Environmental and Social Impact Assessment for Bugesera Special Economic Zone, Rwanda

Final ESIA Report

PREPARED FOR

Bugesera Special Economic Zone Limited

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Environmental and Social Impact Assessment for Bugesera Special Economic Zone, Rwanda

Final ESIA Report

00672166

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Partner in Charge

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
AFC	Africa Finance Corporation
AoI	Area of Influence
ARISE IIP	Arise Integrated Industrial Platforms
ATIF	Africa Transformation and Industrialization Fund
BSEZ	Bugesera Special Economic Zone
BSEZ Ltd	Bugesera Special Economic Zone Limited
CBD	Convention on Biological Diversity
CETP	Common Effluent Treatment Plant
E&S	Environmental and Social
dB	Decibel
DDS	Districts Development Strategies
EDCL	Energy Development Corporation Limited
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
ERM	Environmental Resources Management Southern Africa (Pty) Ltd
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
ESMS	Environmental and Social Management System
GoR	Government of Rwanda
GWP	Global Warming Potential
IFC	International Finance Corporation
IFC PSs	IFC Performance Standards on Environmental and Social Sustainability
ha	Hectares
km	Kilometre
kv	Kilovolts
MINALOC	Ministry of Local Government
MINICOM	Ministry of Trade and industries
MININFRA	Ministry of Infrastructure
MRSS	Main Receiving and Stepdown Substation
NGOs	Non-Governmental Organisations
NLA	National Land Authority
RBS	Rwanda Bureau of Standards

Acronyms	Description
RDB	Rwanda Development Board
REG	Rwanda Power Group
REMA	Rwanda Environment Management Authority
RENGOF	Rwanda Environmental NGOs Forum
RHA	Rwanda Housing Authority
RoW	Right of Way
RTDA	Rwanda Transport Development Agency
SEP	Stakeholder Engagement Plan
UN	United Nations
WASAC	Water and Sanitation Corporation

0 NON-TECHNICAL SUMMARY

0.1 INTRODUCTION

The Bugesera Special Economic Zone (BSEZ) comprise a total of 335.68 hectares (ha) of land situated in Kagasa II Village, Ramiro Cell, Gashora Sector, Bugesera District in the Eastern Province of Rwanda (hereinafter referred to as the "Project"). In 2022, ARISE Integrated Industrial Platforms (IIP) were allocated the total BSEZ development and operation. To develop this area, a joint venture between ARISE IIP and the Government of Rwanda created the Bugesera Special Economic Zone Limited (BSEZ Ltd) – which is the current Project proponent.

BSEZ Ltd engaged the services of Environmental Resources Management Southern Africa (Pty) Ltd (hereinafter referred to as "ERM") to undertake EIA for the Project. ERM worked with its local partner in Rwanda, Earth Systems (hereinafter jointly referred to as "EIA Consultant"). This Environmental Impact Assessment (EIA) for the Project has been designed to provide a full description for a total of 335.68 ha, from which 200 ha have already been licensed in 2011. Furthermore, BSEZ Ltd aims to obtain one license for the Project that will include the remaining 134.38 ha of BSEZ land as agreed between ARISE, the Rwanda Development Board and the EIA consultant in a meeting held on 18th August 2023 at RDB offices. The proponent - BSEZ Ltd has applied to Rwanda Development Board (RDB) to carry out an environment impact assessment (EIA) for the proposed Project in accordance with requirements of the EIA Regulations of the Republic of Rwanda.

0.2 NEED FOR ESIA

Whereas a Project Environmental Impact Report (EIR) for BSEZ was developed in 2011 by MINICOM, the EIA license issued covered 200 ha. BSEZ Ltd, as the current proponent, is thus seeking to obtain the EIA license for the remaining 134.38 ha not covered by the EIA license in 2011.

This EIA Report has been compiled according to the Ministerial Order no.001/2019, which establishes the list of projects that must undergo EIA, instructions, requirements and procedures to conduct an EIA. According to Annex I of the referred regulation, the current project is subject to full EIA, as the project falls under Article 2 (industries) and Article 9 (warehouse with total floor area exceeding one thousand and five hundred square meters (1500 sqm) and plot size exceeding one thousand square meters (1000 sqm). The EIA has also taken into consideration the International Finance Corporation's (IFC) Performance Standards on Environmental and Social Sustainability (2012).

0.3 OBJECTIVES OF THE PROJECT

Transformation for prosperity is one of five priorities of Rwanda's Vision 2050, which aim to develop high-value and competitive sectors in Rwanda that are an avenue to creating productive jobs and to transition the population and the economy from subsistence agriculture toward industry and high-skilled services for sustained economic growth. To

this end, the Government of Rwanda wants to promote industries, including the BSEZ, to create jobs and increase productivity. The main objectives of the BSEZ are the following:

- Promote and attract multi-sectoral investments of an agricultural, industrial, commercial, and service nature by encouraging the establishment of production units.
- Support and assist investors to set up industrial manufacturing units to create value-added products or to provide services, in order to increase exports and reduce Rwanda's dependence on imports.
- Create modern infrastructure to help industrial units within the BSEZ improve their productivity.
- Develop the Logistics Zone including warehouses as an integral part of the BSEZ to meet the logistical needs of Users (including Companies) and to ensure, on an exclusive basis, the traffic of trucks within the BSEZ with the aim of promoting industrial development.
- Generate jobs and help the industrial sector within the framework of the BSEZ to achieve higher productivity.

0.4 PROJECT DESCRIPTION

0.4.1 PROJECT LOCATION

The Project is located in South-Eastern Rwanda, in Bugesera district 56 km from the capital Kigali along the main road NR5, which is bordering the area from the west. The Project is easily accessed through the main road NR5 that borders Phase 1 from the western border. There is also a road that goes through Kagasa settlement, bordering the Project from the north. The main transport nodes and related distances to the Bugesera SEZ are: Proposed Bugesera Airport – 24,5 km; Dar es Salam Port (Tanzania) – 1,470 km and DP World Dry Port – Kigali – 68 km. In terms of closest sensitive receptors, there is an urban settlement (Kagasa) located at nearly 300 m to the west from Phase 2 and around 700m to the north of Phase 1 areas (Figure 0-1).

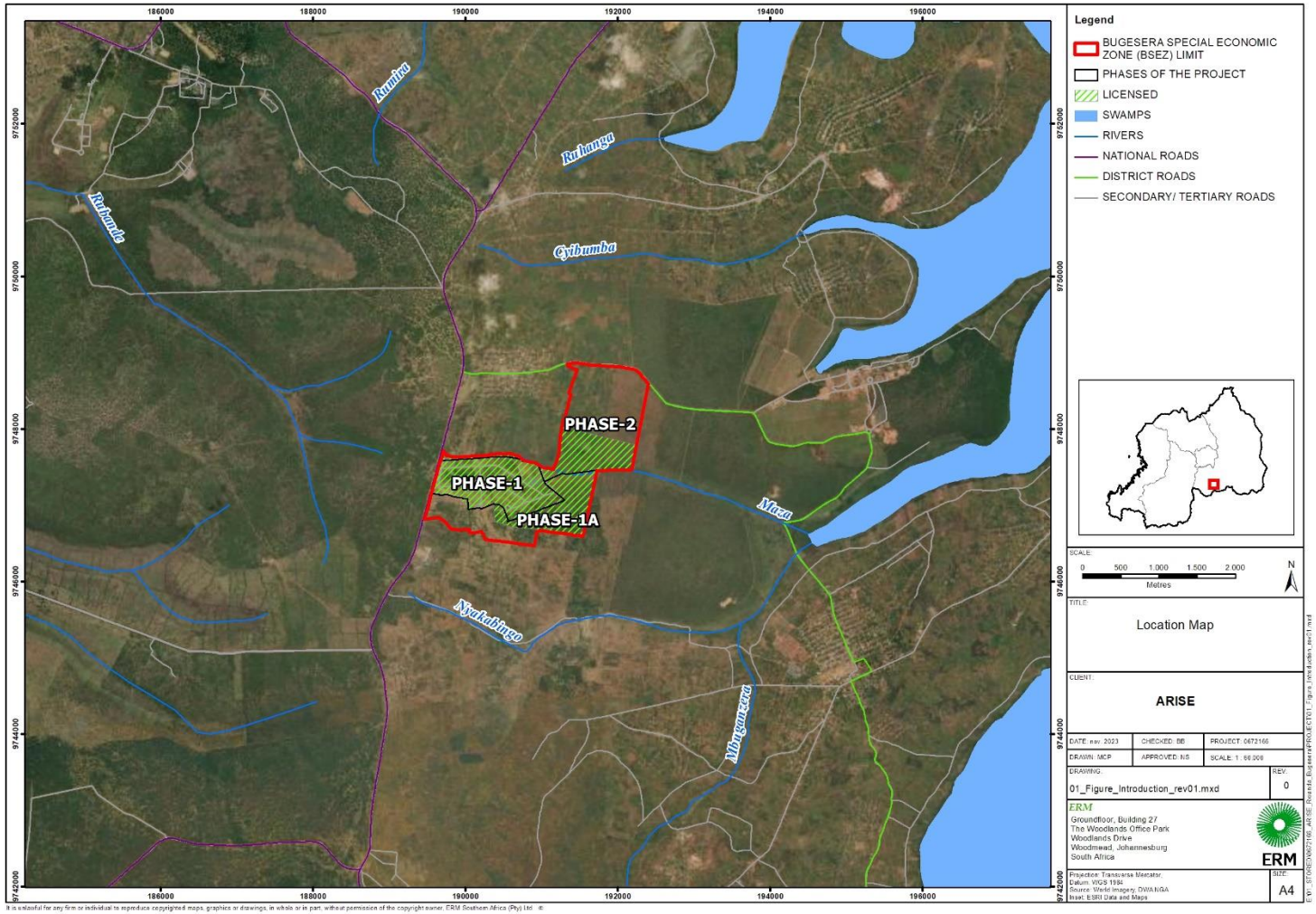


FIGURE 0-1: PROJECT LOCALITY MAP

0.4.2 PROJECT COMPONENTS

The following project component categories are considered for this Project:

- **Core component**. Facilities constructed and operated by the Project proponent (i.e., BSEZ Ltd.), and activities directly associated with their construction and operation. These include:
    - Industrial facilities;
    - Administrative offices;
    - Warehouse facilities;
    - Residential facilities;
    - Common Effluent Treatment Plant (CETP) ;
    - Single Window Clearance building;
    - Wastewater Network;
    - Zonal Substations;
    - Electrical Supply Network;
    - Road network;
    - Water Storage Tanks;
    - Green Areas;
    - Truck Terminal as part of logistic park;
    - Fire Station;
    - Medical Centre;
    - Canteen;
    - Vocational training institute;
    - Bus stops and Food kiosks;
    - Public Toilets;
    - Street Lighting;
    - Site peripheral Infrastructure; and
    - Solid Waste Transfer Station.
- **Associated component (associated facilities)**. Third party facilities that have been constructed or expanded as part of the Project and that are essential to its successful operation. These include Main Receiving Sub-Station and 110 kV incoming transmission line and feeders. Activities associated with constructing and operating these facilities are also considered associated components. As the component is dependent on the Project, and vice versa, BSEZ Ltd is expected to have a limited level of control over the facilities.
- **Other third-party activities**. Facilities constructed or operated by third parties, and associated activities, which are not essential to the successful operation of the

Project. These are not within the Project's AoI and include access Roads, centralised Power Generation Plant, potential quarries and landfill (for sludge deposit – excavated material may be reused to level plots with high slopes).

0.4.3 CONSTRUCTION PHASE

The planned construction phase for Phase 1A and 2 cannot commence prior the approval of the associated ESIA study. Note that Phase 1 construction is ongoing as part of the certificate of approval of EIA obtained in April 2012(Certificate No. RDB/3/EC/JDK/97/04/12). The construction of the Phase 1A and Phase 2 areas of the Project are scheduled to start after obtention of EIA certificate from RDB, and last for 24-30 months. Basic pre-construction work of phase 1A is planned in early 2024.

Construction works to establish essential infrastructure will include following construction activities:

- Site installation, Land Clearing & Disposal;
- Grading Works;
- Road Network;
- Natural Streams;
- Storm Water Drains & Culverts;
- Water Supply System;
- Firefighting System;
- Wastewater System;
- Electrical System;
- Telecommunication System;
- Landscaping;
- Administration Buildings;
- Establishment, Manpower & Administration;
- Consultancy, Studies, Investigations;
- Security Systems; and
- Landscape and Finishing works.

0.4.4 OPERATIONAL PHASE

According to the Master Plan public buildings will be maintained by BSEZ ltd., and Rwanda Power Group (REG) and Energy Development Corporation Limited (EDCL) will be responsible for the maintenance of incoming transmission feeders, Main Receiving and Stepdown Substation (MRSS) and centralized power generation plant.

BSEZ Ltd. will be responsible for the operation and maintenance of the basic infrastructure serving the tenants, e.g., water supply, sewerage/water treatment plant, gas supply, electrical power, road maintenance, landscaping, and general security.

0.4.5 CLOSURE OR REHABILITATION PHASE

At this stage of the Project development there are no plans yet regarding closure or rehabilitation of the Project components. It can be assumed that periodic upgrade /rehabilitation will be undertaken in line with wear-and-tear of the components. This will be done in line with the applicable Rwanda technical standards and E&S regulations.

At some distant time in future the whole Project site (or parts thereof) will be closed and dismantled-decommissioned. This will be performed in accordance with E&S laws that are then in force, including foreseeable maximum recycling-reuse of materials.

0.5 AREA OF INFLUENCE

The environmental AoI of this Project includes the footprint of all Project activities within a radius of 1km of the Project site, which covers the areas in which a direct or indirect impact on the physical, biological, social or cultural environment might occur.

Furthermore, the social AoI for the Project is used to describe the boundaries of the area where Project direct impacts may occur, for the preliminary social baseline purposes, the surveyed area for the Project entails adjacent settlements potentially affected by disturbances from Project construction works and operations, such as dust, airborne emissions, and noise. Also, it includes adjacent settlements that could potentially benefit from Project related opportunities, as employment, local economic development, increased influx and associated indirect economic impacts, etc.

In addition, the Project is expected to induce in-migration and increase the burden on local infrastructure provisions, such as roads, and services, affecting the villages surrounding the Project site. Therefore, the social AoI of 10 km is defined and considered in this ESIA and includes the areas in which a direct or indirect impact on social or cultural environment might occur.

0.6 STAKEHOLDER ENGAGEMENT

A stakeholder engagement process was undertaken to address the ESIA requirements for all phases (Phase 1, Phase 1A and Phase 2) of the Project. Whereas this approach allowed the ESIA practitioners to engage stakeholders regarding their interests and concerns around the broader set of issues and concerns pertaining to the Project, it should be noted that BSEZ Ltd came in when Phase 1 activities had already commenced.

Stakeholder identification and analysis was an essential component of effective and meaningful stakeholder engagement activities. The objective of this step was to provide a general overview of all stakeholders. It was important to understand how each stakeholder may be affected so that engagement can be tailored to inform them and understand their views and concerns in an appropriate manner.

During consultations, stakeholders expressed their views and grievances for the Phase 1 operations, and they also presented suggestions and recommendations for the implementation and operation of the upcoming Phase 1A and 2. Focus group discussions with representatives at the village, cell and sector level were conducted with the youth, women, and people living with disabilities. Detailed list of the stakeholders consulted is provided in the Stakeholder Engagement Plan (SEP) developed as part of this ESIA.

Employment opportunities, particularly for the youth, were identified by the villages as a key anticipated benefit, which is a common expectation for rural communities located near major project developments. It was reported that factories in the BSEZ Phase 1 gave women and youth priority in employment.

The key issues of concern were raised in relation to the Phase 1 of BSEZ development. Some of the Project affected people, who were relocated during Phase 1, raised grievances related to the limited involvement during stakeholder engagement, resettlement process and compensation that was allocated to them. Whereas these are historical issues that existed prior to establishment of BSEZ Ltd, the issues are continually being addressed using a grievance mechanism set out in the SEP and engaging with relevant parties including government, communities and the current industries in place.

0.7 KEY IMPACTS FINDINGS AND RECOMMENDATIONS

The ESIA process undertaken identified and assessed a range of potential impacts to the physical, biological, and social environment. Where impacts have been identified, appropriate mitigation measures have been provided in the ESIA. It should be noted that for many of the impacts identified, the proposed mitigation measures will reduce the significance of the impacts to a minor or negligible level. However, for some impacts, even with mitigation, residual impacts will remain. Those impacts that have a moderate to major post-mitigation (residual) significance, and which will require careful and consistent ongoing management, include:

- Ground disturbance and clearing of vegetation, as well as the movement of large machinery may contribute to the further distribution and/or establishment of alien invasive flora, leading to further degradation of natural and modified habitats.
- Cultural heritage impacts associated with ground disturbance through earthworks would lead to loss of umibirizi indigenous medicinal plant. Direct impacts may not be reduced unless the principle of avoidance is adopted in the first instance by way of re-design. Given the plants straddle the Project boundaries, establishment of exclusion zones with adequate buffer in these areas would minimize anticipated impacts.
- Permanent Loss of Livelihoods and/or household income due to Permanent loss of access to land in the Project footprint. Impacts originally triggered during the construction phase will lead to loss of space used for growing edible crop.

The ESIA process should not stop with the submission of this ESIA report and associated Environmental and Social Management and Monitoring Plan (ESMMP) to the RDB. Upon submission, there will be need for continued work to address anticipated impacts highlighted in the ESIA Report. Monitoring will be conducted (by internal and/or external auditors) to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts. Where any changes are proposed in the future, these will be assessed in terms of their potential to alter the ESIA findings and if necessary, mitigation / management measures included in the ESMMP will be amended to ensure negative impacts are mitigated and positive impacts enhanced.

To provide the vehicle for the integrated management of the potential impacts identified in the ESIA (both positive and negative) the existing Environmental and Social Management System (ESMS) will need to be updated to reflect the findings of this ESIA. The updated ESMS will provide a mechanism for ensuring that mitigation measures identified in the ESIA and associated ESMMP are adequately implemented. Moreover, the ESMS provides a framework for monitoring, compliance auditing and inspection programmes, which assist the Project in meeting its commitments, as stipulated in Rwandan regulations, lender standards (primarily the IFC PSs), and as required by the Contractor.

As the primary title holder to BSEZ, it is understood that investors will acquire plots within BSEZ for the purpose of development of industrial units/logistics facilities. These facilities will be required to undertake site specific ESIA and submit to RDB for authorization prior to commencement of construction and operation activities. As these facilities and activities will not be under the direct control of BSEZ Ltd, BSEZ Ltd cannot reasonably be liable for the assessment and management of environmental and social risks and impacts at these sites. However, BSEZ Ltd should accept a duty of care to ensure that investors manage their environmental and social risks to a level that:

a) meets the legal requirements in terms of the Environment organic law No. 48/2018; and
b) achieves a level of management that is consistent with BSEZ Ltd's own environmental and social commitments.

In order to effect duty of care, it is recommended that BSEZ Ltd contractually imposes BSEZ Ltd's Environment, Health and Safety (EHS) code of conduct of investors and Units that guides the general environment, social health and safety operations of BSEZ. The specific content of these obligations is outside the scope of the current ESIA mandate.

Provided that all the social and environmental mitigation / management measures provided in this ESIA and associated ESMMP are implemented, potential negative impacts from the project will be reduced and positive impacts enhanced.

1 INTRODUCTION

1.1 PROJECT BACKGROUND

The Bugesera Special Economic Zone (BSEZ) comprise a total of 335.68 hectares (ha) of land situated in Kagasa II Village, Ramiro Cell, Gashora Sector, Bugesera District in the Eastern Province of Rwanda (hereinafter referred to as the "Project").

In 2011, an Environmental Impact Assessment (EIA) was undertaken by Ministry of Trade and Industry (MINICOM) (previous land rights owner) for 200ha of the BSEZ and subsequently issued with an Environmental Impact Assessment license by Rwanda Development Board (RDB).

In 2022, ARISE Integrated Industrial Platforms (IIP) were allocated the total BSEZ development. To develop this area, a joint venture between ARISE IIP and the Government of Rwanda created the Bugesera Special Economic Zone Limited (BSEZ Ltd) – which is the current Project proponent.

BSEZ Ltd, engaged the services of Environmental Resources Management Southern Africa (Pty) Ltd (hereinafter referred to as "ERM" to undertake EIA for the Project. ERM worked with its local partner in Rwanda, Earth Systems (hereinafter jointly referred to as "EIA Consultant").

This Environmental Impact Assessment (EIA) for the Project has been designed to provide a full description for a total of 335.68 ha, from which 200 ha have already been licensed in 2011 (Appendix F[1]). Furthermore, BSEZ Ltd aims to obtain one license for the Project that will include the remaining 134.38 ha of BSEZ land as agreed between ARISE, the Rwanda Development Board and the EIA consultant (Appendix B[2]). The proponent - *BSEZ Ltd* has applied to Rwanda Development Board (RDB) to carry out an environment impact assessment (EIA) for the proposed *Project* in accordance with requirements of the EIA Regulations of the Republic of Rwanda. The proposed Project will incorporate practical and cost-effective measures to avoid or minimize negative potential environmental impacts, capturing environmental benefits and ensuring sound environmental management. The purpose of the ESIA study is twofold:

- To provide the *Bugesera Special Economic Zone Limited* with advice on how project design can avoid or mitigate potential negative impacts and to enhance anticipated environmental benefits,
- To prepare an ESIA report and Environmental and Social Management Plan (ESMP) according to national EIA Guidelines and Regulations, 2006.

The BSEZ project now considers three phases at different stages of development: Phase 1 comprising 91.64 ha which is part of the area licensed in 2011 (Appendix F) and currently under construction (54% of completion); Phase 1A (98.66 ha) and Phase 2 (143.69 ha) not developed and for which the proponent is looking to obtain the license that would cover the remaining area not included in the 2011 EIA.

[1] Appendix F – EIA license issued for 200 ha of BSEZ.
[2] Appendix B - Minutes of meeting between RDB, ARISE & ERM on ESIA approach.

The nature of BSEZ is industrial. However, whereas the plots have been identified for development, the details of the individual industries that will eventually occupy the plots remain largely unknown. The key infrastructure includes roads, water and sanitation infrastructure, power utilities, drainage networks, wastewater treatment plant among other support infrastructure that needs to be developed. The locations for these key infrastructures are known and the design is unlikely to change. The EIA takes cognizance that BSEZ Ltd developed and submitted the Project Masterplan to RDB for approval in December 2022 and was subsequently approved on 2nd May 2023.

1.1.1 PROJECT OBJECTIVES

The Republic of Rwanda, concerned about its socio-economic development as well as the improvement of the living standards and quality of life of its populations, wants to promote industries, including the BSEZ, in order to create jobs and increase productivity.

The main objectives of the BSEZ are the following:

- Promote and attract multi-sectoral investments of an agricultural, industrial, commercial, and service nature by encouraging the establishment of production units.
- Support and assist investors to set up industrial manufacturing units to create value-added products or to provide services, in order to increase exports and reduce Rwanda's dependence on imports.
- Create modern infrastructure to help industrial units within the BSEZ improve their productivity.
- Develop the Logistics Zone including warehouses as an integral part of the BSEZ to meet the logistical needs of Users (including Companies) and to ensure, on an exclusive basis, the traffic of trucks within the BSEZ with the aim of promoting industrial development.
- Generate jobs and help the industrial sector within the framework of the BSEZ to achieve higher productivity.

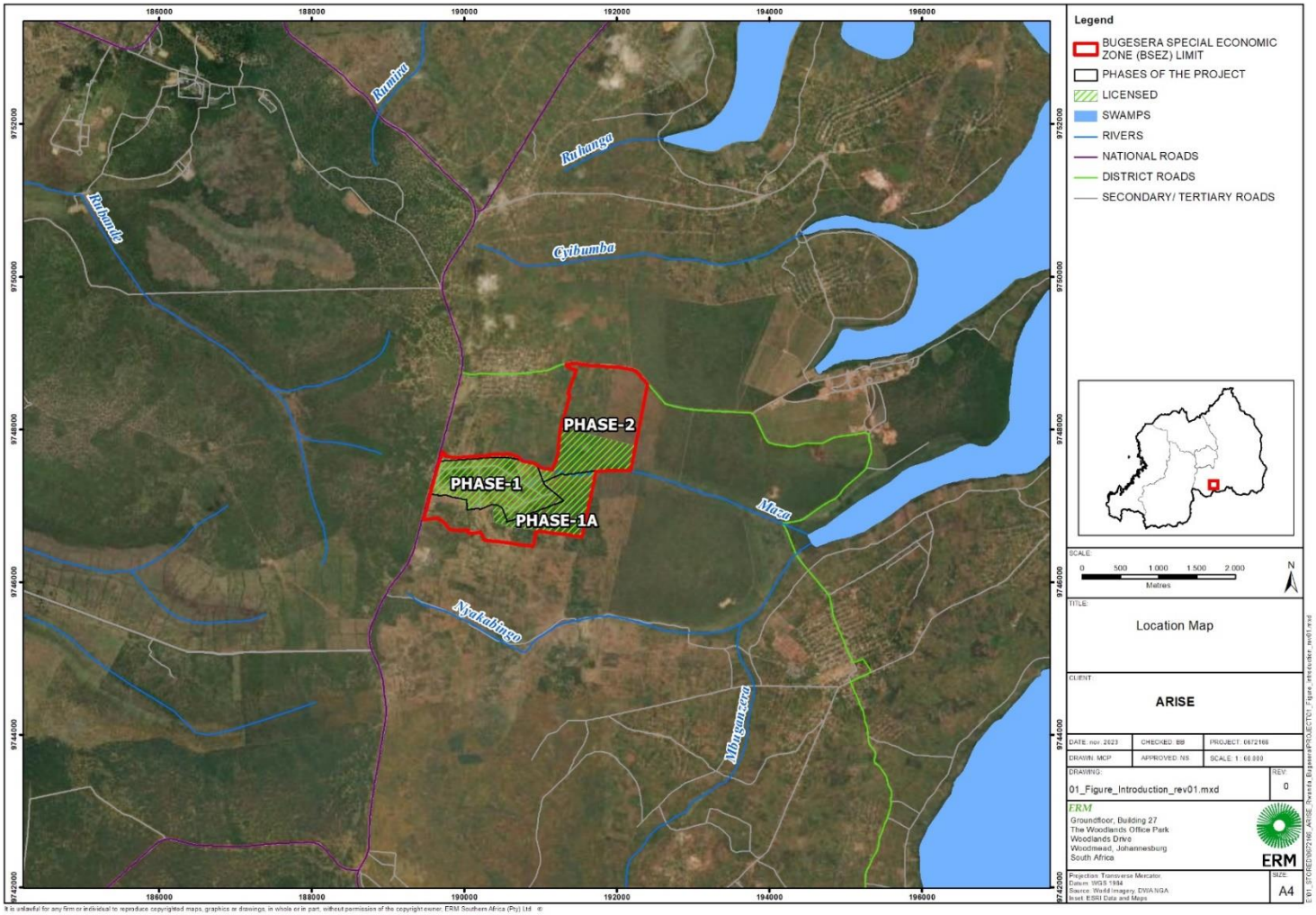


FIGURE 1-1: BUGESERA SEZ PROJECT LOCALITY MAP

1.2 NEED FOR AN ESIA

Whereas a Project Environmental Impact Report (EIR) for BSEZ was developed in 2011 by MINICOM, the EIA license issued covered 200 ha. BSEZ Ltd, as the current proponent, is thus seeking to obtain the EIA license for the remaining 135.68 ha not covered by the EIA license in 2011.

