIVEN NAME
TAREMWA

NATIONALITY	SEX	DATE OF BIRTH
UGA	M	20.10.1998

NIN
CM98114102F1UA

CARD NO.
019677273

DATE OF EXPIRY
25.10.2029

HOLDERS SIGNATURE
KOJO

RIGHT THUMB

VILLAGE: RUBASENGURA CENTRAL
PARISH: IGAYAZA WARD
S.COUNTY: IGAYAZA TOWN COUNCIL
COUNTY: BUGANGAIZI WEST
DISTRICT: KAKUMIRO

IDUGA0196772730CM98114102F1UA<
9810204M2910253UGA191025<<<<<6
NYAKAJO<<TAREMWA<<<<<<<<<<<<<<

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I WAMANI Reuben of Rubasengura cell declare that I have accepted to offer land in Rubasengura cell, Igayaza ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign .....

Name WAMANI Reuben

Contact 0781654666

Witnessed by:

1. LC1 chairperson

Sign .....

Name .....

Contact .....

Office Of The Chairperson L.C.I RUBASENGURA CELL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT

2. LCIII Chairperson

Sign .....

Name .....

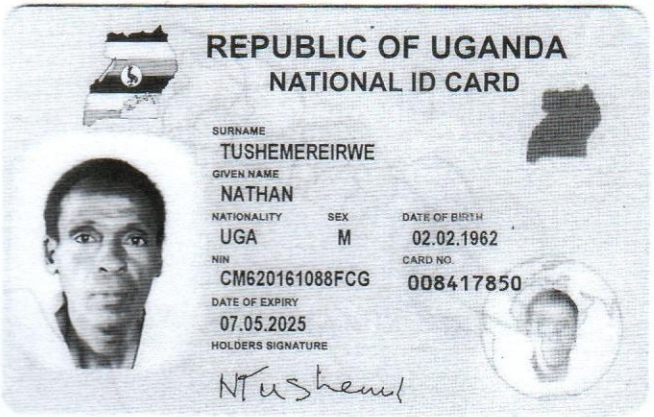
Contact .....

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

3. Town clerk

Ategeka Daniel

TOWN CLERK IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO



REPUBLIC OF UGANDA
NATIONAL ID CARD

SURNAME
TUSHEMEREIRWE
GIVEN NAME
NATHAN
NATIONALITY SEX DATE OF BIRTH
UGA M 02.02.1962
NIN CARD NO.
CM620161088FCG 008417850
DATE OF EXPIRY
07.05.2025
HOLDERS SIGNATURE

RIGHT THUMB

VILLAGE: KIKOORA
PARISH: KIKOORA
S.COUNTY: KAKINDO
COUNTY: BUGANGAIZI WEST
DISTRICT: KIBAALE

IDUGA0084178507CM620161088FCG<
6202024M2505071UGA150507<<<<<7
TUSHEMEREIRWE<<NATHAN<<<<<<<<<

Father of
Owanani Lauben

A DAUGHTER OF NAGAYIA NAUME.

THE REPUBLIC OF UGANDA

IGAYAZA TOWN COUNCIL LOCAL GOVERNMENT

OFFICE OF THE TOWN CLERK

P.O. BOX 522, KAKUMIRO

Date 15th Feb 2023

I...Nampijja Flavia.....of..Rubasengura.....cell declare that I have accepted to offer land in.....Rubasengura.....cell,.....Igayaza..... ward, Igayaza Town Council to Ministry of Water and Environment. The Valuation and compensation process are still ongoing.

Yours faithfully

Sign .....

Name..Nampijja Flavia.....

Contact .....

Witnessed by:

1. LC1 chairperson

Sign..MWAAKI.....

Name..MWAAKI ROBERT.....

Contact..0782908700.....

Office Of The Chairperson L.C.I RUBASENGURA CELL 15 FEB 2023 IGAYAZA TOWN COUNCIL KAKUMIRO DISTRICT

2. LCIII Chairperson

Sign.....

Name.Kamuli.....

Contact..0777467266.....

CHAIRPERSON L.C.III IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

3. Town clerk

Ategeka Daniel

TOWN CLERK IGAYAZA TOWN COUNCIL 15 FEB 2023 KAKUMIRO DISTRICT P.O. BOX 522, KAKUMIRO

Annexe 8. WATER ABSTRACTION PERMIT FROM DWRM

THE REPUBLIC OF UGANDA

SURFACE WATER ABSTRACTION PERMIT

(The Water Act Cap 152 and the Water Resources Regulations, 1998)

In exercise of the powers conferred upon the Director by sections 5 and 18 of the Water Act Cap 152; and in accordance with regulations 3, 7 and 10 of the Water Resources Regulations, 1998, this is to grant a Surface Water Permit

Name: WATER AND SANITATION DEVELOPMENT FACILITY CENTRAL - Kakumiro

Permit Number: KIB504/SP-688/2022/NN

To: P.O Box 80, Wakiso

to abstract surface water in accordance with the terms and conditions of this permit. The permit is granted in the terms and conditions set here, on the next page and in the Annex, which are part of this permit, and under all other terms and conditions set in the Water Act Cap 152 and the Water Resources Regulations, 1998.

This permit is granted for a period not exceeding 5 year(s), which come into force on Tue, Nov 29, 2022 until Sun, Nov 28, 2027.