The EIA study is an obligatory step in the permitting process by RDB. This EIA Report has been compiled according to the Ministerial Order no.001/2019, which establishes the list of projects that must undergo EIA, instructions, requirements and procedures to conduct an EIA. According to Annex I of the referred regulation, the current project is subject to full EIA, as the project falls under Article 2 (industries) and Article 9 (warehouse with total floor area exceeding one thousand and five hundred square meters (1500 sqm) and plot size exceeding one thousand square meters (1000 sqm). The EIA has also taken into consideration the International Finance Corporation's (IFC) Performance Standards on Environmental and Social Sustainability (2012).

1.3 PROPONENT

1.3.1 ARISE IIP

ARISE IIP is a pan-African infrastructure developer. ARISE IIP provides world-class ecosystems across Africa, contributing to the continent's industrialisation agenda and enhancing manufacturing competitiveness. ARISE Integrated Industrial Platforms (IIP) has two shareholders: Africa Finance Corporation (AFC) and Africa Transformation and Industrialization Fund (ATIF). ARISE IIP has operational SEZs in Gabon, Benin and Togo. Additionally, the group has planned SEZs in Rwanda, Côte d'Ivoire, Chad, Nigeria, Republic of Congo, Democratic Republic of Congo, and Sierra Leone[3].

1.3.2 ARISE IN RWANDA

The Bugesera Special Economic Zone (BSEZ), located in the Bugesera district of Rwanda, was conceived through the signing of a Public-Private Partnership (PPP) agreement between ARISE and the Rwandan government. With a committed investment of USD 100 million, BSEZ offers a strategic advantage being 10 km away from Bugesera's new international airport and 50 km from Rwanda's capital, Kigali. The zone provides convenient access to key areas, facilitating transportation and market opportunities. The shareholding comprises 60% held by ARISE IIP and 40% held by Government of Rwanda.

BSEZ Limited is a company that was created as per the Joint Venture Agreement signed between ARISE IIP and Government of Rwanda on 2nd September 2022, with the mandate to design, build, and operate Bugesera Special Economic Zone.

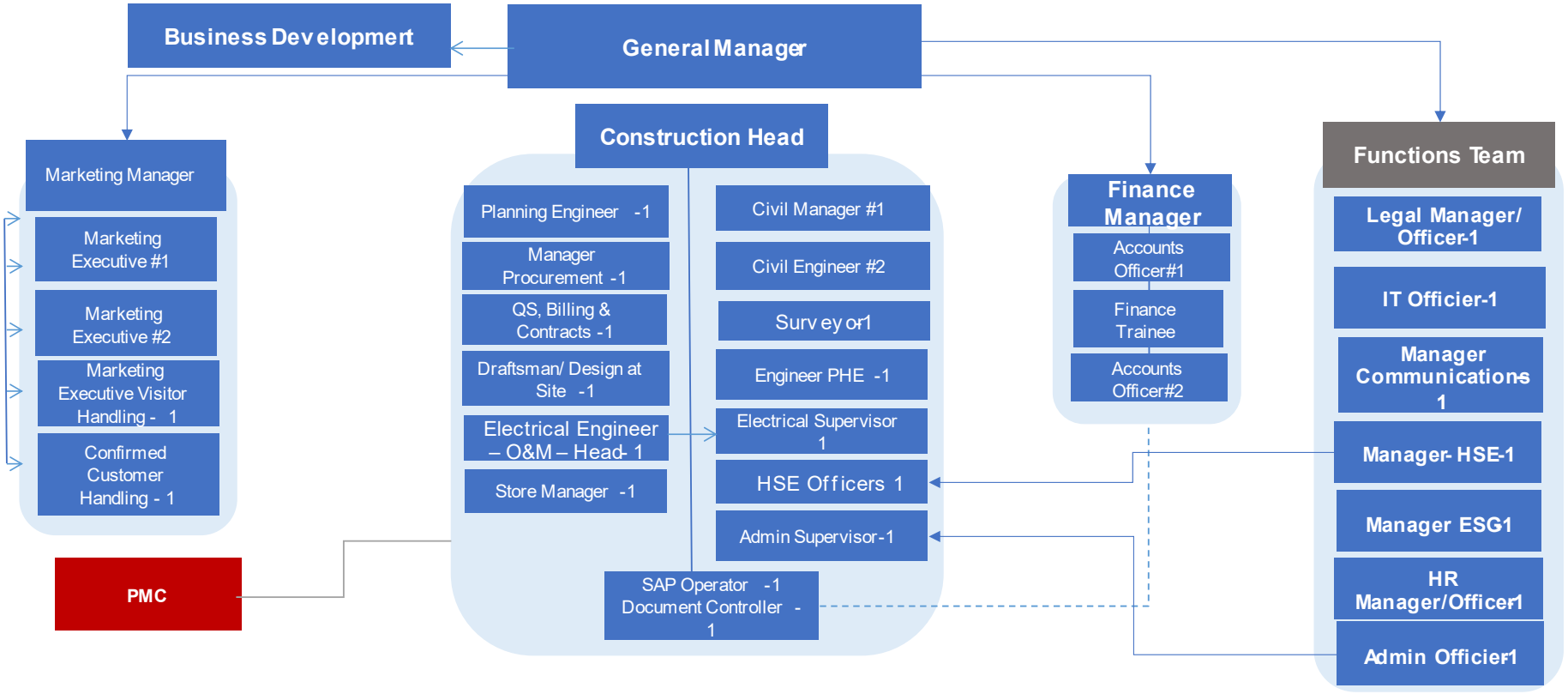
1.3.3 BSEZ LTD PROJECT TEAM

BSEZ team responsible for Environmental and Social (E&S) management will be led by the Managing Director who is in charge of industrial relations and corporate affairs, the Human Resources manager is in charge of employee relations and internal grievances and the ESG Manager is in charge of charge of community liaison and grievances (incl.

[3] https://www.ariseiip.com/about-arise/

grievances from industries, contractors, state, etc). They will be supplemented by the communication and marketing manager to assist in all the communication needs. Further, there is HSE Manager who handles health and safety aspects.

FIGURE 1-2: BSEZ ORGANISATION STRUCTURE



1.4 ESIA CONSULTANT: ERM & EARTH SYSTEMS

The EIA has been undertaken by ERM in partnership with Earth Systems who jointly formed the EIA consultant team. A brief description of the two organisations is provided in *Sections 1.4.1*and *Section 1.4.2* below:

1.4.1 ENVIRONMENTAL RESOURCES MANAGEMENT SOUTHERN AFRICA (PTY) LTD (ERM)

ERM was appointed by the Project Proponent to undertake the EIA for the proposed Project. ERM has no financial ties to, nor is it a subsidiary, legally or financially, of the Project Proponent.

ERM is a leading global provider of integrated environmental, health, safety, risk, social consulting and sustainability related services with over 160 offices in more than 40 countries and territories. ERM has operated throughout Africa for over thirty-five years and our Sub-Saharan Africa Business Division with over 200 employees is currently based in South Africa (Cape Town, Durban and Johannesburg), Mozambique (Maputo), Kenya (Nairobi) and Tanzania (Dar es Salaam). The ERM team will coordinate the overall EIA study supported by Earth Systems to meet national and international standards.

1.4.2 EARTH SYSTEMS RWANDA

ERM's subcontractor for this Project, Earth Systems is an international consulting firm with local presence in Rwanda that provides specialist Environmental and Social (E&S) services to the infrastructure development sector, as well as other industries. Established in 1993, Earth Systems has successfully completed over 600 projects for a range of clients including private companies, governments, aid and development agencies and research organizations. Earth Systems has more than 15 years of experience in East and West Africa, conducting EIAs and EMPs, E&S baseline surveys, Resettlement Action Plans (RAPs), and Livelihood Restoration Plans (LRPs). Earth Systems has an experienced team of social scientists and detailed experience in conducting socioeconomic baseline surveys, social / health impact assessments, resettlement action plans and livelihood restoration plans. Earth Systems is registered by RDB to perform EIAs in Rwanda and its certificate is presented in Appendix A.

1.4.3 BSEZ ESIA TEAM

The BSEZ ESIA team key experts for this Project are presented in Table 1-1 below.

TABLE 1-1**:** ERM PROJECT TEAM

Position	Name	Firm
Partner in Charge	Nigel Seed	ERM
Project Manager	Boaz Bett	ERM
ESIA Technical Lead	Clara Gonçalves	ERM
Biodiversity Lead	Marianne Strohbach	ERM
Social and Human Rights Expert	Kelly Horton	ERM

Position	Name	Firm
Director / Principal Environmental and Social Scientist	Nigel Murphy	Earth Systems
Environmental and Social Scientist	Magalie Ntahokaja	Earth Systems
Environmental Scientist-Hydrology and Water Quality Specialist	Julie Ikome	Earth Systems
IT and Field Technician	Germain Rwibitso	Earth Systems
Environmental Scientist	Sheriffa Shengero	Earth Systems

1.5 STRUCTURE OF THIS REPORT

The EIA report developed by the EIA consultant contains information outlined in the Appendix 3[4] of Environmental Impact Assessment Guidelines (2006) developed by Rwanda Environment Management Authority (REMA). A summary of the content of the EIA report is presented Table 1-2 below:

TABLE 1-2: EIA REPORT STRUCTURE

Section	Contents
Executive Summary	The EIA report brief highlights information on the name and location of the project; name of the developer; name of the agency preparing EIA report; main impacts identified; mitigation recommendations and Environmental management and monitoring plan
Chapter 1: Introduction	Contains an overview of the Project, Project justification, Project Proponent, Environmental and Social Impact Assessment Consultant and an outline of the report structure.
Chapter 2: Legal and Institutional Framework	Outlines the legislative, policy and administrative requirements applicable to the proposed Project.
Chapter 3: Approach and Methodology	Outlines the approach to the ESIA and summarises the process undertaken by the Project to date.
Chapter 4: Project Description	Includes a detailed description of the proposed Project activities.
Chapter 5: Consideration of Alternatives	Describes the alternatives that have been considered and the reasons for the selection of the preferred alternative.
Chapter 6: Baseline Environment	Describes the physical, ecological, and social baseline environment
Chapter 7: Stakeholder Engagement	Describes the approach to and outcomes of the stakeholder engagement and public participation process.
Chapter 8: Impacts Assessment and Mitigation Measures	Describes and assesses the potential environmental and social impacts of the proposed Project.

[4] REMA (2006), Environmental Impact Assessment Guidelines: Appendix 3 - Content of an EIA Report.

Section	Contents
Chapter 8: Mitigation Measures	Presents mitigation measures for the identified impacts in Chapter 8.
Chapter 10: Environmental and Social Management and Monitoring Plan (ESMMP)	Specifies the management and monitoring measures to be undertaken and shows how the Project will mobilise organisational capacity and resources to implement these measures.
Chapter 11: Conclusions and Recommendations	Summarises the key findings of the ESIA process and provides recommendations for mitigation of potential impacts and management of the Project.
References	Contains a list of references used in compiling the report.

The Report includes the following Appendices (Table 1-3):

TABLE 1-3: LIST OF APPENDICES

Appendix No.	Description
Appendix A:	Earth Systems Rwanda Consultancy Registration and Practicing Licences
Appendix B:	Land Title Deed of the Project Site
Appendix C:	Minutes of meeting between RDB, ARISE & ERM on ESIA approach
Appendix D:	Stakeholder Engagement Plan (SEP)
Appendix E:	Detailed minutes of stakeholder engagement meetings conducted during the ESIA process, including attendance registers/ stakeholders' comments
Appendix F:	2011 EIA License
Appendix G:	Traffic Assessment
Appendix H:	BSEZ Climate Change Risk Assessment
Appendix I:	Greenhouse Gas Assessment
Appendix J:	List of Avifauna Species Recorded
Appendix K:	Cultural Heritage Baseline Gazetteer

2 APPLICABLE LEGISLATION AND STANDARDS

This chapter the ESIA Consultant[5], describes the legislation and policy framework that is relevant to the Bugesera Special Economic Zone (SEZ) Project. It covers national legislation, international standards, and international treaties and agreements to which Rwanda is a signatory.

In the juridical system of the Republic of Rwanda, the EIA procedure is regulated by the Ministerial Order N° 003/2008 of 15/08/2008; whereas the Ministerial Order N°004/2008 of 15/08/2008 establishes the list of works, activities and projects that are required to undertake a mandatory EIA. This list includes physical infrastructure activities. Rwanda has a number of laws and policies governing the management of its natural environment as discussed in the following sub-sections.

2.1 INSTITUTIONAL FRAMEWORK IN RWANDA

Overall investment approval is managed by the Rwandan Development Board (RDB) which operates as a 'one stop shop' for managing new investments. RDB brings together several government bodies in Rwanda focussed on promoting investment in Rwanda. RDB has a department responsible for EIA processes including reviewing all projects EIA reports before approval of the implementation of the projects, a duty that was previously undertaken by Rwanda Environment Management Authority (REMA).

The Rwanda authorities involved in environmental and social management and relevant to the Project are described below in Table 2-1.

[5] Earth Systems Rwanda provided the Local Permitting context and a description of applicable National Legislations

TABLE 2-1 INSTITUTIONAL FRAMEWORK RELEVANT TO THE PROJECT

Institutions	Description	Role in the Project
Rwanda Development Board (RDB)	• RDB is the agency of the Government of Rwanda that approves overall investments in Rwanda, it operates as a "one stop shop" for managing new investments. • RDB brings together several government bodies in Rwanda focused on promoting investment in Rwanda. • RDB has a department responsible for EIA processes including reviewing all projects' EIA reports before approval of the implementation of the projects, a duty that was previously undertaken by Rwanda Environment Management Authority (REMA).	RDB's responsibility in this Project concerns: • Regulating BSEZ as RDB is the regulator of all SEZs in Rwanda • Approval of the masterplan • Development of project license • Approval and review of the Terms of Reference (ToR) of the EIA; • Approval of the Project brief and issuance of an EIA certificate; • Evaluation and approval of the ESIA and ESMP report; • Approval and issuing of construction permit • Periodic monitoring of the project activities to ensure mitigation measures are implemented and that it has no adverse impacts on the environment; and • The monitoring of the environmental compliance of the Project activities.
Rwanda Environment Management Authority (REMA)	• REMA is the agency of the Government of Rwanda responsible for implementing policies and laws related to the environment. • Under Article 69 of the Environmental Law, REMA has the responsibility to provide the requirements for an EIA study and report as well as provide a list of projects eligible for a full EIA and those subject to limited EIA. It also has the mandate to conduct environmental monitoring to validate the effectiveness of recommendations coming out of an EIA study.	REMA is involved with RDB in monitoring the Environmental and Social Management Plan (ESMP) and reviewing the environmental audit submitted by the client ARISE.
Ministry of Health	The Ministry of Health is the ministry responsible for setting policy and guidelines for environmental and public health and sanitation.	The Ministry of Health will identify suitable linkages between the Project and health facilities beyond RDB's mandate which include setting up and monitoring the health facilities within the project.

Institutions	Description	Role in the Project
Rwanda Land Management and Use Authority (NLA)	The NLA is the government agency responsible for managing and regulating land use.	NLA is involved in issuing land title to BSEZ for the project. They are also involved in facilitating land title issuance upon request and approval from BSEZ to each investor
Ministry of Trade and Industry (MINICOM)	MINICOM is the government agency responsible for facilitating Rwanda's economic transformation goals and vision through the development of internal and external trade, promotion of industrialization and investment while ensuring a high level of consumer and intellectual property protection for Rwandans.	Prior to signing the framework agreement, MINICOM was the developer, operator, and owner of BSEZ. With BSEZ ltd being the current developer and operator of BSEZ, the responsibility or MINICOM is now to take care of outstanding land acquisition procedures and properly hand the project over to RDB, which in turn shall automatically transfer all project components to BSEZ ltd.
Rwanda Energy Group (REG)	Rwanda Energy Group Limited REG), is a government-owned holding company responsible for the import, export, procurement, generation, transmission, distribution and sale of electricity in Rwanda. It has 2 subsidiary companies which are EDCL (Energy Development Corporation Ltd.) in charge of energy development projects and EUCL (Energy Utility Corporation Limited) in charge of utility and maintenance.	REG's mission is to develop Rwanda's energy supply capacity to meet its growing demand and provide reliable and affordable energy supply up to the boundaries of the BSEZ project by setting up substation of appropriate capacity and ensuring smooth operation of the project in terms of power supply.
WASAC	The Ministerial Order N° 87/03 dated on 16/08/2014 determining modalities of transfer of responsibilities, and property of Energy, Water and Sanitation Authority (EWSA) made WASAC legally incorporated in Rwanda under Law N°07/2009 of 27/04/2009 relating to companies. The Water and Sanitation Corporation (WASAC) is the entity setup to manage the water and sanitation services in Rwanda as a result of the Government of Rwanda (GoR) decision to unbundle the national utility former EWSA	WASAC connect BSEZ to the national grid of water supply via the main water supply connection. WASAC will undertake periodic water quality measurements to ensure the water supplied to BSEZ meets both National requirements.

Institutions	Description	Role in the Project
National Police	Rwanda National Police was established in the year 2000 and is responsible for ensuring safety and security of persons and property on the entire territory of the Republic of Rwanda.	The national police will construct and operate the fire station and police station within the BSEZ Project area.

2.2 RELEVANT LEGISLATION IN RWANDA

2.2.1 RELEVANT LEGISLATION

The regulatory framework in Rwanda is in the form of laws, decrees, circulars, or ministerial orders promulgated from time to time. Key regulatory frameworks relevant to the Project activities are listed in Table 2-2.

TABLE 2-2 RWANDA LEGISLATION RELATED TO THE PROJECT

Regulation	Description	Relevance to the Project
The constitution of the Republic of Rwanda, 25th December 2015	All laws and regulations in Rwanda must be aligned with the principles in the constitution which was approved by the national referendum and adopted in the Parliament on 25th December 2015. Article 3 states that all Rwandans have the right to good health, while Article 22 emphasizes that everyone has the right to live in a clean and healthy environment. Article 34 stipulates that everyone has the right to private property, whether individually or collectively owned. Private property, whether owned individually or collectively, is inviolable. The right to property shall not be encroached upon except in public interest and in accordance with the provisions of the law. Article 35 goes on to inform that Private ownership of land and other rights related to land are granted by the State. A law determines modalities of concession, transfer and use of land. Regarding protection of the environment, Article 53 of the Constitution, everyone has the duty to protect, safeguard and promote the environment. It goes on to say that the State ensures the protection of environment, and a law must be in place that determines the modalities for protecting, conserving, and promoting the environment.	The implication of the Constitution is that the project shall be implemented in with a duty to protect and conserve the environment.
Environment organic law No. 48/2018 – determining the modalities of protection, conservation and promotion of the environment.	Every person has the duty to protect, conserve and promote environment. The State has a responsibility of protecting, conserving and promoting the environment. Sustainable development will aim to support the present and plan for future generations in consideration of conserving biodiversity, play a role in what constitutes biodiversity and equal distribution of benefits derived from their use and the technology applied on them. The Organic law states every project shall be subjected to Environmental Impact Assessment before the authorisation for its implementation is established by any order of the minister. Article 32 of the law further states that every project that may have significant impact on the environment must undergo an environmental audit during and after its implementation. It goes on inform that an Order of the Minister also issues instructions and procedures for conducting environmental audit.	The proposed Project falls within the category of projects for which a full EIA Project Report is required. More specifically: • Warehouses and storage facilities of perishable agricultural commodities occupying an area of a half a hectare (1/2 ha) and above, • Industries, warehouses for storage of hazardous items or perishables, warehouse with total floor area exceeding

Regulation	Description	Relevance to the Project
	Article 33 states that the EIA and Audit must be approved by the Authority in charge of conservation and environment (in this case, REMA) or another state organ authorised in writing to do so by the Authority and as stated in article 34 the consultancy cost for environmental audit and EIA are borne by the project initiator. Article 46 of the law informs that any person who does not carry out EIA before launching any project that may have harmful effects on the environment while it is required, is punished by suspension of his/her activities or closure of his/her association and ordered to rehabilitate the damage to environment, persons and property. He/she also pays an administrative fine of two percent (2%) of the total cost of the project. In regard to conservation and protection of built environment, Article 17 of the law instructs that collection, transport and disposal of wastewater are conducted in accordance with special regulations and guidelines issued by the competent authority (currently, the Rwanda Utilities Regulatory Authority (RURA)). Wastewater must be collected in treatment factories for purification and serve thereafter to perform hygiene, sanitation and developmental activities. Water efficiently purified to standards may be poured into streams or lakes. Regarding solid waste management, Article 18 informs that no person is authorised to discard solid waste in an inappropriate place. Solid waste must be sorted, collected and transported to appropriate destination in accordance with relevant laws. Solid waste must be disposed of in appropriate landfill or in a waste processing factory for production purposes. As part of the obligations of the State, decentralised entities and local communities with regard to the protection, conservation and promotion of environment, the Law obliges the state to protect and conserve soil, biodiversity, energy use. Furthermore, Article 23 requires public organisations in charge of housing and infrastructure to ensure the integration of green spaces in the masterplan as well as in individual construction plans. In regard to noise pollution, Article 53 of the law stipulates that any person who causes noise pollution is liable to an administrative fine of RWF 500,000.	1500 sqm and plot size exceeding 1000 sqm. This EIA has therefore been carried out in line with the requirements of this law, and the Project Proponent is required to commit to implementing the ESMMP laid out in this Project Report, as well as any other conditions as stipulated by REMA, prior to being issued an EIA licence.

Regulation	Description	Relevance to the Project
Ministerial Order no. 001/2019 of 15/04/2019 Establishing the List of projects that must undergo Environmental Impact Assessment, instructions, requirements and procedures to conduct Environmental Impact Assessment, 2019	The Order establishes a list of projects that must undergo an environmental impact assessment before they obtain authorisation for their implementation and instructions, requirements and procedures for conducting environmental impact assessment. Articles 6, 7, 8 and 9 instruct that the developer of the project that requires an EIA must select an expert from the list of EIA practitioners published in accordance with relevant laws to conduct the study. The selected expert must submit an official application for EIA of the proposed project to the authorized organ in form of a project brief together with proposed terms of reference for review and approval. After the reception and analysis of the project brief and proposed TORs, within fourteen (14) days, the authorised organ must approve or request for upgrade of TORs for conducting the EIA. The EIA must be based on the TORs mentioned in this Order. Upon completion of EIA, the expert submits it to authorised organ (in this case, the RDB). The authorised organ, within twenty (20) working days, after reception of the EIA report, accepts by issuing an EIA certificate or requests for additional information from selected EIA expert. If it is necessary to hold public hearing, the authorised organ requires an additional period of fifteen (15) working days from the date of public hearing notification.	This EIA Report has been undertaken to comply with the requirements of these Regulations.

Regulation	Description	Relevance to the Project
Law No. 49/ 2018 of 13/08/2018 determining the use and management of water resources in Rwanda	The order aims to protect and appropriately use water resources which constitutes the obligations of each and every person. Water resources are used and managed in accordance with the following principles: • Prevention of pollution with priority to source; • Precaution, according to which activities considered or suspected to have negative impacts on water resources shall not be implemented even if such impacts have not yet been scientifically proved. Scientific uncertainty must not be taken into consideration for the benefit of destroyers of water resources, instead it may be used in conservation of water resources; • Integrated management of water resources within catchment, taking into account the interests of all water users, land and other natural resources and related ecosystems; • Participation, according to which all interested stakeholders, including water users through their representatives, are entitled to participate in water resources management and planning; • "User-pays and polluter-pays" principles, according to which the user of water and the polluter must support a significant part of expenses resulting from measures of prevention, of pollution reduction and restoration of the water resources in quality and in quantity; • Subsidiarity, whereby development and protection of water resources is planned and implemented at the lowest appropriate level. Article 21 emphasises that the use of water resources in different activities and installation susceptible to modify the flow or the level of water or to degrade their quality, or to threaten water-related ecosystems, wetlands and the environment are subjected to water use permit.	The Project, in accordance with this Law, is required to abide to all relevant requirements towards conservation, protection and management of water resources, some already mentioned above comprising of; which body to go to for public water network, who pays for damages caused to a public water source and how to handle wastewater generated from the project before discharge to the environment.

Regulation	Description	Relevance to the Project
Land Law No. 27/2021 of 10/06/2021 governing land	This law serves the purpose to determine modalities of acquisition, registration, allocation, possession, transfer, management and use of land in Rwanda. With reference to Article 5 of this Law on equal right to land, it is stated that any form of discrimination in relation to access to land and enjoyment of real rights to land is prohibited. In regard to modalities of land tenure, Article 9 of the Law states that a person who acquired land through inheritance, succession, purchase, donation, exchange, land sharing or legal grant by competent authorities, owns it in accordance with one of the following tenure modalities: emphyteutic lease or freehold. Emphyteutic lease is that type of land ownership based on a long-term contract between the State and a person granting him or her rights on land, while freehold is a form of land tenure based on a contract between a person and the State, where it grants him or her full and indefinite rights over the land. According to Article 21, some of the ways transfer of land rights is carried out are lease or sale. Article 23, stipulates that the contract of land rights transfer done in writing is signed by transferee and transferor of land rights, approved, and witnessed by the signature of the notary competent in land matters or any other notary recognised by the chief registrar of land titles. This transfer contract may be done electronically through digital signature of both parties granted by the competent organ in accordance with relevant laws. Transfer of land rights is valid upon its registration in the land register as per Article 24.	This Land Law will be the reference point for the process of project land acquisition for the Bugesera SEZ.
Law No.10/2012 governing urban planning and building in Rwanda	**Article 13: "**CoK and Districts shall have master plans for land management and urban planning in conformity with the pattern of rational land use in Rwanda."	The Project is required to follow the process of acquiring the relevant permits mentioned above in compliance to provisions in this Law.
	Article 15: "Zones envisaged by urban master plans, master plans at the decentralized entities level and by local and specific development plans shall be subject to the following planning operations; land subdivision, urban replotting, plot restructuring, building renewal and building refurbishment".	
	Article 19 and 20: "plots for construction must be serviced with public or private roads that allow direct access and establishment of buildings in plots shall be done in a way that facilities access to services".	

Regulation	Description	Relevance to the Project
	Article 46: "local and specific land development plans with all infrastructure projects aiming at the occupation of space shall be compatible with the indications of the master plan for land management and urban planning."	
	The Law also indicates documents for supervision of building operations comprising; supervision documents, lease contract as certificate for urban land occupation, building permit to commence construction, occupancy permit after building completion and prior to occupancy, demolition permit.	
Law No. 064/ 2021 of 14/10/2021 governing biological diversity in Rwanda	This Law's purpose is to conserve, manage, protect and promote biological diversity in Rwanda, which consists of 3 categories as per Article 4: • Critically endangered species • Endangered species and, • Vulnerable species. • Article 32 states that the conservation of wildlife species and their habitats for the purpose of conservation of wildlife species and their habitats, the following acts are prohibited: • Taking or destroying an egg or a nest of any wild animal; • Capturing, stressing, or removing animal species from their habitat, harming them, transporting, hawking, utilizing, possessing, selling or purchasing them; • Destroying, cutting, mutilating, collecting or removing any wild plant species, picking fruits, transporting, hawking, utilizing, possessing, selling and purchasing, or seedlings or of wild plant species; and • Destroying, altering or degrading natural habitats of wild animal and plant species; 5) erecting infrastructure in protected areas. Article 32 further states that the acts cited in items 2, 3, 4 and 5 may be carried out upon a permit of the Authority. Quality Basic Education (QBE) project additional financing activities must be carried out in accordance with this law.	In compliance with this Law, the Project shall consider the list of protected species during the preparation of the EIA, during the construction and operation of the Project, as a measure to avoid negatively affecting protected species. The Project shall also avoid destruction of biodiversity through limiting vegetation clearance and prohibited practices such as waste dumping that may pollute the nearby water bodies or wetlands. The Project will also avoid the introduction of alien species to the site as instructed by this Law.
Law Nº47bis/2013 of 28/06/2013 determining the management and utilization of forests in Rwanda, 2013	The Law relates to the management and utilisation of forests in Rwanda. The Law applies to all types of forest, all tree species, persons who possess, process and utilise forest products and all issues relating to sustainable forest management.	Once construction of the Project has begun, the land that has been acquired will require clearing of all trees, bushes, structures and other

Regulation	Description	Relevance to the Project
		obstacles present within the footprint of the site.
Ministerial order no 007/16.01 of 15/07/2010 determining the length of land and shores of lakes and rivers, 2010 / law No. 48/ 2018 on environment	This Order aims at setting aside the length of land on shores of lakes and rivers affected in the public domain for environmental protection. The land within a distance of fifty meters from the lakeshore is public property. The land within ten and five meters from the shore of big rivers and small rivers respectively is public property. The length set is calculated beginning from the furthest line reached by water depending on successive flooding record; and such land is statutorily regarded as a protected area and not is allowed to erect private property on such land.	The project will be required to comply with the prescribed distances from the lakeshores.
Air quality Law No. 18/2016 governing the preservation of air quality and prevention of air pollution in Rwanda.	This law requires the National Authority in charge of establishing quality standards (Rwanda Standards Board (RSB) in this case) to: prescribe criteria and procedure for measuring air quality and air pollutants; establish ambient air quality standards in order to curb the impact of air pollutants; establish occupational air quality standards for various sources of air pollution which can cause harm to public health; establish quality standards that regulate emissions of air pollutants from different sources contributing to air pollution; establish specific quality standards that regulate industrial activities with a view to avoid or minimise environmental pollution that may results from such industries; determine stack heights of chimneys for air emissions; prescribe any matter in relation with or affecting air emissions quality standards. The Law also stipulates that any person whose activity is air polluting and does not comply with the air quality standards must apply for a permit issued by the national authority in charge of environmental protection (REMA in this case). An order of the Minister determines requirements and modalities for applying, granting, and using the permit.	The Project is located in an industrial zone where a number of light industrial developments are on-going. Dust creating activities during the construction phase will largely be associated with land clearing and earthworks. Air quality considerations during the operations phase will be associated with truck movements and the infrequent operation of a backup generator for power.

Regulation	Description	Relevance to the Project
Labour law No. 66/2018 of 30/08/2018	This Law applies to: employment relations based on an employment contract between an employee and an employer in the private sector; the public service, unless otherwise provided by the general statutes for public service; an apprentice; an intern; a self-employed person with regard to occupational health and safety; an informal sector employee with regard to: occupational health and safety; the right to form trade unions and employers' associations; the right to salary; the minimum wage in categories of occupations determined by an Order of the Minister in charge of labour; the right to leave; social security; protection against workplace discrimination; protection from forced labour; prohibited forms of work for the child, pregnant or breastfeeding woman.	The Contractor and Project Proponent, being the primary employer, during the construction and operational phases of the Project, are bound by this Law to abide to its stipulations on employee management and relations.
Ministerial order No 1 of 17/5/2012 – determining modalities of establishing and functioning of occupational health and safety committee, 2012	The order gives powers of an occupational safety and health expert and labour inspector. Gives general provisions of health and hygiene, machinery safety, safety measures such as safety signs, fire risk, air and noise pollution. The law elaborates on workplaces welfare, health and safety and provides precaution measures for vulnerable groups.	The project will be required to comply to all requirements of this Order and participate in periodic inspections during the construction and operation phases.
Prime Minister's Instructions N° 005/03 of 27/12/2013 preventing air pollution caused by vehicular emissions and machines using petroleum products in Rwanda, 2013	These instructions determine modalities of protecting citizens and preventing air pollution caused by emission from vehicles and machines using petroleum products. Article 5 refers to all vehicles shall undergo emissions inspection with the Motor Vehicle Inspection Centre. Commercial vehicles shall undergo emission inspection every six (6) months for emission standard compliance. Article 8 states that machines using petroleum products as their source of energy has the obligation to service the machines and to maintain them according to the best technical practices to keep them within the authorized emissions limits.	All transport vehicles and any machine using petroleum products used by the Project will be required to comply with current standards relating to emissions to prevent air pollution.
Ministerial Order No008/MINIRENA/2015 of 18/06/2015 establishing a list of protected trees, 2015	The ministerial order relates to State Harvesting licenses and modalities for its insurance. The Authority in charge of forests management shall be the organ in charge of issuing the State Forest harvesting license.	Once construction of the Project has begun, the land that has been acquired will need clearing of all trees, bushes, structures and other obstacles present within the footprint of the site.
Ministerial Order N°007/2008 of 15/08/2008	The order establishes a list of protected plant and animal species.	The project will be required to ensure protection of any species in

Regulation	Description	Relevance to the Project
establishing the list of protected animal and plant species, 2008		the project area that are on the protected list provided in this Order. Any regulation enforcing the measures of their protection will be adhered to.
Buildings Control Regulations (2009)	The Regulations are overseen by the Ministry of Infrastructure and were established in a bid to improve the quality of life of Rwandans through planning, organizing and spearheading rural settlement, urban settlement, public building construction, affordable housing; management of public office space and Government Assets; and regulation of the construction industry.	Conditions for construction and required prior approval of works will be set by the Building Control Regulations and may be required for the Project.
Law No 28/2016 on the preservation of cultural heritage and traditional knowledge	The Government of Rwanda appoints the Ministry of Culture to be the overall organ that governs every significant cultural and archaeology heritage resources.	The district must be notified if any discoveries are made during the site works.
Constitution of the Republic of Rwanda – 25/12/2005	All laws and regulations in Rwanda must be aligned with the principles in the constitution which define the overall legal framework relating to the environment. Articles that are applicable and relevant to the Bugesera SEZ Project include: Article 21 Right to good health, Article 22 Right to a clean environment, Article 23 Respect for privacy of a person and a family, Article 34 Everyone has the right to private property, whether individually or collectively, Article 35 Private ownership of land and other rights related to land are generated by the State, and Article 53 Protection of the Environment – importantly this law stipulates modalities for protecting, conserving, and promoting the environment.	The project must adhere to the environmental and health legal framework that is defined by the constitution of the Government of Rwanda.
Organic Law 4/2005 determining the modalities of Environmental Protection, Conservation and Management	This Law dictates that the national environment protection, conservation, and management policy is the responsibility of the Government of Rwanda (GoR) and that it will develop national strategies, plans and programs to ensure conservation and sustainable use of environmental resources. In addition, this law highlights that every natural or legal person in Rwanda has the fundamental right to live in a healthy and balanced environment. They also have the obligation to contribute individually or collectively in safeguarding the country's natural, historical and socio-cultural heritage. Moreover, this law stipulates that every project must be subjected to environmental impact assessment prior to its commencement.	The project will have the responsibility to ensure the conservation of the project area's environmental resources as well as the natural, historical and socio-cultural heritage.

2.3 SECTOR POLICIES AND STRATEGIES

2.3.1 RWANDA ENVIRONMENT AND CLIMATE CHANGE POLICY – 2019

The Rwanda Environment and Climate Change Policy – 2019 provides strategic direction and responses to the emerging issues and critical challenges in environmental management and climate change adaptation and mitigation. The policy has been designed within the context of national, regional and global development commitments including Vision 2050, National Strategy for Transformation, Green Growth and Climate Resilience Strategy, Nationally Determined Contributions, Sustainable Development Goals.

The Policy goal is for 'Rwanda to have a clean and healthy environment resilience to climate variability and change that supports a high quality of life for its society. It is delivered through seven objectives as follows:

i. Greening economic transformation
ii. Enhancing functional natural ecosystems and managing biosafety
iii. Strengthening meteorological and early warning systems
iv. Promoting climate change adaptation, mitigation, and response
v. Improving environmental well-being for Rwandans
vi. Strengthening environment and climate change governance
vii. Promoting green foreign and domestic direct investment and other capital inflows

The Policy is implemented through ministerial and Districts Development Strategies (DDS), Sector Specific Plans (SSP) annual Imihigo targets and action plans.

2.3.2 OTHER SECTOR POLICIES AND STRATEGIES

Rwandan policies and strategies relevant to the Bugesera SEZ Project include:

- **Land Policy (June 2019)**; calls for rational use and sound management of national land resources.
- **Forestry Policy (February 2019)**; recognizes the needs to manage forest resources to support the country's development goals.
- **Biodiversity Policy (September 2011)**; considers the rehabilitation of degraded ecosystems in Rwanda.
- **Wildlife Policy, (March 2023)**; acknowledges that Rwanda's wildlife protected areas significantly contribute to the production of global good and services.
- **Energy Policy (March 2015)**; recognises the need to shift consumption from biomass-based energies to clean energies and also focuses on renewable energy infrastructure.
- **Water Supply Policy (December 2016)**; aims to ensure sustainable, equitable and affordable access to safe drinking water.
- **Sanitation Policy (December 2016)**; aims to ensure sustainable, equitable and affordable access to safe sanitation.
- **National Industrial Policy (April 2011)**; emphasizes that waste produced by industrial processes is harmful and needs proper management and disposal strategy.

- **Agricultural Policy (July 2018)**; seeks to make agriculture and livestock more productive and ensure proper utilisation of natural resources.
- **Water Resource Management Policy (December 2011)**; considers managing and develop water resources in an integrated and sustainable manner.

2.1 INTERNATIONAL CONVENTIONS, PROTOCOLS AND AGREEMENTS

Rwanda is a signatory to several international accords and conventions with environmental and /or social implications. The most relevant to the Bugesera SEZ Project are summarized in Table 2-3 below.

TABLE 2-3: INTERNATIONAL TREATIES APPLICABLE TO THE PROJECT

Name of the Convention	Date of Ratification by Rwanda	Objective of the Convention	Aspects Related to the Project
Montreal Protocol on substance that deplete the ozone layer, 1987 (and the Kigali Amendment of 15th October 2016)	15/10/2016	Control of manufacture and use of ozone depleting substances.	Many refrigerants have both Global Warming Potential (GWP) and Ozone Depleting Potential (ODP). The selection of the refrigerants for the Project should avoid those phased out under this.
United Nations Convention on Biological Diversity (CBD)	18/03/1995	The three goals of the CBD are to promote the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources.	The habitats at the Project Site are highly modified which is attributed to previous land use (particularly farming) and the subsequent zoning of the Project Area as an industrial zone. However, landscape planning should consider the need to conserve biodiversity and prevent spread of invasive plant species.
United Nations Framework for Convention on Climate Change (UNFCCC)	22/04/2016	Its main objective is to achieve the stabilisation of GHG concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with climate systems and within a specific timeframe which will allow ecosystems to adapt naturally to climate change, to ensure that food production is	The GHG emissions during the implementation of the Project should be controlled to avoid compromising the objective of this convention.

Name of the Convention	Date of Ratification by Rwanda	Objective of the Convention	Aspects Related to the Project
		not threatened and to enable economic development to proceed in a sustainable manner.	
Bamako Convention, 1991	04/12/2018	This convention focusses on the ban of the import of hazardous wastes into Africa and the control of transboundary movement and management within Africa.	Any Project associated hazardous wastes will need to be appropriately managed to avoid contravention of this convention. Moreover, Project procurement will need to screen all Project goods and products exported from the country. Appropriate and authorised destinations for the export of hazardous waste will need to be identified.
Basel Convention, 1989	O7/01/2004	Transboundary transportation and disposal of hazardous wastes. Its objective is to protect human health and the environment against the adverse effects of hazardous wastes.	Any Project waste will need to be correctly classified to identify what qualifies as hazardous waste according to this convention. Appropriate and authorised destinations for the export of hazardous waste will need to be identified.
Convention for the safeguarding of the intangible cultural heritage, 2003	17/11/2023	The objectives of this convention include to: safeguard the intangible cultural heritage; ensure respect for the intangible cultural heritage of the communities, groups and individuals concerned and raise awareness at the local, national and international levels of the importance of the intangible cultural heritage, and of ensuring mutual appreciation thereof.	As part of the social study associated with the EIA, cultural and natural heritage (including intangible cultural heritage) have been considered and appropriate measures for their management have been included in this EIA Report.

Rwanda is a member of the United Nations (UN) and the African Union – as a result, it has ratified several UN Human Rights Conventions and has therefore made an international commitment to ensure they meet the universal standard for human rights[6]. Moreover, Rwanda has signed a number of human rights agreements and conventions that should be considered by ARISE during the Project construction. Table 2-4 provides and overview of the treaties ratified by Rwanda.

TABLE 2-4 INTERNATIONAL HUMAN RIGHTS TREATIES RATIFIED BY RWANDA

Topic/Name of Agreement	Date of ratification
Human rights	
African Charter on Human and Peoples' Rights	2003
Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (ICCPR)	2008
Optional Protocol to the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment	2015
International Covenant on Civil and Political Rights (CCPR)	1975
Convention on the Rights of Persons with Disabilities (CRPD)	2008
Prevention of discrimination on grounds of race, religion or belief and protection of minorities	
International Convention on the Elimination of All Forms of Racial	1975
International Covenant on Economic, Social and Cultural Rights	1975
Women's rights	
Convention on the Elimination of All Forms of Discrimination against	1981
Children's rights	
African Charter on the Rights and Welfare of the Child	1991
Convention on the Rights of the Child (CRC)	1991
Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour, commonly known as the Worst Forms of Child Labour Recommendation	2000
Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict (CRC-OP-AC)	2002
Optional Protocol to the Convention on the Rights of the Child on the sale of children child prostitution and child pornography (CRC-OP-SC)	2002
Labour and human rights at work	

6 Claiming Human Rights. 2010. Claiming Human Rights - in Cote d'Ivoire. Available at: http://www.claiminghumanrights.org/cotedivoire.html?L=0

International Convention on Equal Treatment	1962
Equal remuneration convention	1980
Abolition of forced labour convention	1976
Discrimination (employment and occupation) convention	1981
Freedom of Association and Protection of the Right to Organise	1988
Minimum Age Convention	1981
Occupational Health and Safety Convention	2018
International Convention on Labour Inspection in the Industrial and	1980
International Convention on the Right to Organise and Collective	1988
Employment Policy Convention	2010

2.2 INTERNATIONAL GUIDELINES AND PRACTICES

The Project considers involvement of international lenders and therefore international standards, Good International Industry Practices (GIIP) must be applied to the Project when developing the E&S studies.

A summary of the main environmental and social performance standards required by financial institutions being considered through the EIA process in relation to this Project is presented in Table 2-5.

Table 2-5 International Guidelines and Standards

The Equator Principles
The Equator Principles (EP) are a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. • Review and categorisation • Social and environmental assessment • Applicable environmental and social standards • Environmental and social management systems and equator principles action plan • Stakeholder engagement • Grievance mechanism • Independent review • Covenants • Independent monitoring and reporting • Reporting and transparency

The EP require that Projects conduct an EIA process in compliance with the IFC Performance Standards on Environmental and Social Sustainability. The IFC Performance Standards are discussed below.

World Bank Group Safeguard Policies

The World Bank has ten environmental and social Safeguard Policies that are used to examine the potential environmental and social risks and benefits associated with World Bank lending operations. The guidelines and standards serve as relevant standards for international good practice. These safeguard policies include the following:

- Environmental Assessment
- Natural Habitats
- Forests
- Pest Management
- Physical Cultural Resources
- Involuntary Resettlement
- Indigenous Peoples
- Safety of Dams
- Projects in International Waterways
- Projects in Disputed Areas

International Finance Corporation (IFC) Performance Standards

The Performance Standards are directed towards providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate and, manage risks and impacts as a way of doing business in a sustainable way.

- PS1 Assessment and management of environmental and social risks and impacts.
- PS2 Labour and working conditions.
- PS3 Resources efficiency and pollution prevention.
- PS4 Community, health, safety and security.
- PS5 Land acquisition and involuntary resettlement.
- PS6 Biodiversity conservation and sustainable management of living natural resources.
- PS7 Indigenous peoples.
- PS8 Cultural heritage.

IFC Environmental, Health and Safety (EHS) Guidelines

The Environmental, Health and Safety (EHS) Guidelines are technical reference documents that address IFC's expectation regarding the industrial pollution management performance of projects. This information supports actions aimed at avoiding, minimising, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility.

In the context of the proposed Project, the World Bank Group General EHS Guidelines (2007) and the EHS Guidelines for Water and Sanitation (2007) are the most relevant.

2.3 SPECIFIC REGULATORY LIMITS (RWANDA AND IFC)

2.3.1 IFC EHS GUIDELINES – 1.1 AIR EMISSIONS AND AMBIENT AIR QUALITY

The IFC EHS Guidelines recommend that the air quality guidelines as set out by the World Health Organisation (WHO) be utilised in such an assessment. The WHO standards are divided into a number of stages, which have interim targets and a final guideline target. The WHO guidelines are recognised to be particularly conservative, as they make no consideration of the economic burden of achieving the stipulated guidelines. The WHO final guideline target is aspirational, and as such, this target should be progressively worked towards. In the case of the proposed Project, progression towards the achievement of the final guideline target may be assisted by regulatory changes to the quality of fuel used for construction and project-owned vehicles (for example, low sulphur fuels) and the regular maintenance and potential mandatory testing of those vehicle emissions.

2.3.1.1 AIR QUALITY LAW NO. 18/2016

The Law No. 18/2016 governing the preservation of air quality and prevention of air pollution in Rwanda, requires the National Authority in charge of establishing quality standards (Rwanda Standards Board in this case) to: prescribe criteria and procedure for measuring air quality and air pollutants; establish ambient air quality standards in order to curb the impact of air pollutants; establish occupational air quality standards for various sources of air pollution which can cause harm to public health; establish quality standards that regulate emissions of air pollutants from different sources contributing to air pollution; establish specific quality standards that regulate industrial activities with a view to avoid or minimise environmental pollution that may results from such industries; determine stack heights of chimneys for air emissions; prescribe any matter in relation with or affecting air emissions quality standards

The nature of the proposed Project is industrial zone where a number of light industrial developments will be set up. Dust creating activities during the construction phase will largely be associated with land clearing and earthworks. Air quality considerations during the operations phase will be associated with truck movements and the infrequent operation of a backup generator for power. Table 2-6 and Table 2-7 presents the ambient air quality tolerance limits for industrial areas.

TABLE 2-6: RS EAS 751:2010. AMBIENT AIR QUALITY TOLERANCE LIMITS FOR DUST

	Pollutant	**Time weighted average**	**Industrial area (µg/m³)**	**Residential, Rural & Other area (µg/m³)**
1	Respirable particulate matter (PM_{10})	Annual average	70	50
		24 hours	150	100
2	$PM_{2.5}$	Annual average	35	

		24 hours	75	

Source: (RS EAS 751:2010)

TABLE 2-7: EMISSIONS LIMITS SPECIFIED IN EAS 752:2010

Sulphur Dioxide (SOx) **(Yearly average)**	**Large Combustion Plants (LCP) using solid fuel**	
	50 to 100 MWth	850 mg/Nm^3
	> 100 MWth	200 mg/Nm^3
	LCP using liquid fuel	
	50 to 100 MWth	850 mg/Nm^3
	100 to 300 MWth	400 to 200 mg/Nm^3 (linear decrease)
	> 300 MWth	200 mg/Nm^3
	LCP using gaseous fuel	35 mg/Nm^3
	LCP using low calorific gases from gasification of refinery residues, coke oven gas, blast furnace gas	**800 mg/Nm^3**
Carbon monoxide (CO)	Liquid fuel combustion with heat output exceeding 5 MW	175 mg/Nm^3
	Solid fuel combustion with heat output of 50 MW and above	Not exceeding 250 mg/Nm^3
Dust	Inert dust, including cement	**250 mg/Nm^3 (24 hour mean)**
Nitrogen oxides (NOx) (yearly average)	**LCP using solid fuel**	
	50 to 500 MWth	600 mg/Nm^3
	> 500 MWth	500 mg/Nm^3
	LCP using liquid fuel	
	50 to 500 MWth	300 mg/Nm^3
	> 500 MWth	200 mg/Nm^3

Source: (EAS 752:2010)

2.3.2 IFC EHS GUIDELINES – 1.3 WASTEWATER AND AMBIENT WATER QUALITY

IFC EHS Guideline 1.3 specifies that discharges should not result in contaminant concentrations in excess of local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality. Receiving water use and assimilative capacity, taking other sources of discharges to the receiving water into consideration, should also influence the acceptable pollution loadings and effluent discharge quality.

As Rwanda has water quality criteria / standards for effluent discharge into the environment, these will be used in this assessment.

2.3.2.1 LAW N 62/2008 OF 10/09/2008 PUTTING IN PLACE THE USE, CONSERVATION, PROTECTION AND MANAGEMENT OF WATER RESOURCES REGULATIONS, RWANDA

This law defines applicable rules to the use, conservation, protection and management of water resources. The Law, in article 5, provides for the application and management of water resources in accordance with some of the following principles; the principle of prevention of the pollution with priority to the source, the principle "user-payer and polluter-payer" according to which the user of water and the polluter support a significant part of expenses resulting from measures of prevention, of pollution reduction and restoration of the resource in quality and in quantity, the principle that users of the public distribution services of drinking water and sanitation should play a major role in these services provided to them, according to the contributory capacity of users.

According to article 71 of the law, public works meant to bring water to people including treatment, distribution be it for domestic or industrial use shall be done in accordance with the law and the same shall apply to rainwater. Such works shall be carried out by a national water and sanitation body or by other administrative institutions or by such administrative institutions when brought together for such a purpose. Such works may be supervised by the responsible authorities or may delegate supervision to private operators.

The Rwanda Standards RS 109: 2017 provide the requirements of discharged Industrial wastewater. The Project must abide by these standards (Table 2-8)

TABLE 2-8: RS 109: 2017: REQUIREMENTS OF DISCHARGED INDUSTRIAL WASTEWATER

Parameters	**RS 109: 2017 (Tolerance Limit of Industrial discharged wastewater)**
pH	5.0 – 9.0
Electric Conductivity	-
Total Dissolved Solids	< 2000
Dissolved Oxygen	-
Chemical Oxygen Demand (COD) (mg/l)	< 250
Biochemical Oxygen Demand (BOD) (mg/l)	< 50
Total Suspended Solids (TSS) (mg/l)	< 50
Ammonia Nitrogen (mg/l)	< 20
Orthophosphates (mg/l)	< 10
Total Nitrogen (mg/l)	-
Total Phosphorus (mg/l)	-

Parameters	**RS 109: 2017 (Tolerance Limit of Industrial discharged wastewater)**
Oil & Grease (mg/l)	< 10
Fecal Coliforms (Cfu/100ml)	< 4 x 102
Heavy metals	
Lead (mg/l)	< 0.1
Cadmium (mg/l)	< 0.1
Chromium Hexavalent (mg/l)	< 0.05
Pesticides	Not detected
Colour	-
Sulfide (mg/l)	< 1.0

Source: (RS 109: 2017

2.3.3 IFC EHS GUIDELINES – 1.4 WATER CONSERVATION

Mechanisms included in the water conservation guidelines include:

- The setting of targets for water use, and monitoring of water flows against these targets;
- Water reuse where possible; and
- Reducing leaks and making more efficient use of water within the water reticulation system.

This will be achieved through implementation of a water management plan for BSEZ.

2.3.4 IFC EHS GUIDELINES – 1.7 NOISE

The IFCs EHS Guidelines – General EHS Guidelines: Environmental Noise Management 1.7 Noise (IFC 1.7 Noise) is an internationally recognized guideline document containing information for the assessment and management of noise.

Table 2-9 presents the IFC noise guidelines that should not be exceeded at the nearest Noise Sensitive receptor locations offsite. In addition to the values provided in Table 2-9, the IFC also requires that noise increase above existing (background) levels should not exceed 3 dB.

TABLE 2-9: IFC NOISE LEVEL GUIDELINES

Receptor	**One Hour LAeq (dB(A))**	
	Daytime (07:00 – 22:00)	**Night (22:00 – 07:00)**

Receptor	**One Hour LAeq (dB(A))**	
Residential; institutional; educational	55	45
Industrial; commercial	70	70

LAeq = A-weighted equivalent sound levels over a measurement period, dB(A) = A-weighted decibel

IFC Guidelines are designed to apply to noise emissions from facilities and stationary noise sources such as factories. The value of 70 dB(A) at the property boundary differs to the Rwandan standard; hence the Rwandan noise standards for Industrial Areas of 75 dB(A) and 70 dB(A) for day and nighttime at the property boundary will apply to this Project.

2.3.4.1 RWANDA STANDARDS RS 236:2014: NOISE TOLERANCE

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Bureau of Standards (RBS) Board of Directors in accordance with the procedures of RBS and in compliance with the Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards. This Rwanda Standard prescribes maximum allowable noise limits in industrial, commercial, residential and silence zone areas in respect to human beings, as seen in Table 2-10 below;

TABLE 2-10: RWANDA STANDARDS NOISE TOLERANCE LIMITS

Area	**Maximum Limit (dB)**	
	Daytime	**Night**
Residential	55	45
Industrial	75	70
Commercial	65	55
Silence	50	40

2.4 ARISE AND SEZ POLICIES AND STANDARDS

ARISE is committed to meeting international standards of good practice in the areas of environmental protection, social development, and health, safety and security. The Company has adopted a set of Policies and Standards as summarised below. In addition, ARISE is committed to aligning with Rwanda's Special Economic Zone Policy (2018) to ensure the successful development and operations of the Bugesera SEZ. Details on the policies applicable to BSEZ are provided in the Table 2-11 below.