Issuance Date: Tue, Nov 29, 2022

Eng. Joseph Oriono Eyatu
DIRECTOR OF WATER DEVELOPMENT

Annexe 9. CERTIFIED VALUATION CERTIFICATE

Republic of Uganda

Ministry of Water and Environment

Directorate of Water Development

Urban Water Supply and Sanitation Department

Water & Sanitation Development Facility – Central (WSDF-C)

Consultancy Services for Feasibility Study and Detailed Engineering Design for water supply and sanitation systems for towns in the Albertine Region under Framework Contract

Call Off Order No.1: Igayaza Town Council and Kikwaya Town, Water Supply and Sanitation Systems.

Contract No: **MWE/WSDF-C/CONS/18-19/00006**

Engineer's Estimates – Igayaza TC

October 2021

ENG. OKELLO RONALD DANIEL
UGANDA ENGINEERS REGISTRATION BOARD
CIVIL ENGINEER ERB NO: 850

SGI life, first STUDIO GALLI INGEGNERIA

SGI Studio Galli Ingegneria
Head office: Via della Provvidenza, 13
35030 - **Sarmeola di Rubano** (PD) - ITALY
Tel. +39 049 89 76 844 - Fax +39 049 89 76 784

MINISTRY OF WATER AND ENVIRONMENT

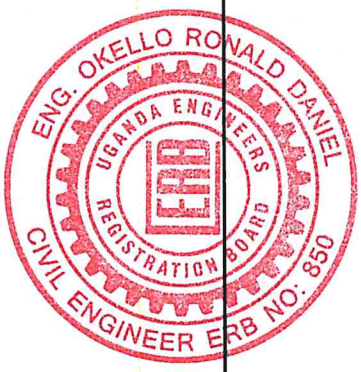
WATER & SANITATION DEVELOPMENT FACILITY- CENTRAL

CONSTRUCTION OF IGAYAZA RGC PIPED WATER SUPPLY AND SANITATION SYSTEM

Engineer's Estimate

Grand Summary

Bill No	Description	Investment Costs
		UShs
IGA G-01	General Items	832,600,000
IGA G-02	Method Related Charges	149,500,000
IGA G-03	Dayworks	6,944,200
	WATER SUPPLY, SANITATION AND EQUIPMENT	
IGA W-01	Intake structure works	394,555,818
IGA W-02	Raw water pumping main	76,325,919
IGA W-03	Intake and water treatment plant siteworks	1,245,839,533
IGA W-04	Aerator and flow divider chamber	111,021,376
IGA W-05	Flocculation chambers	271,315,413
IGA W-06	Clarifiers	416,280,863
IGA W-07	Rapid gravity filters	821,034,821
IGA W-08	Treated water tank	958,211,401
IGA W-09	Chemical house	345,894,212
IGA W-10	Filter wash water sedimentation structure	290,111,727
IGA W-11	Sludge drying channel	164,460,327
IGA W-12	Sludge drying buffer	130,953,863
IGA W-13	Laboratory and workshop	104,022,977
IGA W-14	Treated water pumping main	754,299,836
IGA W-15	Storage reservoir and site works	1,004,807,313
IGA W-16	Gravity main to Kikwaya Water Supply System	2,294,587,285
IGA W-17	Distribution network	2,587,386,671
IGA W-18	Intensification network	866,292,000
IGA W-19	Water Office Block	103,152,996
IGA EE-01	Electrical Works	1,292,852,380
IGA ME-01	Mecahnical Works	1,646,019,236
IGA S-01	6 Stance VIP school latrines - Boys	33,839,579
IGA S-02	6 Stance VIP school latrines - Girls	38,220,079
IGA S-03	4 Stance VIP staff latrine	8,376,480
	Sub-Total 1	**16,948,906,303**
	Allow for 10% contingency	1,694,890,630.32
	Sub-Total 2	**18,643,796,934**
	Allow for 18% VAT	3,355,883,448.03
	GRAND TOTAL	**21,999,680,382**



Annexe 10. PROOF OF PAYMENT OF THE 30% ESIA REVIEW FEES

Uganda Revenue Authority
DEVELOPING UGANDA TOGETHER

Payment Receipt

For General Tax
call our Toll Free
(256) 800117000
Or log on to URA web portal
https://www.ura.go.ug

Notice DT-2079

Notice Date : 21/02/2023

WATER AND SANITATION DEVELOPMENT FACILITY-CENTRAL
012,KISIMBIRI WARD,
KISIMBIRI CENTRAL,
WAKISO TOWN COUNCIL,BUSIRO EAST,
LUZIRA,WAKISO

Notice Number
NS01230035144

TIN :
1020196699

Section A - Payment Information

Sr No	Payment Registration	Tax Head	Reference Number	Date of Payment	Amount
1	2230009936672	NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY -> ENVIRONMENT IMPACT ASSESSMENT -> FEES PAYABLE ON PROJECTS -> Total Value is more than 5billion but does not exceed 70bn-EIA	ESIA FOR IGAYAZA	21/02/2023	4,619,933.00
Total					4,619,933.00

Section B - Official MDA Representative

Authorized Signature	**Designation of Signatory** MDA
Name of Signatory SANTA ATIMANGO	**Contact Number** 782251694
This receipt has been issued for and on behalf of the Commissioner/Commissioner General	