TABLE 2-11: BSEZLTD., ARISE IIP AND SEZ POLICIES AND STANDARDS

BSEZ ltd. Environmental, Social and Governance (ESG) Policy

BSEZ ltd.'s ESG standards have been put in place to mitigate risks, and create value through better governance, generating positive social outcomes and reducing the Company's environmental impact.

BSEZ ltd. implements this policy through working with relevant stakeholders with transparency regarding their ESG objectives and expected business practices and conducting their operations in an honest and ethical manner, with a zero-tolerance approach towards bribery and corruption.

BSEZ ltd. does not invest in businesses/projects that:

- Are in a country or involve a person, Company or entity subject to international trade embargoes or sanctions at the time of investment;
- Employ forced labour of any kind;
- Allow children to form part of their workforce (or their supply chain where this is reasonably practical); or
- Pay wages which are below industry or national minima.

BSEZ's Code of Conduct

Their code of conduct defines the rules and values governing the organization. It provides general guidance about the group's expectations, highlights situations that may require attention – other than those defined in the policies.

The Code of Conduct expresses the Group's commitment to conducting business ethically. It explains what it means to act with integrity and transparency in everything it does and in accordance with its unique culture and values.

BSEZ ltd. Health and Safety Policy (HSP)

BSEZ Ltd.'s goal is to deliver a world-class health and safety programme through effective workplace risk management by:

- Implementing a safety management programme based on safe systems of work including risk assessment and mitigation and Emergency Response Plan;
- Developing consultation between management, employees, contractors and other relevant parties on matters affecting health and safety at the workplace;
- Forming a safety committee with representation from both management workers; and
- Establishing SMART (Specific, Measurable, Achievable, Reliable and Time) health and safety goals and targets supported by necessary processes to achieve progress.

BSEZ ltd. Employee's Grievance mechanism

The purpose of this mechanism is to ensure a legitimate, accessible, and consistent mechanism for receiving, investigating, consulting on, responding to and resolving formal complaints or concerns that may arise as a direct result of BSEZ LTD. operations.

It provides measures for monitoring any impact BSEZ LTD's operations may have on stakeholders and the local communities; it also manages grievances that may arising from those impacts.

ARISE Fair Employment Policy

ARISE is committed to providing a workplace where rights of all employees are respected.

ARISE's approach on fair employment is aligned to their core purpose of growing responsibility and is in full compliance with the conventions of the International Labour Organization (ILO) and United Nations Global Compact's (UNGC) guiding principles on human rights and labour.

There are six standards associated with ARISE's Fair Employment Policy:

- Prohibition of Child Labour and Forced Labour
- Workplace Conditions
- Wages and Benefits
- Diversity & Inclusion
- Health and Nutrition
- Freedom of Association and Right to Collective Bargaining

ARISE Sexual Harassment Policy

ARISE is committed to providing a safe working environment for all its employees so that persons, irrespective of gender or sexuality, are free from harassment at work including sexual harassment.

It aims at providing staff with information on the internal mechanism for reporting such complaints and at reassuring them that their reports of sexual harassment at the workplace are taken seriously and investigated appropriately.

Rwanda's Special Economic Zone Policy (2018)

Rwanda's Special Economic Zone Policy was adopted in 2011 and later revised in 2018. The purpose of this Policy is to ensure the successful development and operations of SEZs in Rwanda. It ensures that activities of SEZs contribute to the achievement of several of the government's ambitious development targets including:

- Increased foreign and domestic private sector investment;
- Increased employment and income generation (Direct and Indirect);
- Export growth and diversification and increased foreign exchange;
- Development of industry and other sectors; and
- Skills upgrade and technological transfer.

This policy provides recommendations in six strategic policy areas including:

1. Scope of SEZs and eligibility criteria
2. SEZ development and operation
3. Land use for SEZs
4. Zone benefits and incentives
5. Complementary policies & safeguard measures
6. Institutional framework: the SEZ authority.

3 METHODOLOGY AND APPROACH

3.1 EIA APPROACH

The EIA for the Project follows a systematic process of predicting and evaluating the impacts the Project might have on the physical, natural, cultural, social and socio-economic environment, and identifying measures that BSEZ Ltd will need to take to avoid, reduce, remedy, offset or compensate for adverse impacts, and to provide benefits where possible.

The overall approach is shown schematically in Figure 3-1 and the key steps are described briefly in the subsequent sections; further references are made to other parts of this ESIA Report in which the specific topics are more specifically addressed. The ESIA process in Rwanda presented in *Section 3.5* was followed during the implementation of this approach.

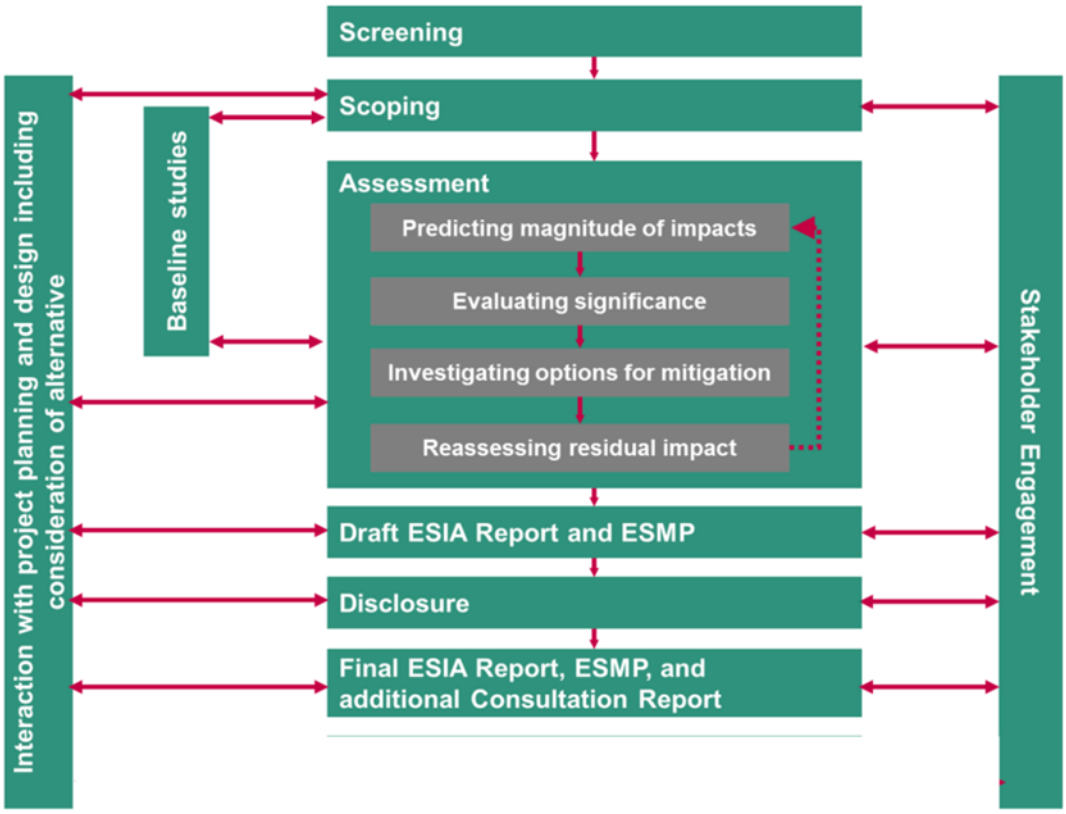


FIGURE 3-1: ESIA APPROACH

3.2 PROJECT SCREENING

Screening was the first stage in impact assessment, in which the need for assessment and the level of assessment required is determined for a particular project. For this Project, a separate Screening Study was not required because by the nature of the Project and its categorisation, Ministerial order No.001/2019 require that the Project must undergo environmental impact assessment as the Project falls under Article 2 (industries) and Article 9 (warehouse with total floor area exceeding one thousand and five hundred square meters (1500 sqm) and plot size exceeding one thousand square meters (1000 sqm).

3.3 SCOPING AND TERMS OF REFERENCE

The Scoping phase of this Project leveraged on the EIA gap analysis that was undertaken for BSEZ presented in *Section 3.3.1* below:

3.3.1 EIA GAP ANALYSIS

In February 2023 ERM performed a Gap analysis of the 2011 EIR to determine the alignment of the E&S risk assessment procedures with national and international best practices. It was noted that the initial EIA had been given to cover 200 ha and that ARISE was allocated with additional land from RDB for BSEZ expansion into Phase 1A and Phase 2 to bring the total land area for BSEZ to 335.68 ha. Following discussions with ARISE and further consultation with RDB (Appendix C), it was agreed that an EIA update will be required to extend the BSEZ EIA license to cover to the remaining 134.68 ha for the BSEZ expansion.

As an outcome of the gap analysis, ERM proposed the ToR for EIA which included baseline studies that would be required to bring the E&S risk assessment in line with the Rwanda legislation and IFC Performance Standards.

3.3.2 PROJECT APPLICATION AND REGISTRATION BY RDB

The Project Brief was developed to provide an understanding of the project in a format appropriate for the EIA and was submitted to the RDB on 27 July 2023. The key objective of this task was to establish a solid understanding of the Project Final design and status including the different Project components, associated facilities and Project Area of Influence.

ERM local partner registered with the RDB (Earth Systems) submitted this application on behalf of BSEZ Ltd. The Project Brief was submitted alongside the Terms of Reference (ToR) for the EIA. The ToR was developed following the desk and field-based assessments made during the gap analysis (February 2023).

Following submission of the Project Brief, RDB undertook Project site visit to determine the impact level of the proposed Project and to ascertain the adequacy of the proposed ToR for the study. RDB accompanied the EIA consultant and BSEZ Ltd to the Project Area during the gap analysis in February 2023 and further visited Project Site after receiving the Project brief in August 2023.

3.4 IMPACT ASSESSMENT

The purpose of impact assessment is to identify and evaluate the significance of potential impacts on identified receptors and resources according to defined assessment criteria and to develop and describe mitigation measures that will be taken to avoid or minimise any potential adverse effects and to enhance potential benefits.

ERM's approach in conducting this EIA study is to work closely with the Project proponent and RDB so that the environmental and social assessment is an iterative process. In this way, all E&S considerations and mitigation and enhancement measures are embedded into the design, where possible, to maximise efficiencies.

The methodology for the baseline data collection is based on a targeted analysis of the various components of the natural and socio-economic environment that are likely to be modified by the Project. The baseline data collection methods are further described in the *Chapter 6* of this EIA report.

The impact assessment methodology adopted for this Project has been described in detail in *Chapter 8* of this report. The potential impacts of the Project (i.e., the interaction of elements of the physical, biological, cultural or human environment) are assessed against the baseline conditions of the Project's Area of Influence (further addressed in the *Chapter 6*).

The EIA consultant has worked closely with ARISE during the EIA phase of the Project and interacted with the Project design which already includes many technical measures to avoid/minimise impacts, (e.g. International Best Practices, clean energy technologies, conservation/green areas etc.,). Such "embedded measures" are considered as part of the existing Project design and not specified again as mitigation measures - they are anyhow already planned/obligatory and defined as part of the Project Description (see section 4.6). Examples of embedded controls could include acoustic reduction measures around noisy equipment or servitude and buffer requirements the development is obliged to implement and is part of the layout. Additional mitigation measures to be implemented have been discussed in *Chapter 8* of this EIA Report.

3.5 OVERVIEW OF EIA PROCESS IN RWANDA

The environmental and social impact assessment process in Rwanda is guided by the Organic Law 4/2005 on Environmental Protection, Conservation and Management. The primary government agency responsible for the EIA process is the Rwandan Development Board (RDB) supported by the Rwandan Environmental Management Authority (REMA).

Under Article 69 of the Organic Law 4/2005 on Environmental Protection, Conservation and Management, REMA, is confirmed as having responsibility to provide the requirements for an EIA study and report as well as provide a list of projects eligible for a full EIA and those subject to Limited EIA. The process of obtaining an EIA certificate in Rwanda involves steps (i-ix) and thereafter implementation phase (steps x and xi):

i. Scoping, consideration of alternatives, and Terms of Reference
ii. Project Brief Submission and registration;
iii. Screening;
iv. Baseline data collection and analysis of environmental and social conditions;
v. Impact prediction and analysis of alternatives;
vi. Preparation and submission of Environmental Impact Report;
vii. Public hearing;
viii. EIA review;
ix. EIA approval and issuance of certificate;
x. Environmental Monitoring; and
xi. Environmental audit.

The EIA process is summarized in the figure below

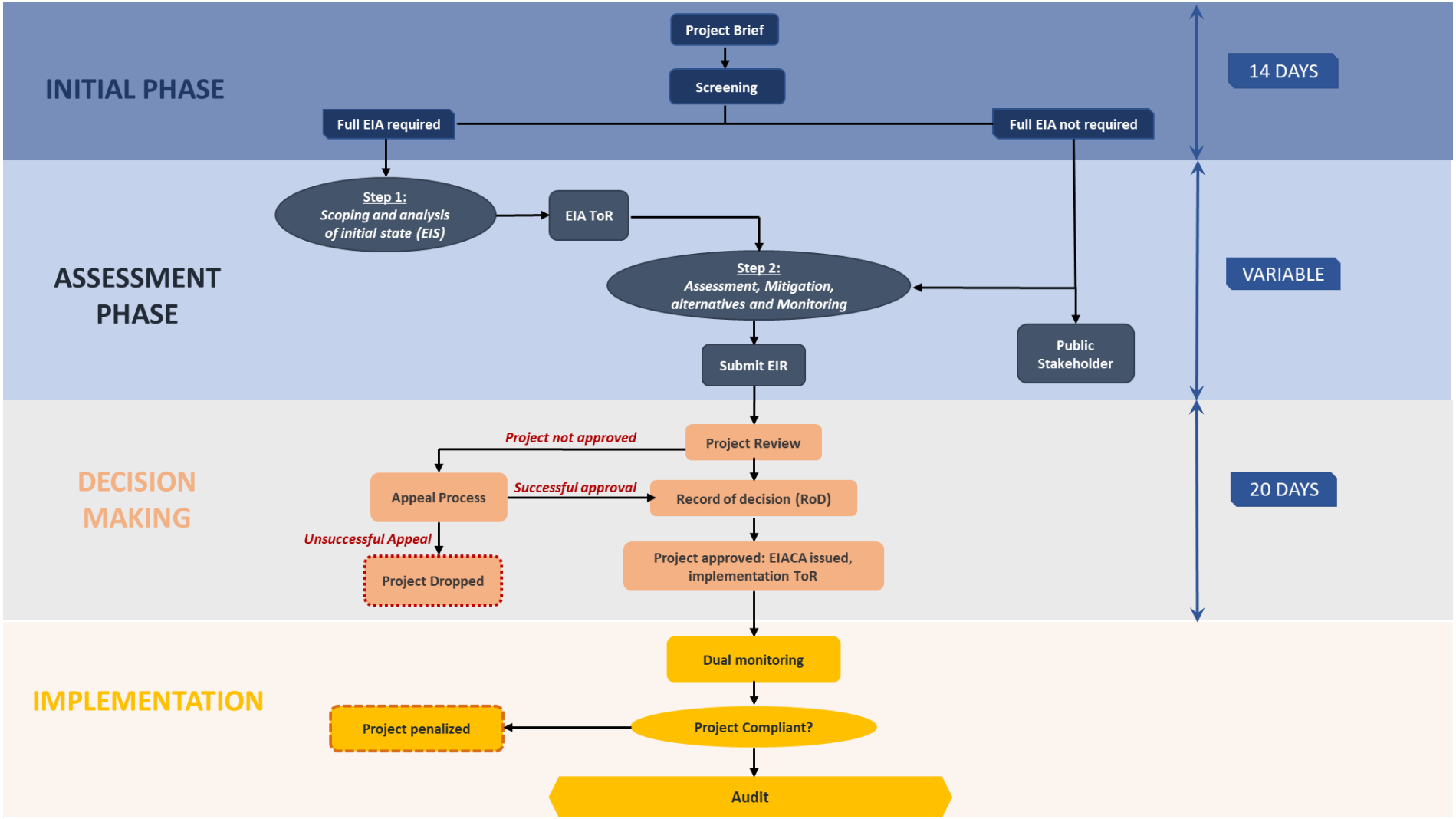


FIGURE 3-2: EIA PROCESS IN RWANDA

4 PROJECT DESCRIPTION

This section provides a description of the Project summarizing Project alternatives, Project components and activities during the development, construction, and operation phases.

4.1 PROJECT JUSTIFICATION

4.1.1 INDUSTRIAL ZONES IN RWANDA

According to Rwanda's Vision 2050 one of the pillars for country development is Competitiveness and Integration, where, among other objectives, the ambition is to create a diversified economy built upon future industries, to become competitive in manufacturing anchored to a regional logistics hub and to strengthen export competitiveness and trade connectivity.

The current Plan of the Government of Rwanda (GoR) for the country development includes the establishment of nine SEZ across the country in strategic locations (near secondary cities) that will occupy nearly 800 ha in total (see Figure 4-1). As per the "Rwanda Vision 2050[7], industry sector's value-added contribution to the GDP is expected to continuously increase, and to be about 24% in 2035 and 33% by 2050. The GoR aim is to establish the SEZs and to boost the industrial sector through enhancement of the enabling environment to attract both domestic and foreign capital. The establishment of such zones will promote small and medium processing industries and allow to substitute imported products by locally produced. It will also benefit the local job market, specifically in provinces.

The Bugesera SEZ will be one of these projects (occupying nearly 335 ha), having good accessibility, being close to the NR5 highway, which connects the Project with the capital Kigali. It is only 24.5 km away from the planned Bugesera International airport and 57 km from the Kigali international airport. Figure 4-1 presents the Bugesera SEZ location, being announced as the biggest planned SEZ and the most advanced project in country.

[7] English-Vision_2050_Abridged_version_WEB_Final.pdf (minecofin.gov.rw), access on 05/10/2023.

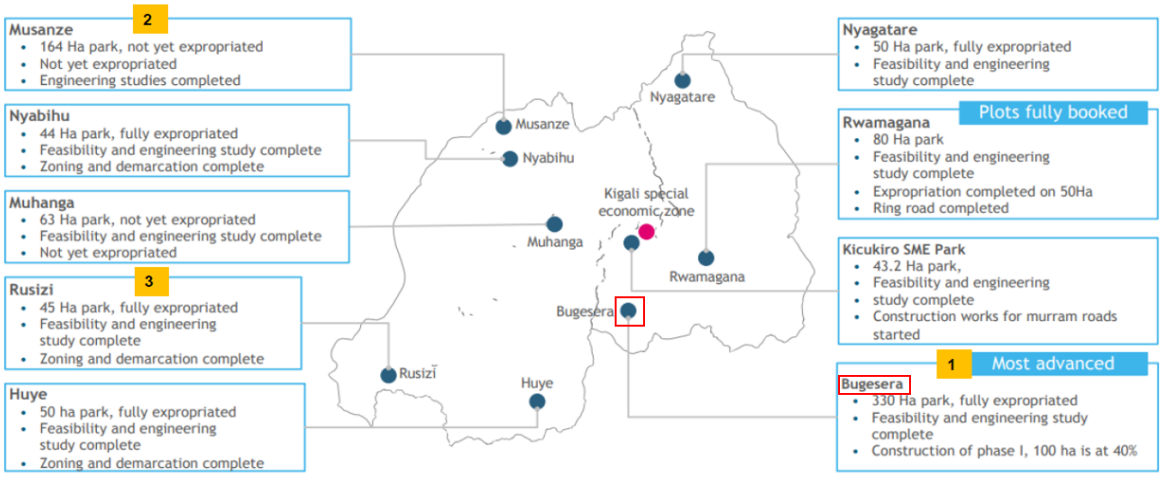


FIGURE 4-1 PLANNED SEZS IN RWANDA

Source: ARISE, Business Plan Report, Industrial Park Development for Bugesera, Rwanda (March, 2022)

4.1.2 BUGESERA SPECIAL ECONOMIC ZONE (SEZ)

The Bugesera SEZ is being developed as part of a joint venture signed between ARISE IIP and the GoR, who created BSEZ Ltd – the current project proponent.

The BSEZ was established by the GoR in 2011 in line with Law N°05/2011 of 21 March 2011, as amended by Law 55/2018 of 13 August 2018 governing special economic zones in Rwanda, including all subordinate legislation made pursuant thereto (the "SEZ Laws"). The Proposal for the initial development of the SEZ was submitted in July 2011, which, following the development of an Environmental Impact Report by the Ministry of Trade and Industry, obtained the Rwanda Development Board (RDB) license approval in 2012 for 200 ha into plots to accommodate large to small scale industries, commercial activities, utilities, administrative and residential areas, plus green and recreational facilities, along with a centralised wastewater system and improved road network. Several conditions have been established for the project development, including the fact that all projects to be implemented in the planned area, should go through a dedicated EIA process.

ARISE IIP has submitted a Letter of Intent (LOI) / Proposal in July 2021 for developing the Bugesera SEZ and based on the discussions held with GoR, worked on a Business Plan for the development of the industrial zone in the Bugesera Industrial Park. Then, on 2nd May 2023, RDB approved the Master Plan for the development of the Bugesera SEZ, granting the BSEZ Ltd (Joint Venture between ARISE IIP and the GoR) the rights to develop/operate the full SEZ.

BSEZ Ltd seeks to establish at Bugesera a Special Economic Zones (SEZ) with connectivity, shared infrastructure, utilities and amenities in order to attract tenants/customers and link them to the international supply chains.

The establishment of the proposed SEZ aims to achieve the following objectives*:*

- Attract investment and generate jobs;
- Create positive impact on the country's GDP;

- Diversify export sectors & Streamline trade procedures;
- Overcome land and infrastructure gaps;
- Improve regulatory and administrative environment;
- Facilitate manufacturing agglomeration; and
- Generate a spill-over of knowledge and technology to support upgrading.

The Bugesera SEZ covers a total of area of 335.68 ha and its development is considered to be undertaken in three different phases (Figure 4-2):

- Phase 1 development (licensed and currently under construction – nearly 54% of construction done and 67 ha of the area is occupied) has attracted several investors, some of which have reportedly completed site specific subsequent environmental impact assessments (EIAs) (as required under Rwanda Legislation) for each specific activity (See Figure 4-3 and Table 4-2) .
- Phase 1A (planned); and
- Phase 2 (planned).

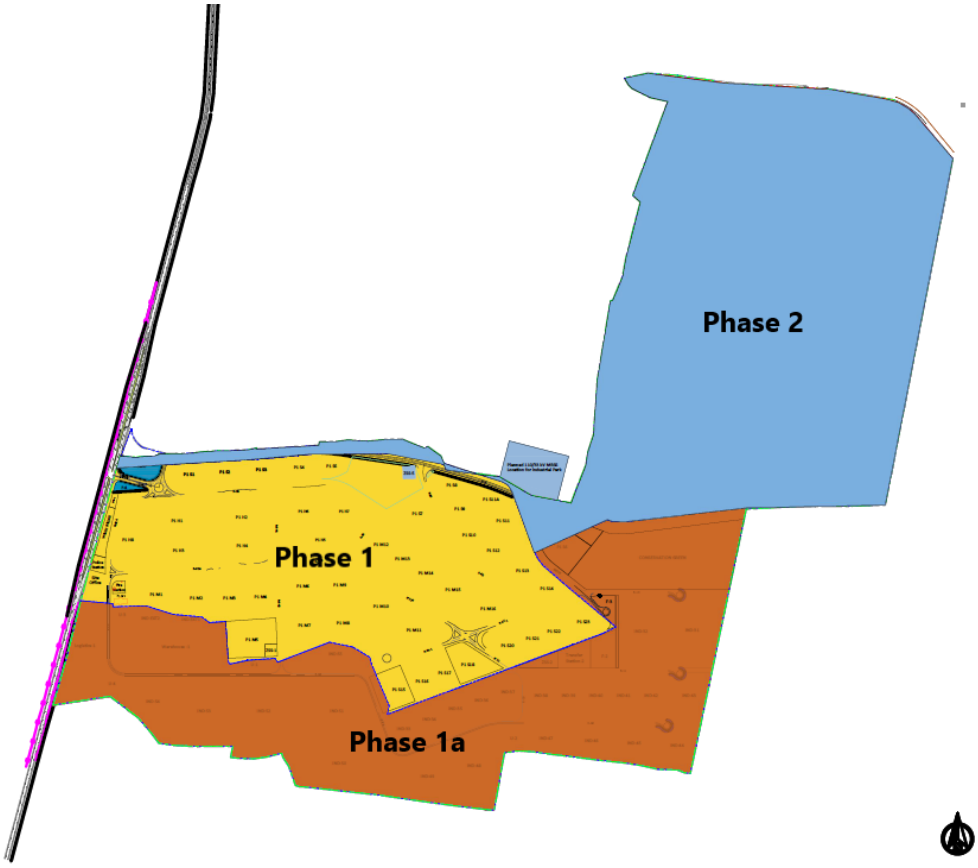


FIGURE 4-2 BUGESERA INDUSTRIAL ZONE: SITE PHASING

Source: ARISE IIP/BSEZ Ltd., Masterplan & Preliminary Engineering for Bugesera SEZ, October 2023

Figure 4-3 provides an overview on plot occupancy and operational plots (ARISE, Masterplan & Preliminary Engineering, 2022) and Table 4-2 presents a list of existing industries within the Phase 1.

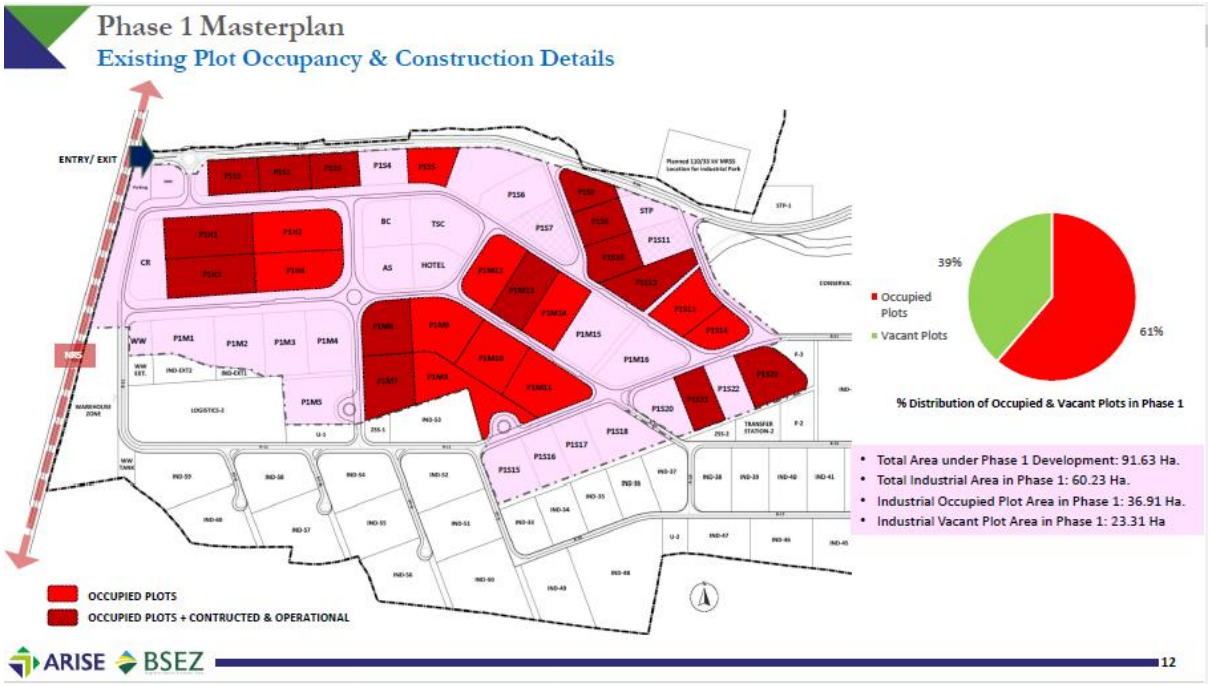


FIGURE 4-3 PHASE 1 PLOT OCCUPANCY

Source: ARISE, Masterplan & Preliminary Engineering for Bugesera SEZ, December 2022

There are already various existing industries and other proposed in Phase 1 area.

Table 4-2 below presents the industries zoning plan considered for the three phases and the list of activities already known at Phase 1 (BSEZ Ltd, October 2023). Note that the colour code used refers to the CPCB Pollution Index code[8] for emissions, effluents and hazardous wastes (see colour code in Table 4-1). According to this Index used by the proponent to plan the SEZ area zoning, four industrial sector types are proposed according to their related pollution score, where red are the more pollutant industries and white are the less pollutant.

TABLE 4-1 CPCB POLLUTION INDEX COLOR CODE FOR INDUSTRIAL SECTORS

Colour coding	*Pollution Index Score	Industry types
Red	score of 60 and above	Pharma, EV, Spinning, Weaving, Dying, Garmenting, Printing, Paper Production, E- waste recycling, ore refineries, Recycling / reprocessing/ of Hazardous Waste (like lead)
Orange	score of 41 to 59	Fertilizer, Oxygen and Nitrogen gases, baby diapers
Green	score of 21 to 40	Chiller and Storage Area, Construction materials, Tiles, Plastic processed products manufacturing, Edible oil extraction, Grains milling, Paper bags packaging, Manufacturing of fridges, stoves
White	less than and including 20	Garment (stitching the fabric)

Source: ARISE IIP/BSEZ Ltd., Zoning Plan (October 2023)

[8] Central Pollution Control Board (CPCB), CPCB | Central Pollution Control Board.

TABLE 4-2 INDUSTRIES ZONING IN THE BSEZ DEVELOPMENT

PHASE 01

PLOT NUMBER	AREA (in ha)	Colour coding	Name of the company	Activities	PLOT NUMBER	AREA (in ha)	Existing/ Proposed	Colour coding	Name of the company	Activities
P1 S1	1.00	Red	ENVIROSERVE (E-WASTE)	E-Waste Recycling	P1 H6	1.24	Proposed	Orange		
P1 S2	1.00	Red	ENVIROSERVE (E-WASTE)	E-Waste Recycling	P1 H7	1.66	Proposed	Orange		
P1 S6	1.48	Red			P1 M15	1.87	Proposed	Orange		
P1 S7	1.30	Red			P1 M16	1.78	Proposed	Orange		
P1 S8	0.78	Red	POWER X Ltd	Coltan Processing	P1 S20	1.18	Proposed	Orange		
P1 S9	1.03	Red	POWER X Ltd	Coltan Processing	P1 S22	1.01	Proposed	Orange		
P1 S10	1.06	Red	SUNRISE OVERSEAS LTD	Lead ingots from battery scraps	P1 S3	0.98	Existing	Green	H-Q AQUA PLASTICS LTD	Plastics products
P1 S11	0.98	Red			P1 S5	0.85	Existing	Green	BUGESERA PLASTICS LTD	Plastics
P1 S11A	0.76	Red			P1 S12	1.61	Existing	Green	ALMAHA FOR INDUSTRY CO LTD	Manufacturig of fridges, stoves
P1 S13	1.40	Red	KIGALI MINGYANG PAPER CO LTD	Paper rolls, Kraft Paper, Corrugated Pape	P1 S15	1.38	Proposed	Green		
P1 S14	1.00	Red	KIGALI MINGYANG PAPER CO LTD	Paper rolls, Kraft Paper, Corrugated Pape	P1 S16	1.00	Proposed	Green		
P1 H8	1.16	Red			P1 S17	1.01	Proposed	Green		
P1 M1	1.39	Red			P1 S18	1.51	Proposed	Green		
P1 M2	1.50	Red			P1 S23	1.56	Existing	Green	MAHWI GRAIN MILERS	Grains milling
P1 M3	1.51	Red			P1 M8	2.05	Existing	Green	RWANDA EDIBLE OIL LIMITED	Edible oil
P1 M4	1.50	Red			P1 M9	1.89	Existing	Green	RWANDA EDIBLE OIL LIMITED	Edible oil
P1 M5	1.70	Red			P1 M10	1.61	Existing	Green	RWANDA EDIBLE OIL LIMITED	Edible oil
P1 S21	1.01	Orange	VR INDUSTRIES LTD	Oxygen and Nitrogen gas	P1 M11	1.93	Existing	Green	RWANDA EDIBLE OIL LIMITED	Edible oil
P1 H1	2.00	Orange	OCP AFRICA SA	Fertilizers	P1 M13	1.50	Existing	Green	HARDWARE WORLD LIMITED (CRANE PAPER LTD)	Paper bags packaging
P1 H2	2.00	Orange	OCP AFRICA SA	Fertilizers	P1 M6	1.45	Existing	White	SUNBELT TEXTILES LTD	Garment Bedsheets, Bed Covers, Blankets
P1 H3	2.01	Orange	OCP AFRICA SA	Fertilizers	P1 M12	1.51	Existing	White	MATERIAL BANK RWANDA Ltd	Garment
P1 H4	2.00	Orange	OCP AFRICA SA	Fertilizers	P1 M14	1.51	Existing	White	NEW HOPE INDUSTRIAL PARK RWANDA LTD	Garment
P1 M7	1.66	Orange	AFROTURK SANITARY INDUSTRY Ltd	Baby diapers	P1 S4	1.00	Proposed	White		
P1 H5	2.29	Orange								

PHASE 01 A

PLOT NUMBER	AREA (in ha)	Colour coding
IND-43	1.78	Red
IND-31	4.04	Orange
IND-32	3.62	Orange
IND-33	1.16	Orange
IND-34	1.17	Orange
IND-35	1.17	Orange
IND-36	1.21	Orange
IND-37	1.36	Orange
IND-38	1.32	Orange
IND-39	1.35	Orange
IND-40	1.35	Orange
IND-41	1.35	Orange
IND-42	1.35	Orange
IND-48	4.49	Orange
IND-49	2.06	Orange
IND-EXT-1	0.29	Orange
IND-EXT-2	0.91	Orange
IND-50	5.88	Green
IND-51	5.48	Green
IND-52	5.09	Green
IND-53	3.99	Green
IND-54	3.17	Green
IND-55	2.34	Green
IND-44	1.99	White
IND-45	1.61	White
IND-46	1.67	White
IND-47	1.39	White

PHASE 02

PLOT NUMBER	AREA (in ha)	Colour coding
IND-21	2.09	Red
IND-22	2.20	Red
IND-23	2.86	Red
IND-24	2.10	Red
IND-25	2.17	Red
IND-26	2.17	Red
IND-27	1.90	Red
IND-08	2.76	Orange
IND-09	2.51	Orange
IND-10	2.51	Orange
IND-11	2.25	Orange
IND-12	2.38	Orange
IND-13	2.51	Orange
IND-14	2.40	Orange
IND-15	2.55	Orange
IND-16	2.09	Orange
IND-17	2.19	Orange
IND-18	2.38	Orange
IND-19	2.17	Orange
IND-20	2.09	Orange
IND-28	2.15	Orange
IND-29	2.11	Orange
IND-30	1.89	Orange
IND-01	1.67	White
IND-02	2.09	White
IND-03	2.09	White
IND-04	2.20	White
IND-05	2.32	White
IND-06	2.51	White
IND-07	2.17	White

Source: ARISE IIP/ BSEZ Ltd., Zoning Plan (October 2023)

This current EIA provides a description of the full SEZ area, focusing on obtaining the license from the RDB for the remaining area not licensed in 2011 (about 135 ha), however, considering few changes to Phase 1, such as the possibility to allocate different land use to some vacant plots and few interventions on existing main road network (by enlarging the main access from NR5 highway).

No list of developments is yet available for these areas, apart from those presented in Table 4-2, and in the zoning plan, which proposes the land use areas for the SEZ development. Further information can be found in Section 4.1.1.

4.1.3 THE NEED FOR THE PROJECT

Transformation for prosperity is one of five priorities of Rwanda's Vision 2050, which aim to develop high-value and competitive sectors in Rwanda that are an avenue to creating productive jobs and to transition the population and the economy from subsistence agriculture toward industry and high-skilled services for sustained economic growth. 7 Years National Strategies for transformation (NST1[9]) was developed with different pillars including:

- Promote industrialization and attain a structural shift in the export base to high-value goods and services;
- Modernize and increase productivity of agriculture and livestock;
- Establish Rwanda as a globally competitive knowledge-based economy;
- Accelerate sustainable urbanization from 18.4% (2016/17) to 35% by 2024; and
- Position Rwanda as a hub for financial services to promote investments NST1 is underpinned by sectoral strategies in key economic sectors.

The Bugesera SEZ has been defined by the GoR as a strategic area for the country development. The Project will promote small and medium processing industries, also those that are providing services for the industrial sector, such as transport and logistics, maintenance and repair. The GoR aims the project to help create more jobs in the region and attract both Rwandan and foreign capital investments, which is considered important for the provincial economic infrastructure and encourage firms capable of development of high-added value products (e.g., fertilizers, pharma), especially agro-processed products. Based on the number of plots provided in the Zoning Plan, the Project is expected to have the capacity to accommodate up to 82 tenant companies (25 in Phase 1, 27 in Phase 1A and 30 in Phase 2).

In this sense, BSEZ Ltd. will be responsible for general management of the Project within the Bugesera SEZ and will be liable for the construction of the infrastructure required according to the specific masterplan and for obtaining the necessary environmental permits and approvals, as well as for the operation of its own facility. The tenants to be installed at each plot will be responsible for obtaining the respective environmental permits and approvals for operation of their specific activities.

[9] National_Strategy_For_Trsansformation_-NST1-min.pdf (nirda.gov.rw), accessed on 05/10/2023.

4.1.4 PROJECT'S DESIGN PRINCIPLES

According to the BSEZ Ltd.'s Masterplan[10] (2022), the current Project followed the design and planning principles listed below:

- Connectivity to site:
  - The site has direct connectivity from the highway;
  - Effective connections from major road network to provide uninterrupted access to all parts of the country and hinterland;
- Land Area Use:
  - Compact Development Model for efficient land use;
  - Complete industrial & logistic solution by creating intersecting, time-based movement loops;
- Planning efficiency:
  - Inclusive design for efficient planning & operations;
  - Efficient Road Network through stepped planning;
  - Optimized planning of utilities, based on gravity flow;
- People centric Design:
  - Encourage walkability;
  - Creating safe public spaces;
  - Ensuring adequate public amenities (Food kiosks, water points, toilets etc.)
- Sustainability
  - Optimised design & construction;
  - Water management strategies: e.g. rainwater harvesting is planned for single window clearance building with a roof of 1,200 m2;
  - Renewable energy generation (e.g. solar panels are being considered on rooftops of warehouses; the amount of generated energy is unknown at the present moment).

4.2 PROJECT OVERVIEW

4.2.1 LOCATION

The Project is located in South-Est Rwanda, in Bugesera district 56 km from the capital Kigali along the main road NR5, which is bordering the area from the west (see Figure 4-4 and Figure 4-5).

[10] ARISE IIP, Masterplan & Preliminary Engineering for Bugesera SEZ, December 2022

FIGURE 4-4 BUGESERA INDUSTRIAL ZONE LOCATION

Source: ARISE, Masterplan & Preliminary Engineering for Bugesera SEZ, December 2022

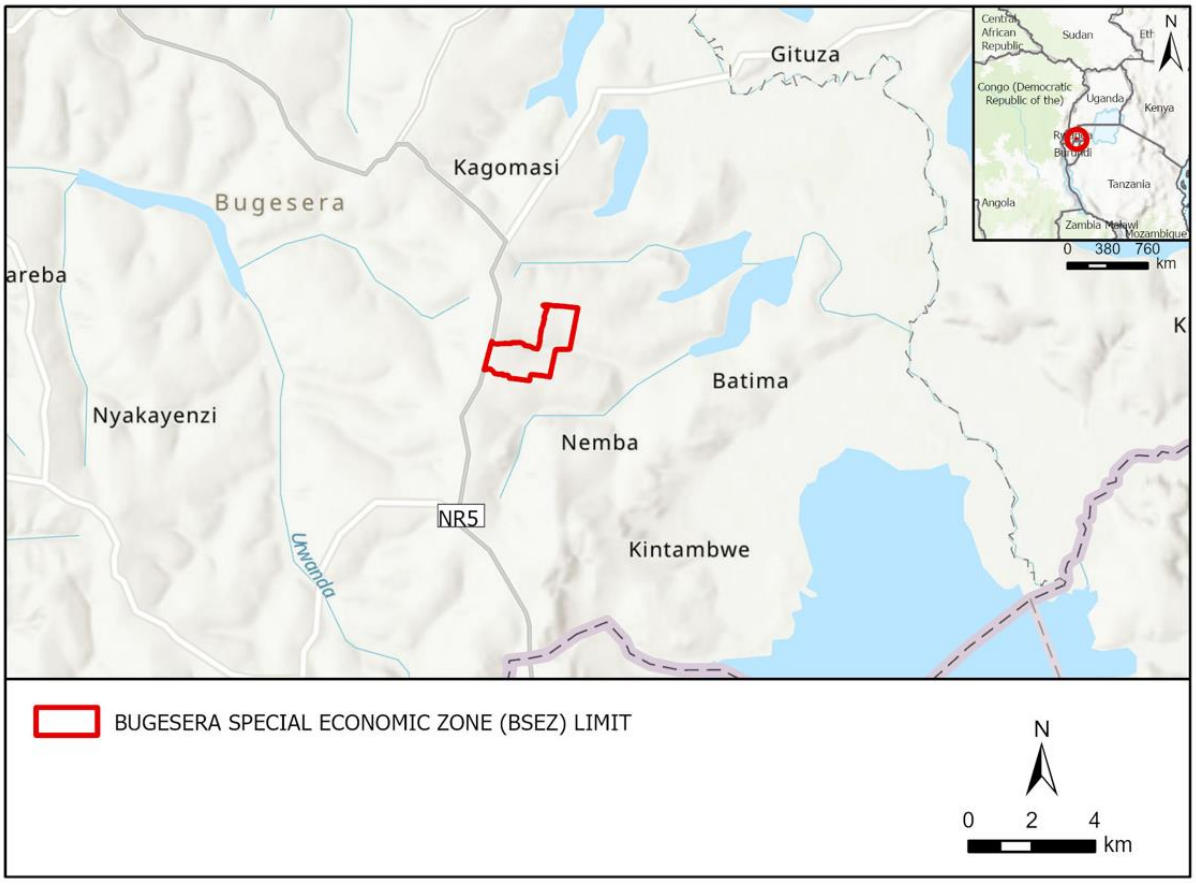


FIGURE 4-5 PROJECT LOCATION OVERVIEW

The Project is easily accessed through the main road NR5 that borders Phase 1 from the western border. There is also an access road that goes through Kagasa settlement, bordering the Project from the north.

The main transport nodes and related distances to the Bugesera SEZ are:

- Kigali International Airport – 57 km;
- Proposed Bugesera Airport – 24,5 km;
- Dar es Salam Port (Tanzania) – 1,470 km; and
- DP World Dry Port in Kigali - 68 km.

In terms of closest sensitive receptors, there is an urban settlement (Kagasa) located at nearly 300 m to the west from Phase 2 and around 700m to the north of Phase 1 areas. Note that some isolated buildings can be found closer to the SEZ boundaries.

It is important also to note the closest main water bodies: Kilimbi and Gaharwa lakes located at 2.3 and 2.5 km to the east from the SEZ limits. Refer to Section 1.1.1.

4.2.2 PROJECT MASTER PLAN

BSEZ Ltd. has been allocated 335.68 ha of the Bugesera SEZ of land (including Phase 1, Phase 1A and Phase 2), which are different stages of development:

- Phase 1 – 91.64 ha (under development);
- Phase 1A – 98.66 ha (planned);
- Phase 2 – 143.69 ha (planned).

The project will comprise the development of industrial, logistics and residential zones, facilities utilities, roads, green spaces drain buffer areas and conservation green areas. For that reason, BSEZ Ltd. developed a Masterplan & Preliminary Engineering document (December 2022) for the Project, which defines the different uses for the 335 ha, especially focusing on Phases 1A and 2, but also describing and presenting already licensed Phase 1. The industrial use is the use with higher expression (59%) followed by the green areas (conservation green, drain buffer and other green) with a total of 19% of the total area and access roads (13%). Figure 4-6 shows the proposed land use distribution by type and phase and an overview of the Project Master Plan as per October 2023 with the planned location for different zone types within the Project footprint. Below a summary of main uses and activities considered within the project:

Industrial: Plots allocated for the enterprises of the target industries (e.g., paper production, construction material, pharmaceutical industries, and other manufacturing activities, etc);

Residential: Housing for direct and indirect jobs generated by the industries / related activities;

Warehouse and logistic areas: storage space for the industries of the zone to store equipment, raw materials, and finished products. The logistic zones will be accompanied by custom clearance facilities and a container yard;

Facilities: The common administrative buildings to be constructed are as follows:

- Clearance facilities building;
- Fire Station: to serve the users of the Project industrial zone;
- Medical centre;
- Food court /canteen;
- Truck Terminal: area for truck parking;
- Bus stops and food kiosks;
- Public Toilets.

Utilities: Electricity supply and distribution system (Zonal Substations, underground and overhead distribution cables), water supply and management system (one Common Effluent Treatment Plant, water tanks, water pipes), solid waste transfer station;

Green: The green zones (green corridors, drain buffers and conservation green) have been designed to act as green lungs and service corridors between different areas, and can act as storm water paths. It is envisaged to integrate natural & constructed drains into a comprehensive drainage network. The central area will not include any construction and will be maintained as green zone and act as storm water/ run off sink to prevent potential flash floods and erosion. A Zoning Plan has also been developed by BSEZ Ltd. as per RDB's requirements in November 2023, which presents the types of industries, their distribution across the SEZ, and the future tenants of the plots. For the zoning of the area, the BSEZ Ltd considered the CPCB Pollution Index score[11], which takes into consideration emissions, effluents (water pollutants), generated hazardous wastes and resources consumption (see Table 4-1 and Table 4-2 for CPCB details). Figure 4-7: presents the proposed zoning and industries already implemented in the SEZ.

[11] Environment Ministry releases new categorisation of industries (pib.gov.in)

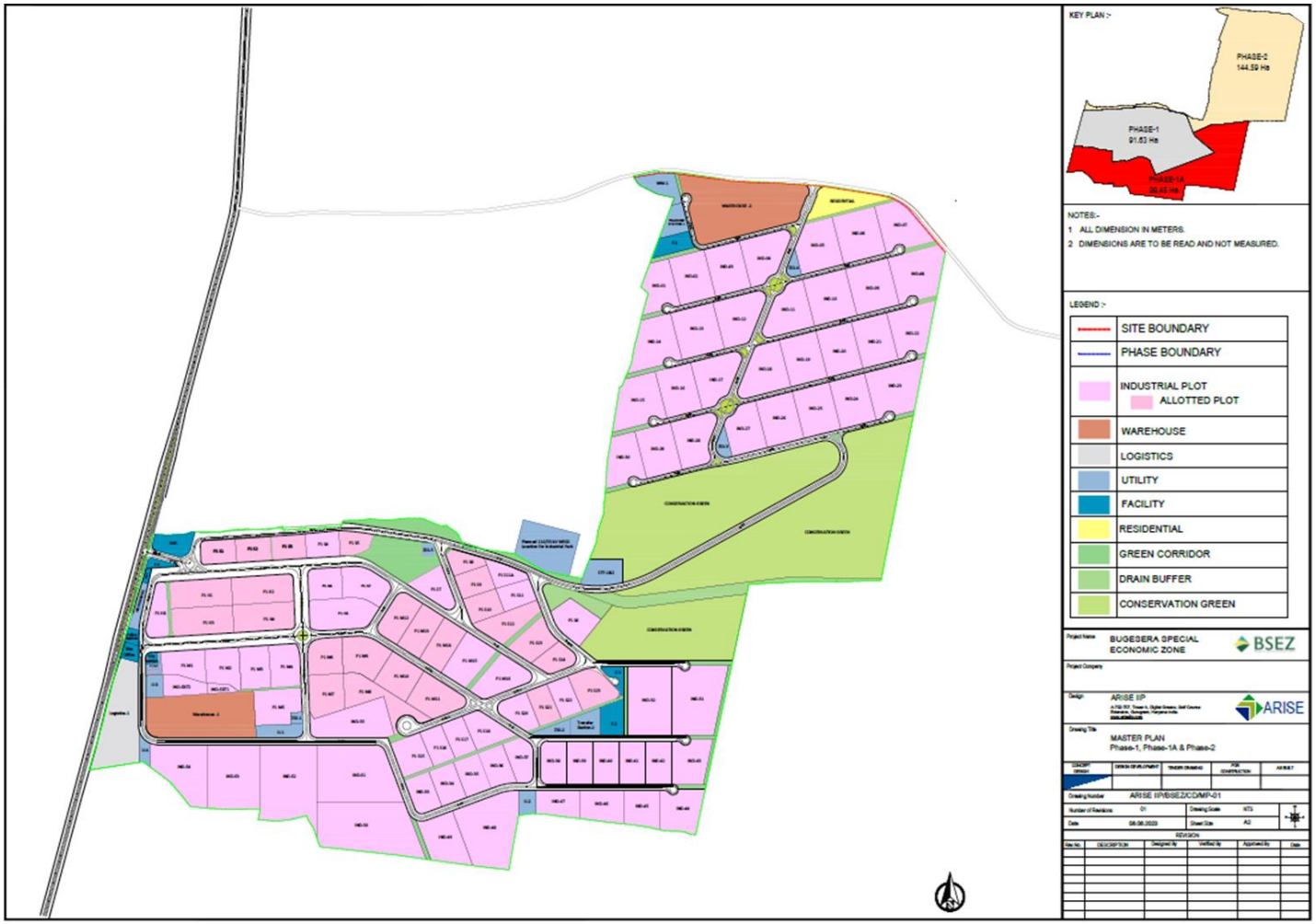


FIGURE 4-6 PROJECT MASTER PLAN

Source: ARISE, October 2023

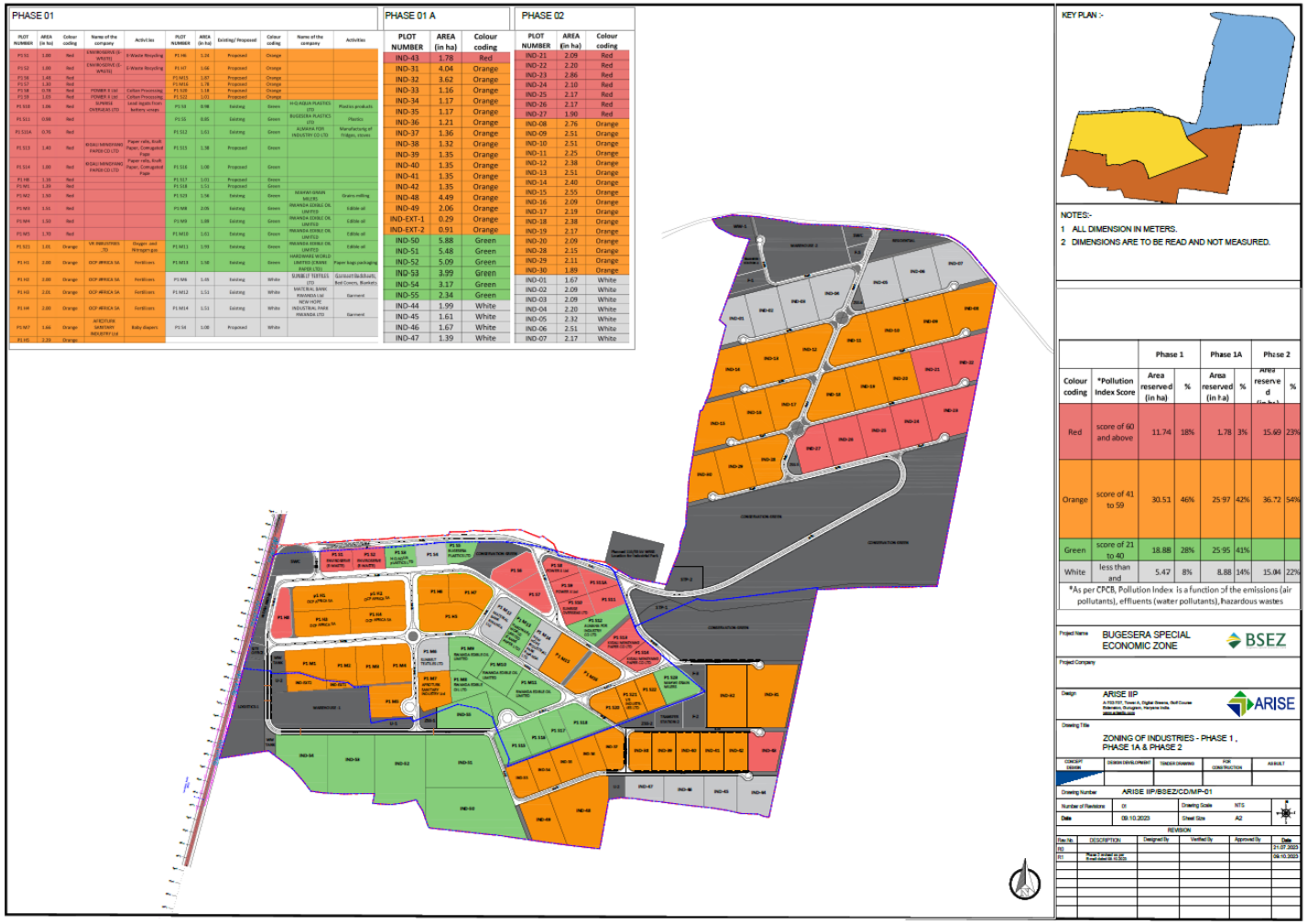


FIGURE 4-7: BUGESERA SEZ ZONING AND EXISTING/ PLANNED INDUSTRIES

Source: ARISE Zoning Plan, November 2023

The nature of BSEZ is industrial, however, whereas the plots have been identified for development, the details of the individual industries that will eventually occupy the plots remain largely unknown. Potential production activities identified in the Bugesera Business Plan developed by BSEZ Ltd. in 2022 considered Chemical & Pharmaceutical Industries, Clay Products, Agriculture Equipment, Cold Storage, Packaging, Agro Processing (Banana, Beans), Plastic Industry, Electrical & Telecom Cables, Painting Industries, Assembly Industries Appliances.

Within the scope of the Project, BSEZ Ltd is in charge of the basic infrastructure (such as accesses, warehouses, administrative buildings, logistic and parking, internal road networks, drainage, and sewerage, etc.) for the 335.68 ha and prepare all utilities to be ready for the enterprises who decide to settle in. It will be the responsibility of each particular enterprise to construct the required special infrastructure based on their specific project design, and to obtain the necessary environmental permits and approvals as per Rwandan regulations.

4.3 PROJECT AREA OF INFLUENCE

The direct AoI can be described as the place subject to direct effects arising from the construction and operation of the SEZ. It includes the Project Footprint, as well as the extent of direct impacts of the project on the physical, biological, social or cultural environment. These impacts may occur during construction and operation of the Project and in several environmental descriptors.

4.3.1.1 DIRECT AREA OF INFLUENCE

The IFC Performance Standards require project proponents to identify and manage environmental and social risks and impacts within their Area of Influence (AoI). The AoI is defined in *Performance Standard 1*[12] as:

The area likely to be affected by: (i) the Project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the Project; (ii) impacts from unplanned but predictable developments caused by the Project that may occur later or at a different location; or (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.

Associated facilities, which are facilities that are not funded as part of the Project and that would not have been constructed or expanded if the Project did not exist and without which the Project would not be viable.

Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the Project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

The initial step in defining the Area of Influence is to classify the facilities and activities ('the Project components') that make up the Project. The components of this Project are

[12] IFC (2012): Performance Standard 1 Assessment and Management of Environmental and Social Risks and Impacts (p.i-ii). Available at: PS1_English_2012.pdf (ifc.org)

described in Chapter 4.4 (see Table 4-3). The appropriate level of assessment and management of risks and impacts is determined by the degree of control that the Project is able to exercise over its facilities or activities, and by the importance of the facilities or activities to the Project's successful operation.

Thus, the environmental AoI of this Project includes the footprint of all Project activities within a radius of 1 km of the Project site, which covers the areas in which a direct or indirect impact on the physical, biological, social or cultural environment might occur.

Furthermore, thus the social AoI for the Project is used to describe the boundaries of the area where Project direct impacts may occur, for the preliminary social baseline purposes, the surveyed area for the Project entails adjacent settlements potentially affected by disturbances from Project construction works and operations, such as dust, airborne emissions, and noise. Also, it includes adjacent settlements that could potentially benefit from Project related opportunities, as employment, local economic development, increased influx and associated indirect economic impacts, etc.

In addition, the Project is expected to induce in-migration and increase the burden on local infrastructure provisions, such as roads, and services, affecting the villages surrounding the Project site. Therefore, the social AoI of 10 km is defined and considered in this EIA assessment includes the areas in which a direct or indirect impact on social or cultural environment might occur.

4.4 PROJECT COMPONENTS

The appropriate level of assessment and management of risks and impacts is determined by the degree of control that the Project is able to exercise over its facilities or activities, and by the importance of the facilities or activities to the Project's successful operation. The first step in defining the Area of Influence is to classify the facilities and activities ('the Project components') that make up the Project. The following project component categories are considered for this Project:

Core component. Facilities constructed and operated by the Project proponent (i.e., BSEZ Ltd.), and activities directly associated with their construction and operation. BSEZ Ltd. is expected to have full control of these components in terms of management of risks and impacts.

Associated component (associated facilities). Third party facilities that have been constructed or expanded as part of the Project and that are essential to its successful operation. Activities associated with constructing and operating these facilities are also considered associated components. As the component is dependent on the Project, and vice versa, BSEZ Ltd is expected to have a high level of control. Note that these types of components are considered to meet the definition of an associated facility per *Performance Standard 1,* e.g., to be constructed ad-hoc for the Project (access roads, grid connection line, etc.). However, for example, as the Project will be supplied by existing Kanyonyomba water treatment plant by a pipeline, that was not constructed specifically for the Project, these facilities are not Project-associated facilities since these facilities already exist or will exist in any case.

Primary supply chain. Refers to third parties supplying goods or materials essential to the successful operation of the Project, on an ongoing basis. The level of control BSEZ Ltd. can exercise may be limited, especially for suppliers further along the supply chain. No primary supply chain elements could be identified at the time of this assessment.

Other third-party activities. Facilities constructed or operated by third parties, and associated activities, which are not essential to the successful operation of the Project. These are not within the Project's AoI. A possible exception would be a development that occurs as a result of the Project's existence, but that is not part of the Project itself. The potential for this kind of induced development to occur will be considered as part of the impact assessment.

Classification of Project Components applicable to the Project is presented in Table 4-3.

TABLE 4-3 CLASSIFICATION OF PROJECT COMPONENTS

Project Facilities and Activities	Project Zones (Phase 1 / Phase 1A / Phase 2/ ND Not Defined)	Classification	Timeline (Permanent – P Temporary – T)	Project Phase (Construction – C Operation – O)
Main Project Facilities				
Industrial facilities	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Administrative offices	Phase 1	Core Component	P	C & O
Warehouse facilities	Phase 1 / Phase 1A	Core Component	P	O
Residential facilities	Phase 1A/Phase 2	Core Component	P	O
Common Effluent Treatment Plant (CETP)	Phase 2	Core Component	P	C & O
Single Window Clearance building	Phase 1	Core Component	P	C & O
Wastewater Network	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Zonal Substations	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Electrical Supply Network	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Road network	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O

Project Facilities and Activities	Project Zones (Phase 1 / Phase 1A / Phase 2/ ND Not Defined)	Classification	Timeline (Permanent – P Temporary – T)	Project Phase (Construction – C Operation – O)
Water Storage Tanks	Phase 1 / Phase 1A	Core Component	P	C & O
Green Areas	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Truck Terminal as part of logistic park	ND	Core Component	P	C & O
Fire Station	Phase 1	Core Component	P	C & O
Medical Centre	ND	Core Component	P	C & O
Canteen	Phase 1	Core Component	P	C & O
Vocational training institute	Phase 2	Core Component	P	O
Bus stops and Food kiosks	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Public Toilets	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Street Lighting	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Site peripheral Infrastructure	Phase 1 / Phase 1A / Phase 2	Core Component	P	C & O
Solid Waste Transfer Station	Phase 1A / Phase 2	Core Component	P	C & O
Associated Facilities				
Main Receiving Sub-Station	Outside of the Project's border	Associated Facility	P	C & O
110 kV Incoming transmission line and feeders	Outside of the Project's border	Associated Facility	P	C & O
Other				
Access Roads	Outside of the Project's border	Existing facilities used by the Project	P	C & O

Project Facilities and Activities	Project Zones (Phase 1 / Phase 1A / Phase 2/ ND Not Defined)	Classification	Timeline (Permanent – P Temporary – T)	Project Phase (Construction – C Operation – O)
Centralised Power Generation Plant	Outside of the Project's border	Existing facilities used by the Project	P	C & O
Quarry	ND (to be provided by each contractor, not defined at this stage)	Primary Supply Chain	T	C
Landfill (for sludge deposit – excavated material may be reused to level plots with high slopes)	Phase 1A/ Phase 2	Other Third-Party Activities	P	C&O

At the moment of the current assessment, despite of the occupied plots, only waterworks and a temporary office building are constructed in Phase 1.

4.4.1 MAIN PROJECT ZONES

According to Bugesera SEZ Masterplan update (October 2023), the following land uses (Table 4-4) are planned for each project Phase (note that Phase 1 is already under construction and partially operating):

TABLE 4-4 LAND USES

	Phase 1		Phase 1A		Phase 2		Total	
	ha	%	ha	%	ha	%	ha	**%**
Industrial	67.43	71.2	61.64	62.0	67.45	47.6	**196.52**	**58.5**
Warehouse	0	0.0	5.5	5.5	7.17	5.1	**12.67**	**3.8**
Residential	0	0.0	0	0.0	1.68	1.2	**1.68**	**0.5**
Logistic		0.0	4.25	4.3	0	0.0	**4.25**	**1.3**
Green	3.64	3.8	1.64	1.7	3.24	2.3	**8.52**	**2.5**
Drain Buffer		0.0	1.93	1.9	1.43	1.0	**3.36**	**1.0**

	Phase 1		Phase 1A		Phase 2		Total	
Plantation and Conservation Zone/Non-Developed Area		0.0	11.5	11.6	40.89	28.9	**52.39**	**15.6**
Supporting Facilities	3.09	3.3	1.3	1.3	2.22	1.6	**6.61**	**2.0**
Utilities		0.0	3.2	3.2	3.54	2.5	**6.74**	**2.0**
Roads	20.27	21.4	8.41	8.5	13.98	9.9	**42.66**	**12.7**
Road – NR05	0.28	0.3	0	0.0	0	0.0	**0.28**	**0.1**
Total	**94.71**	**100.0**	**99.37**	**100.0**	**141.6**	**100.0**	**335.68**	**100.0**

Source: ARISE Master Plan, updated October 2023.

4.4.1.1 INDUSTRIAL ZONE

Industrial plots are expected to occupy nearly 71% of **Phase 1**, considering that this phase is already licensed, under construction and plots are partially operating.

Phase 1 concentrates 34.3% of the industrial area of the total Bugesera SEZ, similarly to the industrial area planned for Phase 2, followed by Phase 1A which will concentrate 31.4% of the industrial areas in Bugesera SEZ. See Table 4-4.

The proposed industrial zoning considered plots to be mostly laid out perpendicular to the proposed roads giving them the rights to be later subdivided/ merged based on market needs. The industrial plots size varies between 1.11 ha to 4.49 ha in **Phase 1A** and from 1.67 ha to 2.89 ha in **Phase 2**.

4.4.1.2 WAREHOUSES ZONE

The Bugesera SEZ logistic facilities consider two warehouses (one in Phase 1A with 5.5 ha and other in Phase 2 occupying 6.19 ha) and one logistic area in Phase 1A. Warehouses will have varying capacity (from 5,000 to 10,000 m^2), which can be adjusted as needed.

According to October 2023 layout the logistic area is located at western area of the Bugesera SEZ, mainly within Phase 1A, but partially crossing to Phase 1 area, and is expected to occupy nearly 4.25 ha. This area will have direct access through Phase 1, having external connectivity from the highway. The proposed container yard will be able to store 20’ and 40’ containers that will be stacked in a height of maximum five containers. The logistics zone will be accompanied by custom clearance facilities.

4.4.1.3 RESIDENTIAL ZONE

The residential zone considered within the Bugesera SEZ is planned for the Phase 1A and Phase 2 areas, occupying a total area of 1.68 ha The project masterplan considered an approach "work-live-play" and for that, has included a specific area to cover the industrial zone residential needs for workers. This cluster will be separated from the industrial plots through dedicated green areas.

FIGURE 4-8 PROPOSED RESIDENTIAL ZONE

Source: ARISE Master Plan, 2022

Table 4-5 presents the unit types considered and proposed distribution for the residential area. To the date, approximately 519 people will be accommodated in the residential zone. A security plan will be developed along with the development of Phase 2.

TABLE 4-5 PROPOSED RESIDENTIAL UNIT TYPOLOGY AND AREA DISTRIBUTION

Unit Typology	M^2	No. of floors	No. Units/Floor	No. of Units	Unit Area
1 BHK Block	793.7	4	10	40	3.174.9
2 BHK Block	448.6	3	4	12	1,345.9
3 BHK Block	455.4	4	4	16	1,821.5
Dormitories (Individual)	945.4	4	27	108	3,781.8
Dormitories (4 Persons/Room)	818.8	4	19	76	3,275.3

Source: ARISE Master Plan, 2022

4.4.1.4 SUPPORTING UTILITIES AND FACILITIES ZONE

Several utilities of the Project considered within the masterplan will act as tools to support the Bugesera SEZ functioning and correct operations (see Table 4-6 and Figure 4-9).

TABLE 4-6: SUPPORTING UTILITIES AND FACILITIES AT THE BUGESERA SEZ

Name	Phase	Purpose / Description	Number/Area, ha Phase 1 (licensed)	Number/Area, ha Phase 1A/2 (Planned)
Supporting Utilities				
Zonal substation (ZSS 5)	Phase 1	Power distribution and SCADA Monitoring & Control	1600 sq mtr	NA
SWC	Phase 1	To facilitate investors and stakeholders regarding required licenses/permits, First aid room and etc.	8000 sq mtr	NA
Water Works	Phase 1	To cater water requirements of investors.	2583 sq mtr	NA
Weighbridge	Phase 1	Weighing facility for incoming and outgoing commercial vehicles	4559.38 sq mtr	NA
Fire Station	Phase 1	Shall be located near Water Tanks.	1595.075	NA
Transfer Station 01	Phase 2	To cater to the solid waste management of the SEZ	NA	7239 Sq.m
Transfer station 02	Phase 1A	To cater to the solid waste management of the SEZ	NA	7980 Sq.m
Zonal Sub Station 01	Phase 1A	To facilitate power distribution within the Zone	1600 sq mtr	NA
Zonal Sub Station 02	Phase 1A	To facilitate power distribution within the Zone	NA	4124 Sq m
Utility Area 01	Phase 1A	Envisaged plot for future utility requirements	NA	6975.46
Utility Area 02	Phase 1A	Envisaged plot for future utility requirements	NA	4896.00

Name	Phase	Purpose / Description	Number/Area, ha Phase 1 (licensed)	Number/Area, ha Phase 1A/2 (Planned)
Utility Area 04	Phase 1A	Envisaged plot for future utility requirements	NA	3398.41
Water Works Ext	Phase 1A	Plot extension to cater to the water demands of Phase 1A	NA	4606.98
Water works	Phase 2	To cater water requirements of investors of Phase 2	NA	9602.22 Sq mtr
Zonal Sub Station 03	Phase 2	To cater to the electrical needs of the SEZ	NA	3670 Sq m
Common Effluent Treatment Plant (CETP)	Phase 2	Effluent treatment plant	NA	11740.49 Sq.m
General Facility area	Phase 2	To cater to the parking needs and future facility.	NA	7687.81 Sq.m
Supporting Facilities				
Vocational training institute	Phase 2	Institute for training and skill development, which will be hosting trainings for various industries.	NA	14496.42 Sq.m
Integrated Facility Building (F4)	Phase 1	Facility building serving the development.	2145.06	
Bus Stops	Phase 1 / Phase 1A/ Phase 2	To be located along main roads	3 nos	8 nos
Food court/ Kiosks	Phase 1	To be located along main roads	1016.85 Sq.m	NA
Site Peripheral Infrastructure				
Watch Towers	Phase 1(existing) / Phase 1A/ Phase 2	NA	NA	8
Video surveillance & Security	Phase 1/ Phase 2	Shal be provided at each roundabout	2 nos	2 nos
Gate Complex	Phase 1	To control and facilitate access	282 Sq.m	

Name	Phase	Purpose / Description	Number/Area, ha Phase 1 (licensed)	Number/Area, ha Phase 1A/2 (Planned)
Other Facilities Outside the side boundaries				
MRSS (planned 110/33kV)	NA	this will provide energy supply to the Bugesera SEZ	NA	NA
Centralised Power Generation Plant	NA	NA	NA	NA
Incoming Transmission feeders	NA	From MRSS	NA	NA
Other	NA	NA	NA	NA

Source: ARISE Business Plan, Updated Area Statement (rev. October 2023).

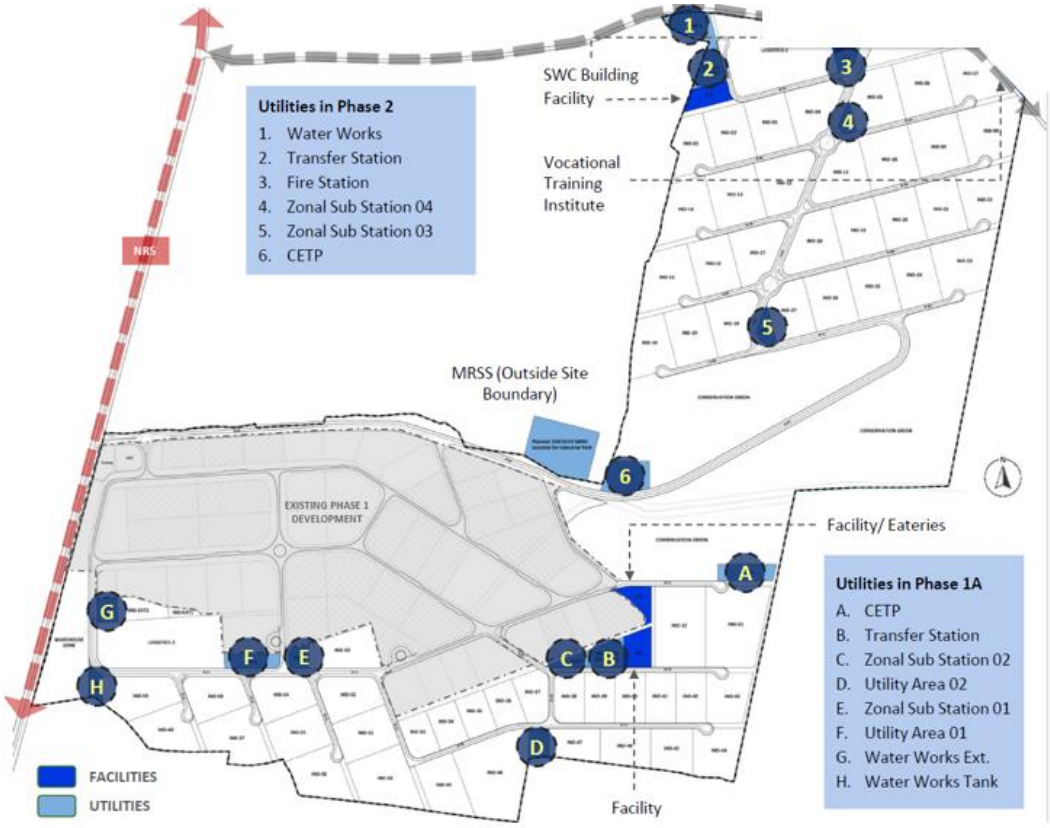


FIGURE 4-9 SUPPORTING FACILITIES AND UTILITIES

Source: ARISE Master Plan, 2022

4.4.1.5 GREEN ZONE

There are three types of green zones/functions envisaged in all three phases (Figure 4-10, Table 4-7):

- **Green buffers:** corridors/areas within the road ROWs and Green corridors between plots used as buffer for land use segregation – to act as green lungs and service corridors. These are expected to act like storm water paths.
- **Conservation Green:** Considering forest plantation, the conservation zone will be maintained at the bottom of the valley. It will act as a safeguard against flash floods and erosion.
- **Drain buffer:** buffer of 20 m on both sides of the central drain.

The green areas will occupy the central area between Phase 2 and Phases 1 /1A and especially along the roads.

According to the project masterplan preference is given to indigenous plants and shrubs (e.g. *Kigelie africana, Parkia biglobosa, Hibiscus, Izora*, etc) for the plantation scheme, and fruit bearing trees are proposed to be planted along the road edges.

TABLE 4-7 GREEN ZONES SCHEME WITHIN THE BUGESERA SEZ

	Phase 1 (ha)	Phase 1A (ha)	Phase 2 (ha)	Total (ha)
Green Buffers	3.65	1.64	3.24	8.53
Conservation Green	-	10.30	40.89	51.19
Drain Buffer	-	1.93	1.43	3.36

Source: ARISE Master Plan, Updated Area Statement October 2023.

FIGURE 4-10 GREEN ZONES IN PHASE 1A AND PHASE 2

Source: ARISE Business Plan, 2022

Plantation in Conservation Green Zone will be used for carbon sequestration. The following options are considered for carbon sequestration (Table 4-8):

TABLE 4-8 OPTIONS FOR CARBON SEQUESTRATION

Species	Canopy Radii, m	Trees/ha	Carbon sequestration of one tree, ton/year	Carbon sequestration in 1 Ha, ton/year
Albiza adianthifolia	6.1	49	0.26	12.74
Entada abyssinica	3.5	169	0.065	10
Polyscias fulva	1	2,162	1.34	2,897
Erythrina abysinnica	3.5	169	0.061	10

Source: ARISE Master Plan, 2022.

4.4.2 MAIN PROJECT INFRASTRUCTURES

4.4.2.1 ACCESS AND MOBILITY

4.4.2.1.1 Road Network

The Project's roads will connect to the existing NR5 Highway. The Phase 1 roads are already constructed. The Bugesera SEZ access is made from the main entry (**proposed 25 m wide arterial road**) connecting from the NR5, bordering Phase 1 through the north and then connecting the remaining proposed 25 m wide sub arterial roads and then the smaller distribution roads between plots.

The concept behind the Bugesera SEZ road network considers, among others:

- Road gradient limited to less than 4%;
- Majority of roads have slopes less than 2.5%; and
- Majority of roads are aligned with the contours.

4.4.2.1.2 Existing roads

Within Phase 1 area, under construction and where some industries are already installed and implemented (in operation), the traffic/circulation distribution is made from the 14m wide arterial road through roundabouts, which distribute circulation to the smaller roads and into the plots. Figure 4-11 below presents the existing road network. The total length of Phase 1 road network is 6.6 km with RoW of various width, from 24 m to 50 m.

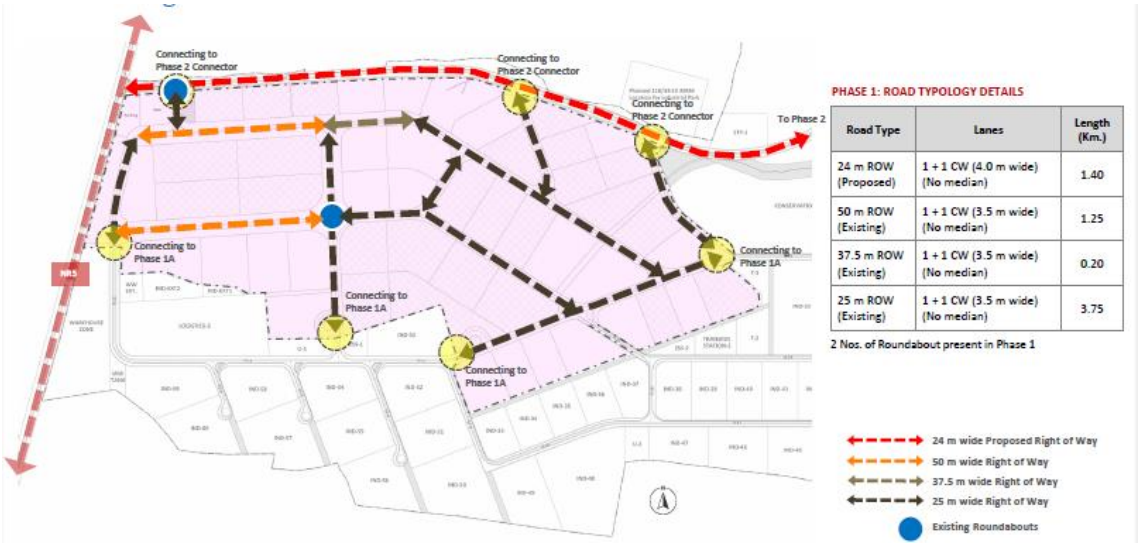


FIGURE 4-11 BUGESERA SEZ PROPOSED ROAD NETWORK FOR PHASE 1

Source: ARISE, 2022 (Masterplan)

4.4.2.1.3 Planned roads/ changes to existing roads.

The projected road network for Phase 1A and Phase 2 also consider changes to the main existing access in Phase 1 (from the NR5 into the SEZ), especially in the existing entry, such as: the enlargement of the entry to 130 m into the SEZ; the enlargement of the existing roundabout from 25 m to 30 meters of diameter allowing efficient manoeuvres and movements from the main external road into the SEZ. Additionally, additional space for parking and SWC is provided (Figure 4-12).

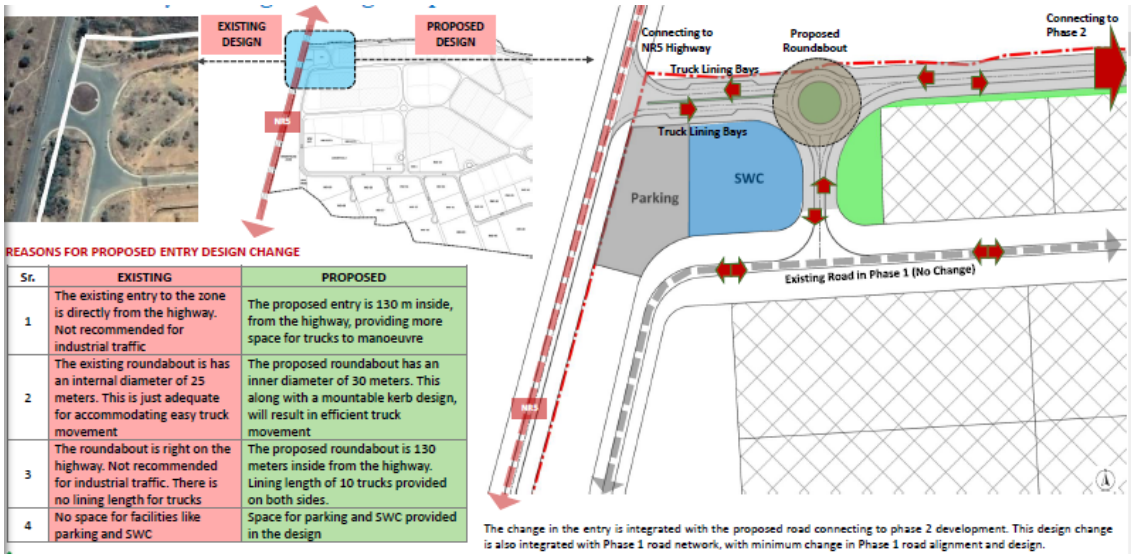


FIGURE 4-12 PROPOSED CHANGES TO PHASE 1 ROAD NETWORK

Source: ARISE, 2022 (Masterplan)

Phase 1A and Phase 2 will also benefit from direct connectivity from the highway (NR5) through the arterial roads connecting to multiple existing connections at Phase 1, providing access into the proposed plots. The proposed Project Design considers two new types of roads:

- Central Arterial roads with Right of Way (RoW) of 24 m – 3,790 m in length;
- Other roads with RoW of 15 m – total length 6,290 m.

The Arterial roads will have two lanes with a width of 4 m each. On both sides of the connector road there will be a 7.6 m wide zone for kerb, pedestrian zone, green zone and utilities (water supply, sewage, telecom, gas, drainage and electricity) (Figure 4-13).

Other secondary roads will have two lanes of 3.5 m wide. Space for utilities, street lightning, pedestrian and green zone will be provided on one side (7.5 m, Figure 4-14).

All roads will have a slope of 2.5° to direct the water to the drainage facilities at the sides.

The surface of the roads will comprise of:

- Wearing course - 40 mm thick;
- Binder course - 50 mm thick;
- Base course (Laterite) – 0.2 m thick;
- Sub-base (natural gravel) – 0.3 m thick.

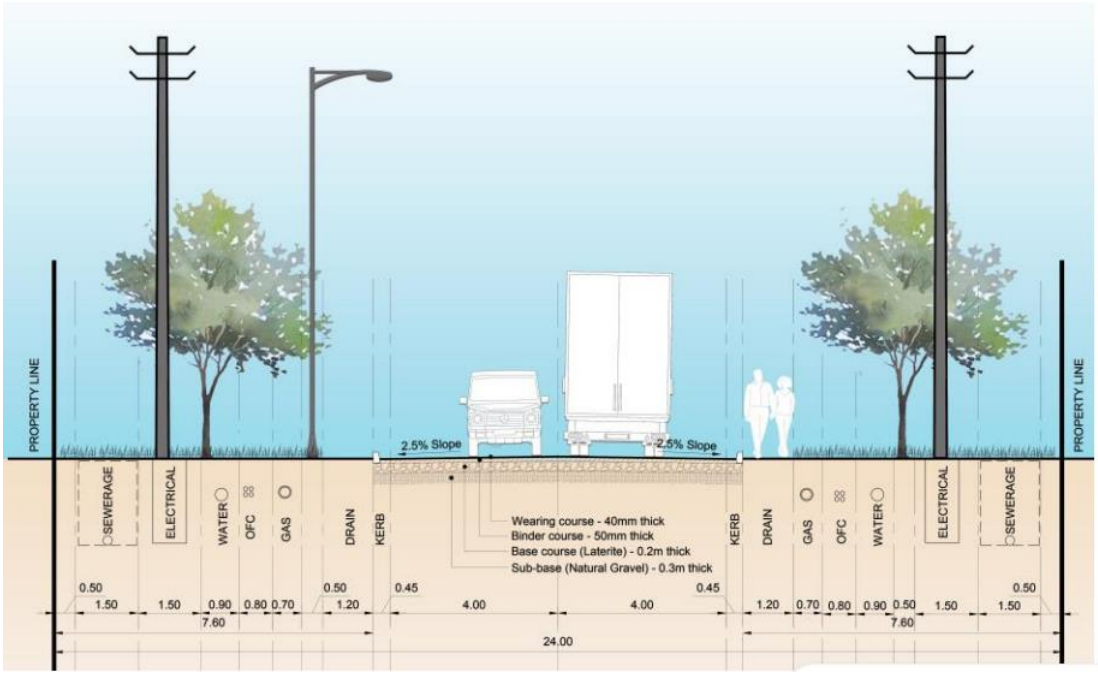


FIGURE 4-13 TYPICAL CROSS SECTION (24 M WIDE)

Source: ARISE Master Plan, 2022

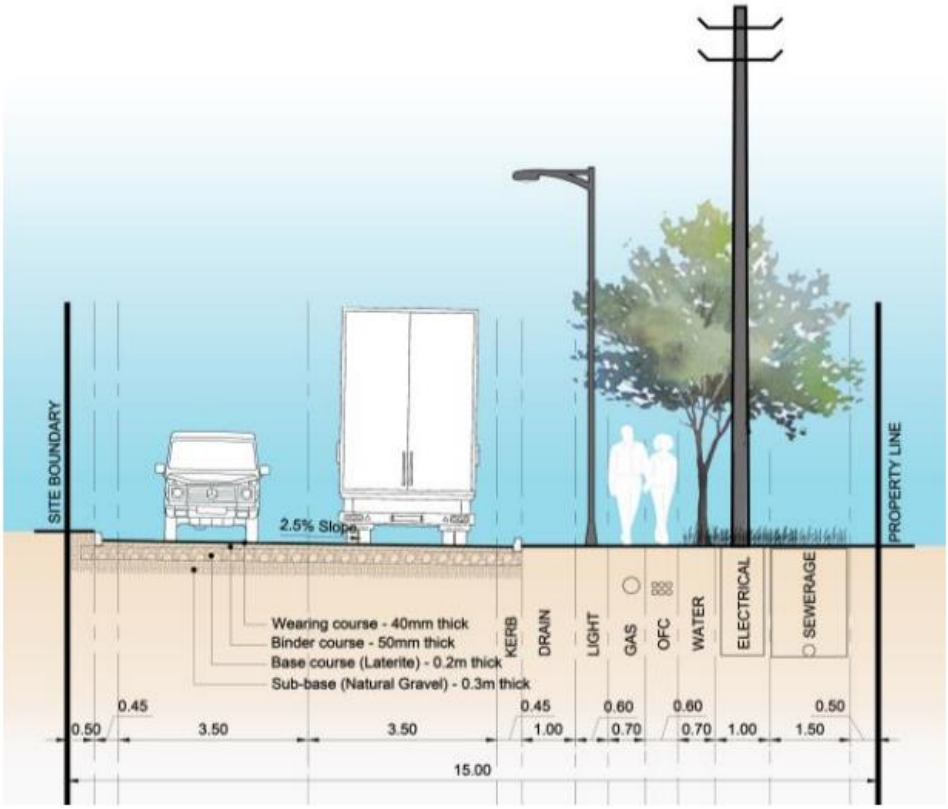


FIGURE 4-14 TYPICAL CROSS-SECTION (15 M WIDE)

Source: ARISE Master Plan, 2022

4.4.2.1.4 Bus Stops and Pedestrian Facilities

Across the SEZ, the pedestrian zones are to be organized to create public spaces and bus stops will be distributed in a way that the walking distance to the bus stop will not exceed 500 m. According to the 2022 Master Plan, there are 18 bus stops planned along the arterial and secondary roads (Figure 4-15). Way finders and signages will be installed to ease the navigation through the area.

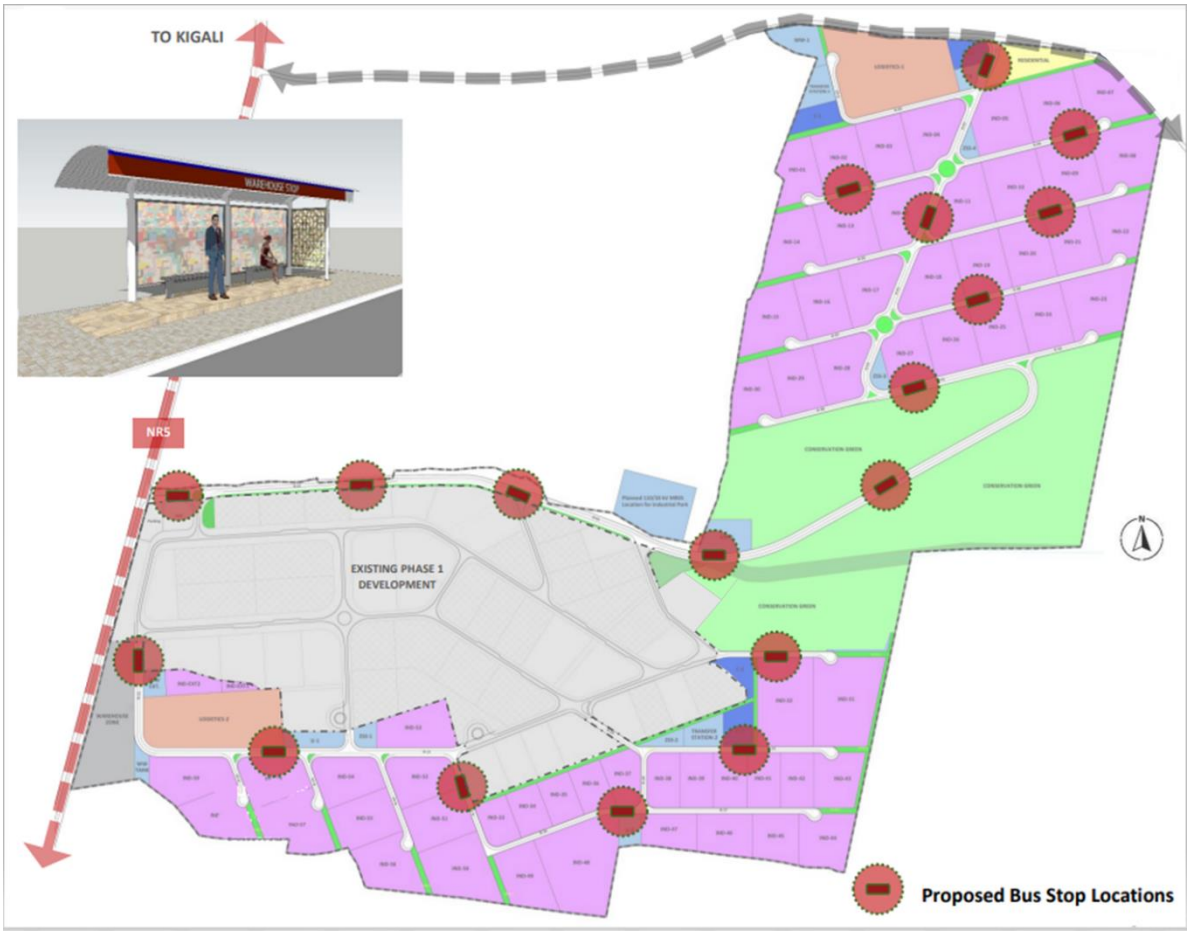


FIGURE 4-15 BUS STOPS

Source: ARISE Master Plan, 2022

4.4.2.2 WATER SUPPLY

The Bugesera SEZ is supplied by the Kanyonyomba treatment plant located 11 km away from the SEZ. To transport the water from the plant a 250 mm existing pipeline that goes along the highway NR5 will be used. From the governmental pipeline extension lines, the water will be transported to Ground Level Storage Reservoirs (GLSRs) by tapping lines. Water distribution network of the Project includes water supply lines, Ground Level Storage Reservoirs (GLSRs) and firefighting pipelines.

According to the proponent, industrial areas should consume on average 27.3 m3/day/ha. For construction needs water is supplied through the governmental pipeline while some contractors also bring their own water. The water consumption rates during the construction phase remain unknown at the time of current assessment. The existing water supply at Phase 1 comprises the water works, that are proposed to be extended

and two water tanks (with a total capacity 2,500 m^3) that is expected to cover the demand of this phase. Phase 1 has a separate firefighting network, including water pipe, 60 fire hydrants and two fire pumps.

For the planned phases 1A and 2, the water will be distributed across the Project by water pipelines along the roads. Dual pipelines have been proposed separately for water supply and firefighting networks. The alignment of the water supply network is presented in Figure 4-16 and Figure 4-17.

Table 4-9.below presents the water consumption estimates by different land use that are expected for the planned areas – Phase 1A and Phase 2. The main water consumption is expected to be from industrial land use. The total estimated consumption for the proposed Phase 1A and Phase 2 of Bugesera SEZ is 9,000 m^3/day. This amount will be supplied by the public sources which is expected to cover the remaining project needs of 6,000 m^3/day.

TABLE 4-9 WATER DEMAND CALCULATIONS

Land Uses	Area (ha)			Water Demand Phase 1A (m^3/day)				Water Demand Phase 2 (m^3/day)			
	Phase 1A	Phase 2	Total	Industrial	Workforce	Landscape	Total	Industrial	Workforce	Landscape	Total
Industrial	61.6	67.6	129.2	1,810.2	814.6	0.0	2,624.8	2,026.9	912.1	0.0	2,939.0
Logistics	5.55.5	6.26.2	11.7	44.0	14.9	0.0	58.8	49.5	16.7	0.0	66.2
Warehouse	5.5	6.2	11.7	22.0	8.0	0.0	30.0	0.0	0.0	0.0	0.0
Residential	4.2	1.7	5.9	0.0	0.0	0.0	0.0	0.0	70.1	0.0	70.1
Green	1.6	3,2	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drain Buffer	1.9	1.4	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plantation and Conservation Zone/Non-Developed Area	10.3	40.9	51.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Facilities											
Supporting Facilities	1.3	1.8	3.1	0.0	3.3	6.6	10.0	0.0	6.6	13.1	19.6
Utilities	3.7	3.6	7.3	0.0	3.9	19.4	23.3	0.0	3.6	17.8	21.4
Roads	8.4	17.3	25.7	0.0	0.0	35.9	35.9	0.0	0.0	77.3	77.3
Sub Total	99.4	144.6	244.0	1,876.2	844.7	61.9	2,782,7	2,076.4	1,009.1	108.2	3,193.6
Loses 5% + Fire Make up				278.3				319.4			
Total Estimated Water Demand				**3061 m^3/day Say, 3000 m^3/day**				**3513 m^3/day Say, 3500 m^3/day**			
Total Phase 1A and Phase 2				6573.9 m^3/day							

Land Uses	Area (ha)			Water Demand Phase 1A (m^3/day)				Water Demand Phase 2 (m^3/day)			
	Phase 1A	Phase 2	Total	Industrial	Workforce	Landscape	Total	Industrial	Workforce	Landscape	Total
Approximate Demand for Phase 1				2301.8 m^3/day							
Total for BSEZ				**8875.7, Say, 9000 m^3/day**							

Source: ARISE Master Plan, 2022

TABLE 4-10 WATER DISTRIBUTION NETWORK TECHNICAL PARAMETERS

Size	Phase 1 (existing)	Phase 1A	Phase 2	Total
Tapping Line (from governmental to Water works)	<100 m	300 m	1,450 m	1,750 m
Tapping Line diameter (HDPE)	250 mm			
Water Pipe Length (supply)	6,327 m	3,750 m	5,400 m	15,477 m
Water Pipe Diameter (supply)	63-315 mm	200-315 mm		
Water Storage Tanks	2,500 m^3	3,000 m^3	3,500 m^3	9,000 m^3
Firefighting Pipe Length	6,094 m	3,750 m	5,400 m	27 m
Firefighting Pipe Diameter	90-250 mm	200-250 mm		

Source: ARISE Master Plan, 2022

The water supply lines, according to the Master Plan, have the following parameters:

- Pressure head: 15 m to 25 m & Peak factor: 2.0;
- Minimum pipe size: 200 mm;
- Design: Hazen Williams formula;
- Pipe material: HDPE PE 100 PN10/ 12.5 grade;

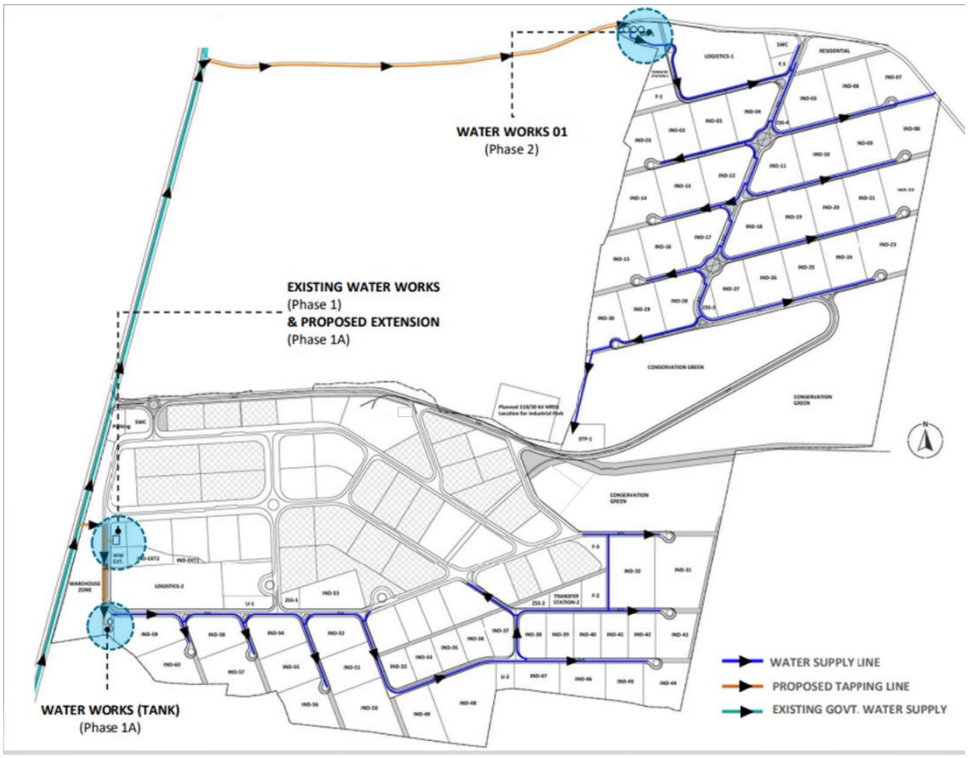


FIGURE 4-16 WATER SUPPLY NETWORK FOR PHASE 1A AND PHASE 2

Source: ARISE Master Plan, 2022

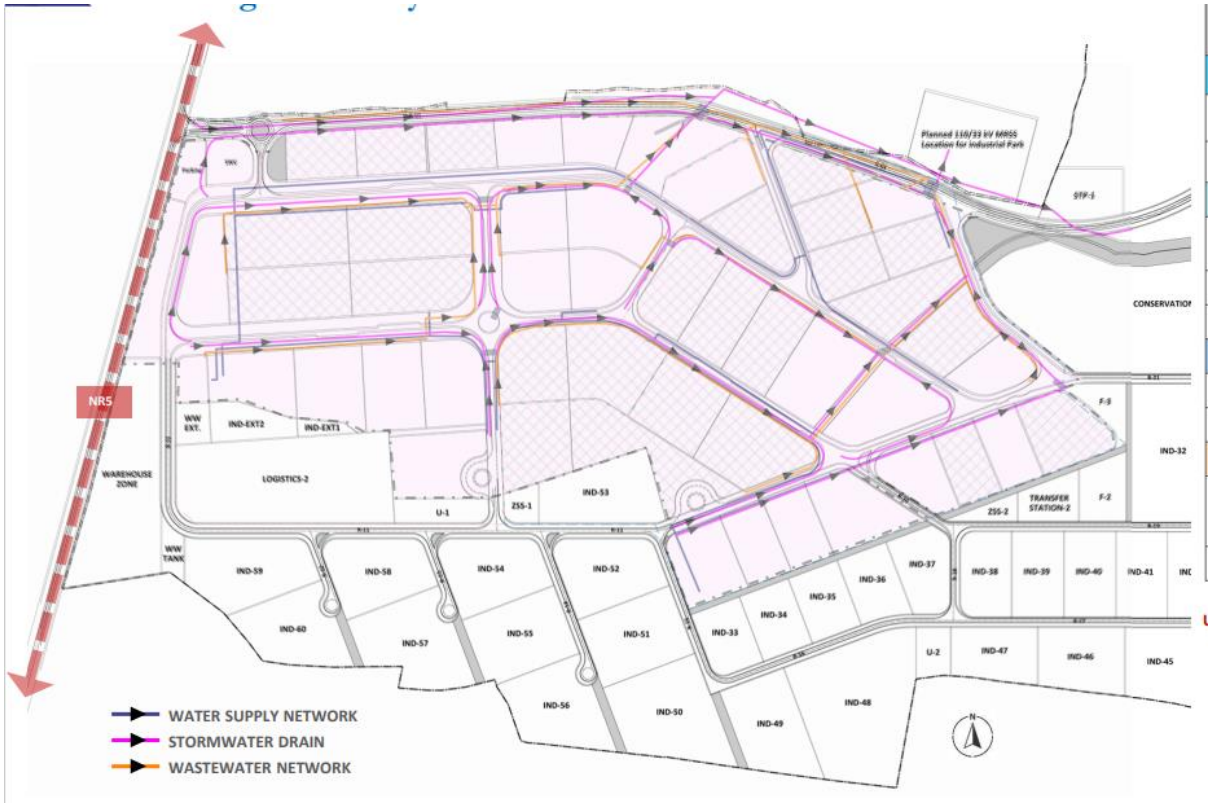


FIGURE 4-17 WATER SUPPLY NETWORK FOR PHASE 1

Source: ARISE Master Plan, 2022

4.4.2.3 WASTEWATER

4.4.2.3.1 Wastewater Network

The sewage network is constructed according to the same principle following the geometry of the landscape. The wastewater collection plants will be located in Phase 1A next to administrative facilities and in Phase 2 next to the residential area. The sewage will be transported to one CETP located at the bottom of the valley. Phase 1 and Phase 1A will not have their own CETP and the collected water will be treated at the CETP located withing Phase 2.

The wastewater network of Phase 1 will be connected with Phase 1A and Phase 2 network by four connecting points.

For the water discharge network, according to the Masterplan and Business Plan, the following parameters were considered:

- Peak factor: 2.0
- Gravity collection & Decentralized system;
- Minimum pipe size: 200 mm;
- Pipeline material: HDPE (PE80 PN8) or PVC CR 8 kN/sqm SDR 41;
- d/D ratio: 80 % maintained for all sizes of pipe;
- Min Max Velocity: 0.60m/s to 2.5m/s respectively;

- Manholes: 1.2m X 1.2 m X 2.5-4.5m Concrete block masonry (or) RCC pre-cast or cast in-situ, M30 RCC covers;
- Manhole spacing: 45m to 60 M C/C and junction;
- Infiltration 5%.

The pipelines will be placed along one side of the roads with a minimum cover of 2.5 m. Manholes will be provided within the utility corridor.

4.4.2.3.2Septic Tanks and Portable Toilets

During construction, only portable toilets are used. Once the site office is constructed, a temporary septic tank of 8.4 m^3 will be made available, until the CETP comes into operation.

4.4.2.3.3 Wastewater Treatment

The main source of wastewater of the Project will be industries, which will have pre-treatment facilities. The effluents discharged into BSEZ Ltd. network will have to comply with the prescribed standards. Around 80% of domestic use and 70% of industrial use water will come as wastewater. No water used for irrigation purposes is expected to generate wastewater.

The generated wastewater will be treated at the CETP, which has a total treatment capacity of 6,100 m^3/day that will be developed in modules with a capacity of 500 m^3/day (Table 4-11). There is no information available on estimated wastewater generation within Phase 1 and water demand of supporting facilities and roads within this project phase, so the table below was filled with estimations based on data provided for Phase 1A and Phase 2. About 80% of potable use is expected to become wastewater. Thus, the total amount of generated wastewater is estimated to be 5,598 m^3/day, which is very close to the proposed CETP total treatment capacity.

The proposed treatment methods are:

- Sequencing batch reactor (SBR) – a fill-and-draw activated sludge system for wastewater treatment;
- Moving bed biofilm reactor (MBBR) – biological treatment based on a combination of conventional activated sludge process and biofilm media
- After treatment the water is expected to meet the IFC standards and will be discharged into the existing natural drain at the bottom of the valley.

TABLE 4-11 WASTEWATER GENERATION

	Area, ha				Water Demand, m^3/day			Wastewater Generation, m^3/day		
Land Uses	**Phase 1**	**Phase 1A**	**Phase 2**	**Total**	**Phase 1**	**Phase 1A**	**Phase 2**	**Phase 1**	**Phase 1A**	**Phase 2**
Industrial	67.4	61.6	67.5	**196.5**	1,830.6	2,624.8	2,939.0	ND	1,918.8	2,148.5
Logistics	-	4.3		**4.3**	-	58.8	66.2	-	42.7	48.0
Warehouse	-	5.5	7.2	**12.7**	-	30.0	0.0	-	21.8	0.0
Residential	-	-	1.7	1.7	-	0.0	70.1	-	0.0	56.1
Green	3.6	1.6	3.2	**8.5**	0.0	0.0	0.0	ND	0.0	0.0
Drain Buffer	-	1.9	1.4	**3.3**	-	0.0	0.0	ND	0.0	0.0
Plantation / Conservation Zone/ Non-Developed Area	-	11.5	40.9	**52.4**	-	0.0	0.0	ND	0.0	0.0
Other Facilities										
Supporting Facilities	3.1	1.3	2.2	**6.6**	Ca.23	10.0	19.6	ND	2.7	5.3
Utilities	-	3.2	3.6	6.7	-	23.3	21.4	ND	3.1	2.9
Roads	20.6	8.4	14	**43.0**	Ca.74	35.9	77.3	ND	0.0	0.0

	Area, ha				**Water Demand, m^3/day**			**Wastewater Generation, m^3/day**		
Sub Total	94.7	**99.4**	**141.7**	**335.7**	**ca.1,927.6**	**2,782,7**	**3,193.6**	**ca.1,349.3**	**1,989.0**	**2,260.7**
TOTAL Wastewater generation								**Ca.5,598**		
		Infiltration 5%						**67.5**	**99**	**113**
		Proposed CETP Capacity						6,100		

Source: ARISE Master Plan, 2022

The technical parameters of the wastewater network are presented in the Table 4-12.

TABLE 4-12 WASTEWATER NETWORK TECHNICAL PARAMETERS

Size	Phase 1	Phase 1A	Phase 2	Total
Total Length	6,174 m	6,400 m	6,200 m	18,774 m
Water Pipe Diameter	200 m	225-400 mm		
No. of Manholes	235	150	130	515
Depth	-	2.5-4.5 m		
CETP Capacity		-	6,100 m^3/day (for all phases	6,100 m^3/day

Source: ARISE Master Plan, 2022

4.4.2.4 DRAINAGE

The proposed drainage network uses natural gradient (Figure 4-18). There were the following considerations for the development of the drainage network:

- Grading site to convey runoff to the central green valley;
- Central green valley to channelize the rainwater into the existing storm water drain;
- Project area divided into a single drainage catchment, accessible from both sides;
- Annual rainfall can produce runoff of 2.2 million cubic meters;
- Design rainfall is a 5-year frequency rainfall – 60 mm/hour;
- Weighted average coefficient: 0.8
- Computation of flow: rational formula and Manning's equation employed for capacity of drain;
- Design Section: Rectangular channels with B/D Ratio ranges from 0.5 to 1;
- Freeboard: 0.1m – 0.15m for open drains;
- Permissible velocity: 0.6m/s to 4.5 m/s, Min for self-cleansing and max Safe against erosion
- In case of heavy downpour, green zone in the valley can accommodate additional runoff (estimate of additional runoff or possible quantities are not available at the moment the EIA was developed.).

The Project has the following planning criteria:

- Conventional rectangular drains along both sides of the road. RCC Precast /cast in situ open U- type drains (along with provision of covers) have been provided;
- Multiple outfalls are proposed to reduce drain sizes. Ultimate disposal to the natural drainage channel along the valley, connected to Lake Gaharwa, on the downstream;
- Utility corridor proposed with green cover to trap silt /dust prior to entry in storm drains;
- Rooftop rainwater storage, reuse/ harvesting system can be suggested for Industrial Plots and common buildings;
- Cross drainage works are proposed at road and drain crossing locations;

- Intermediate drops in drains proposed to control the velocities.

The drainage network will include two types of constructions: storm water drains and culverts. Their technical parameters are presented below (Table 4-13). The existing stormwater drainage network of Phase 1 will be connected with the network of Phase 1A.

TABLE 4-13 STORMWATER DRAINWORK DETAILS

	Phase 1	Phase1A	Phase 2	Total
Total length	11,764 m + 115 m outflow channel	7,980 m	8,120 m	20,979 m
Drain width	ND	0.5-1.5 m		-
Drain depth	0.5-2.0m	0.5-2.0 m		-

Source: ARISE Master Plan 2023

The whole area can be divided into ten catchment areas. Each of these areas will have a collecting point (outfall). The water will be collected through the drainage network and discharged into the natural drains/streams (Figure 4-18, Table 4-14).

TABLE 4-14 PROJECT AREA DRAINAGE TECHNICAL PARAMETERS

Outfall	Outfall 1	Outfall2	Outfall 3	Outfall 4	Outfall 5	Outfall 6	Outfall 7	Outfall 8	Outfall 9	Outfall 10
Outfall into	Phase 1	Phase 1A - Natural Drain	Phase 1A - Natural Drain	Phase 1A- 2 via Road Connected to Natural Stream	Phase 2 - Natural Drain	Phase 2 - Natural Drain	Phase 2 - Natural Drain Near Culvert	Phase 2 - Natural Drain	Existing Phase 1A to Nat. Drain	Existing Phase 1A to Nat. Drain
Catchment Area, ha	34.9	58.4	14.4	7.9	23.7	22.6	41.9	51.5	54.5	83.0
Discharge, m3/sec	6.41	9.14	3.02	1.35	4.81	4.75	6.24	7.31	8.9	15.31
Drain Size Min	0.9 x 1.5	1.0 x 2.0	0.8 x 1.5	0.5 x 1.0	1.1 x 1.5	1.1 x 1.5	0.9 x 1.5	1.1 x 1.5	1.0 x 2.0	1.7 x 2.0
Drain Size Min	0.5 x 0.5	0.5 x 0.5	0.5 x 0.5	0.5 x 0.5	0.5 x 0.5	0.5 x 0.5	0.5 x 0.5	0.5 x 0.5	0.5 x 0.5	0.5 x 0.5

Source: ARISE Master Plan, 2022

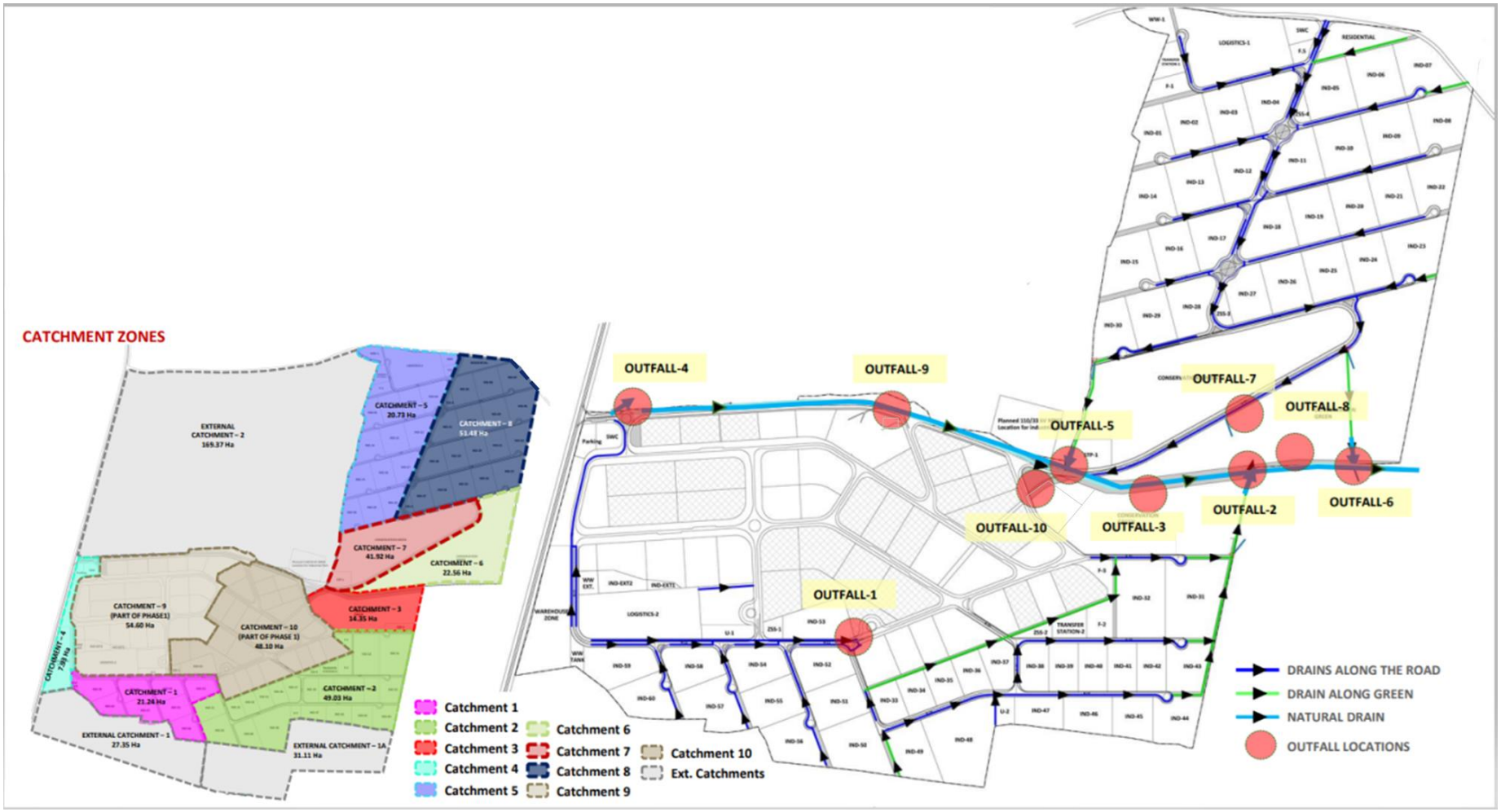


FIGURE 4-18 PROPOSED STORM WATER DRAINAGE NETWORK AND CATCHMENT ZONES

Source: ARISE Master Plan, 2022

4.4.2.5 ENERGY SUPPLY

4.4.2.5.1 Electrical Network

Electrical network of SEZ will be connected to governmental network owned by Rwanda Power Group (REG). A Main Receiving and Stepdown Substation (MRSS) will be built by the government for the Project supply. During the construction phase the power demand is estimated to be 2.5 MVA, according to the Master Plan (BSEZ Ltd.,2022). At the moment, there is a possibility that part of the Project's demand will be covered by solar energy. The possibility of solar panels installation is considered being considered; however, the amount of generated energy is yet unknown.

From governmentally owned MRSS the power will be distributed to five substations within the SEZ, and from these five substations the power will be distributed by overhead and underground cables across the Project (Figure 4-19).

Phase 1 utilities will be integrated with Phase 1A and Phase 2 proposed infrastructure. The expected electrical demand in Phase 1 development will be 25.39 MVA, that will supply all land uses of the phase, including industrial, which will consume 88% of the energy. The maximum power demand in Phase 1 is expected to equal 26 MVA. The following electrical supply facilities and utilities are planned to be installed within Phase 1 area:

- 30 kV underground distribution cable;
- 30 kV underground distribution cable for ring main connection between ZSS;
- ZSS 5;
- 30 kV overhead distribution cable from ZSS to consumers (6,800 m in length);
- Underground cable for crossing points;

The electrical network within Phase 1A and Phase 2 include:

- Four 30 KV Zonal sub-stations (equipment + civil);
- Underground 30 kV Power Cables from Main Receiving Sub Station (110/30 kV);
- 30 kV underground distribution cable for ring main connection between ZSS; and
- Overhead and Underground Distribution Cables.

The length of the overhead distribution network is presented in the table (Table 4-15):

TABLE 4-15 OVERHEAD DISTRIBUTION NETWORK (30 KV)

30 kV Zonal Switching Substation (ZSS)	Conductor Size	Length, m
Phase 1		
ZSS 5	148 mm^2 AAAC* Conductor	6,800
Phase 1A		
ZSS 1	148 mm^2 AAAC Conductor	3,060
ZSS 2		3,460
Phase 2		

30 kV Zonal Switching Substation (ZSS)	Conductor Size	Length, m
ZSS 3	148 mm^2 AAAC Conductor	2,900
ZSS 4		3,400
TOTAL		**19,620**

*AAAC - All Aluminium Alloy Conductor.

Source: ARISE Master Plan 2022.

Two power cables will be laid from MRSS to each 30 kV Zonal Substations and one power cable will be laid between each ZSS to power redundancy and Ring Main between all ZSS. Underground power cable inside HDPE pipe is proposed on road crossings.

The length of the underground distribution network is presented in the Table 4-16. The location of the underground cables is presented in Figure 4-20.

TABLE 4-16 UNDERGROUND DISTRIBUTION NETWORK (30 KV)

From-to	Cable Size	Length, m
Phase 1		
MRSS-ZSS5	30kV, 2Rx3Cx 300mm^2 Al. Ar. Power Cable	1,100
Phase 1A		
MRSS-ZSS1	30kV, 2Rx3Cx 300mm^2 Al. Ar. Power Cable	3,300
MRSS-ZSS2		2,200
ZSS1-ZSS2	30kV, 2Rx3Cx 300mm2 Al. Ar. Power Cable	1,000
ZSS2-ZSS3		2,000
Phase 2		
MRSS-ZSS3	30kV, 2Rx3Cx 300mm2 Al. Ar. Power Cable	1,900
MRSS-ZSS4		3,600
ZSS3-ZSS4	30kV, 2Rx3Cx 300mm2 Al. Ar. Power Cable	910
ZSS4-ZSS5		2,650
ZSS5-ZSS1		1,000
TOTAL		**19,660**

Source: ARISE Master Plan 2022

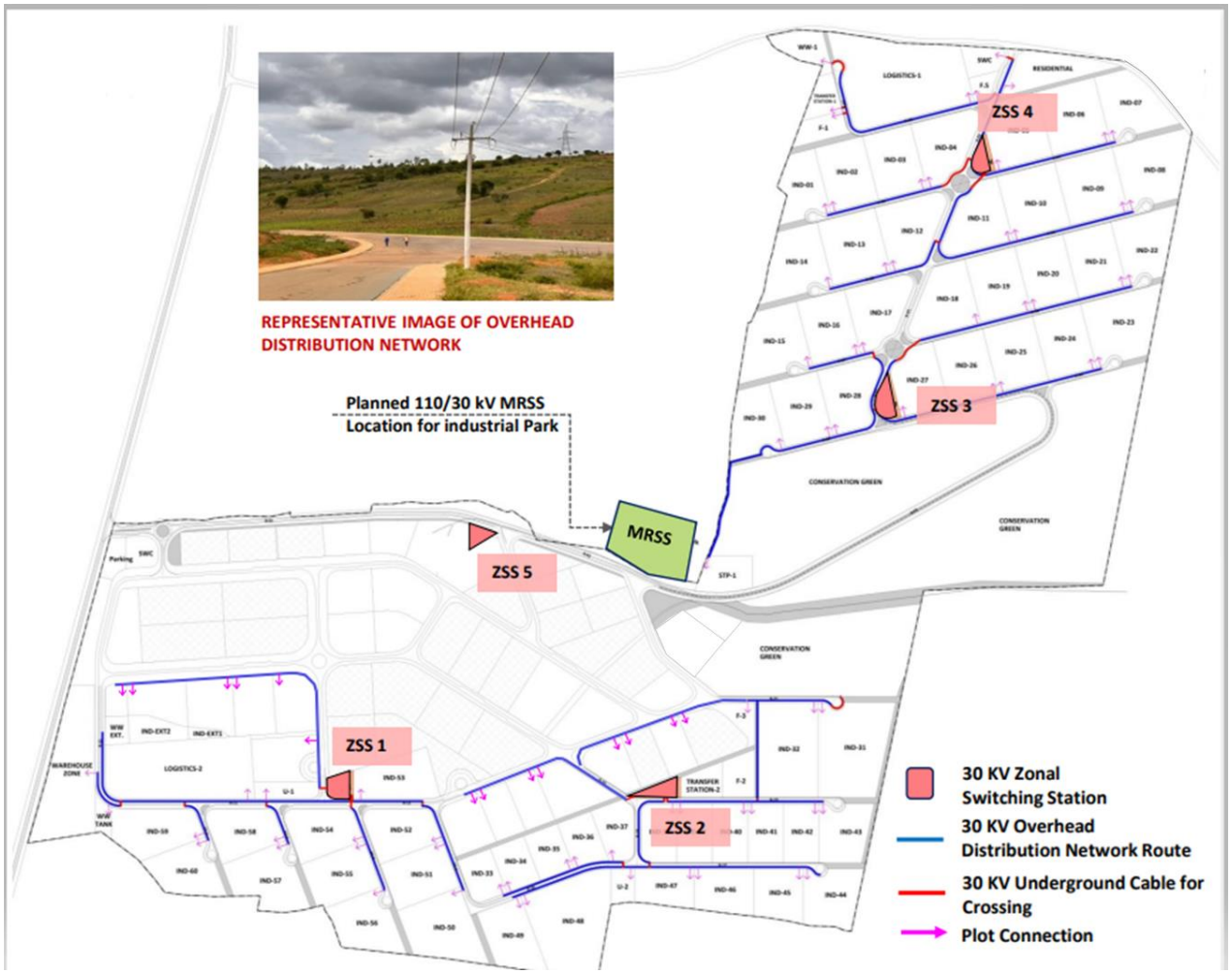


FIGURE 4-19 PROPOSED OVERHEAD ELECTRICAL NETWORK DESIGN

Source: ARISE Master Plan 2022

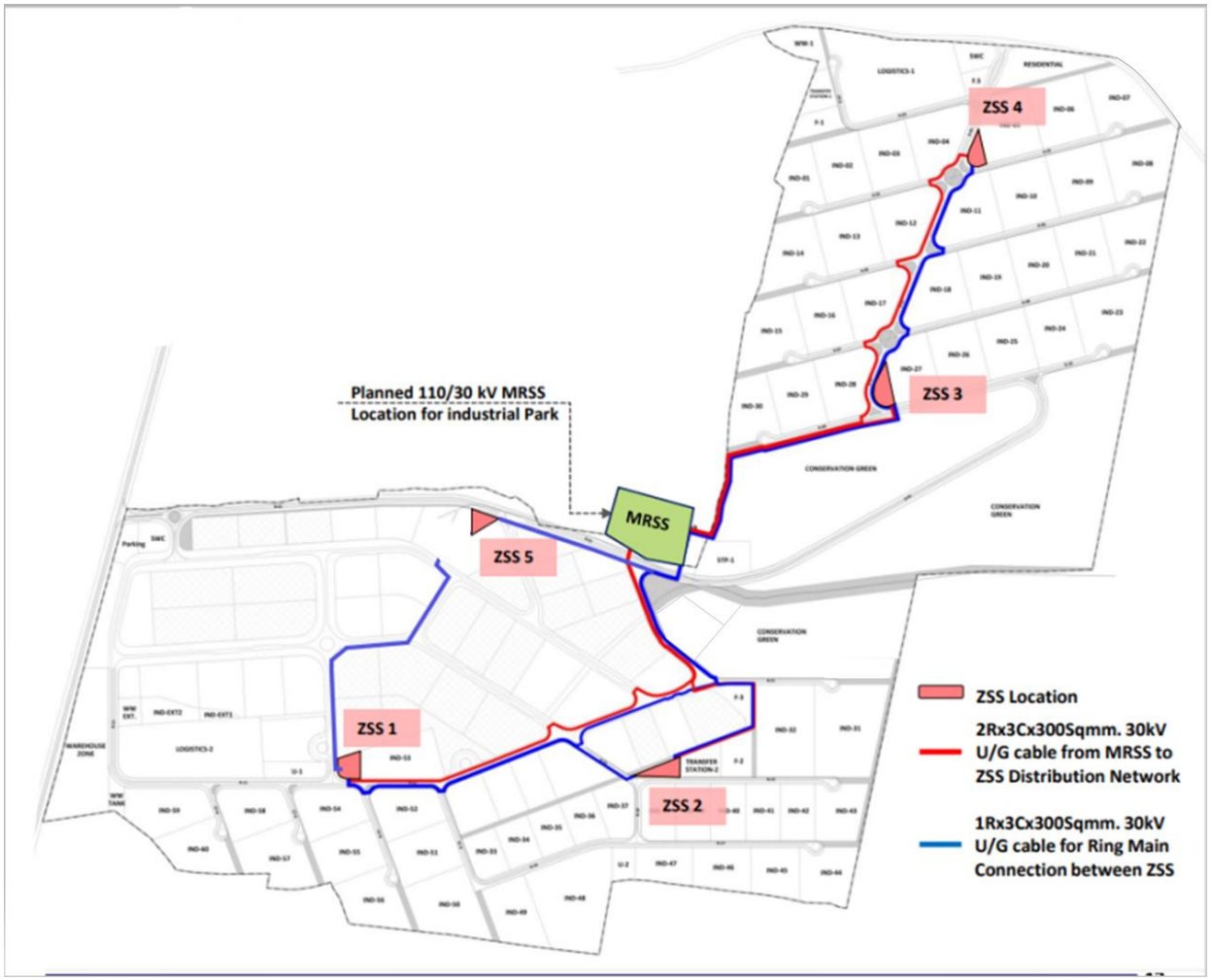


FIGURE 4-20 PROPOSED UNDERGROUND ELECTRICAL NETWORK DESIGN

Source: ARISE Master Plan 2022

4.4.2.5.2 Energy Consumption

According to the SEZ Masterplan (BSEZ Ltd.,2022) the power consumption during operation of Phase 1 is expected to be of 25.4 MVA, and for the planned Phase 1A – of 26.72 MVA a day, and for Phase 2 – 30.79 MVA a day. Once all phases enter operation, the total consumption of the Project is expected to be 82.9 MVA a day) (Table 4-17).

The electrical system of SEZ will be connected to the public network. Rwanda Energy Group (REG) will be responsible for providing robust energy supply from the national grid, including construction of Main Receiving Substation (MRSS), incoming transmission line and Bulk Power Transmission to Industrial Zone.

TABLE 4-17 POWER DEMAND

Category/Type of Operation	**Load Norms (kW/ha)**	**Area (ha)**		**Power Demand (kW)**		**Power Demand (MVA)**		
		Phase 1A	**Phase 2**	**Phase1 A**	**Phase 2**	**Phase 1**	**Phase 1A**	**Phase 2**
Industrial Plots	450	61.6	67.5	19,007.1	21,282.3	22.39	22.4	25.04
Warehouse	100	5.5	7.2	308.0	0.0	0	0.36	0
Residential Plots	500	-	1.7	0.0	432.5	0	0	0.51
Facility Plots	697	1.3	2.22	617.9	1,213.8	2.94	0.73	1.43
Utility Plots	75	3.2	3.5	258.3	237.8		0.3	0.28
Road	4.94	8.4	14.0	39.4	84.8		0.05	0.1
Green	2.47	1.6	3.2	6.8	5.7		0.01	0.01
Drain Buffer Green	0.0	1.9	1.4	0.0	0.0	0.06	0.00	0
Conservation Green	2.47	11.5	40.9	28.1	101.0		0.03	0.12
TOTAL Power Demand	-	-	-	**20,650.3**	**23,790.7**	**25.4**	**24.3**	**28.0**
Future Expansion Load 10%						00	2.43	2.8
Final Power Demand with Future Expansion						**00**	**26.72**	**30.79**
Final Power Demand of the Project						**25.4**	**82.9**	

Source: ARISE Master Plan 2022

The five Zonal Sub Stations (ZSS) with a maximum load of 20 MVA will provide for the Project (Table 4-18, Figure 4-21). Six overhead feeders form each zonal substation are proposed to cater power to the entire area. The proposed system inside ZSS consist of

incomer panel, LI-LO panel & 30kV Distribution Panel. From the ZSS, 1 of 30kV outgoing circuits will connect to the Bulk/ Heavy load industries.

TABLE 4-18 ZSS MAXIMUM POWER DEMAND

30 kV Zonal Switching Substation (ZSS)	Maximum Power Demand (MVA)	Provision for additional Load on ZSS (MVA)
Phase 1		
ZSS 5	26	no increase planned
Phase 1A		
ZSS 1	13.15	6.85
ZSS 2	17.74	2.26
Phase 2		
ZSS 3	13.29	6.71
ZSS 4	14.70	5.30
TOTAL	**84.88**	**21.12**

Source: ARISE Master Plan 2022

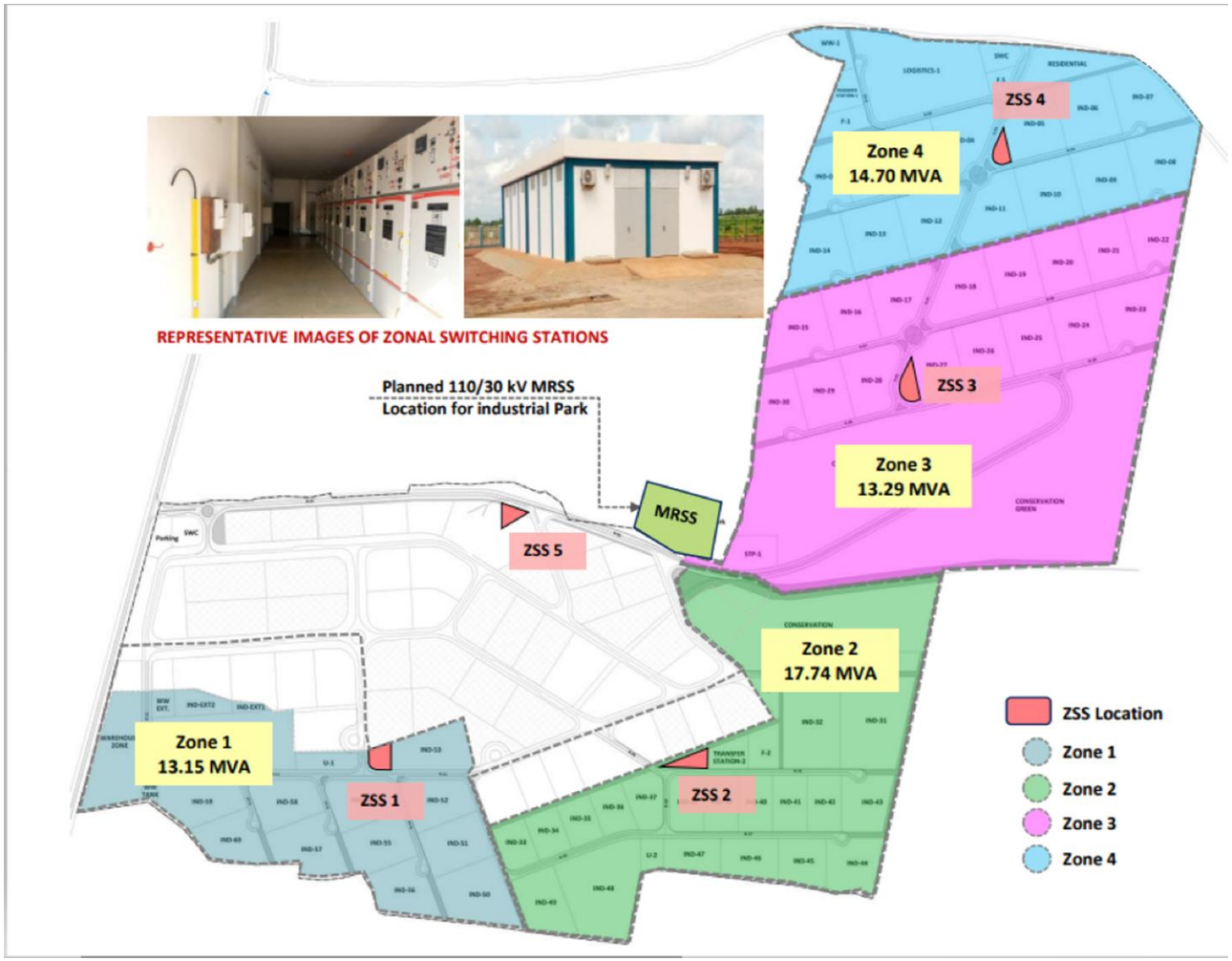


FIGURE 4-21 POWER DISTRIBUTION SYSTEM

Source: ARISE Master Plan 2022

4.4.2.5.3 Energy Efficiency

Depending in industrial power demand, number of outgoing feeders to be designed for each Zonal Switching Stations (ZSS). The sub distribution system of 30 kV is planned on AAAC Conductor with Single/Double circuits as required. All poles (main runner lines, tangent line poles etc.) are designed on 12/13 m high polygonal galvanized / concrete / wood poles (400, 650, 800 & 1200dAN) to maintain safe vertical clearance of power lines.

In order to achieve energy efficiency, the following measures were considered:

- Energy efficient fixtures to be proposed as a part of the electrical design components. This includes low power consuming lights, sensors etc.;
- Intelligent system of road lighting can be adopted;
- Incorporation of energy efficient measures will reduce the energy cost by approximately 10%.
- The Project aims to employ the design of energy efficient/sustainable green buildings (Figure 4-22, Figure 4-23).

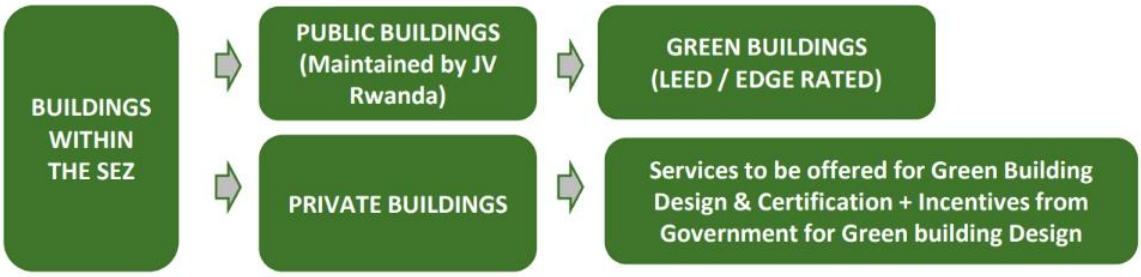


FIGURE 4-22 ENERGY EFFICIENT PRINCIPLES USED FOR BUILDINGS WITHIN SEZ

Source: ARISE Master Plan, 2022

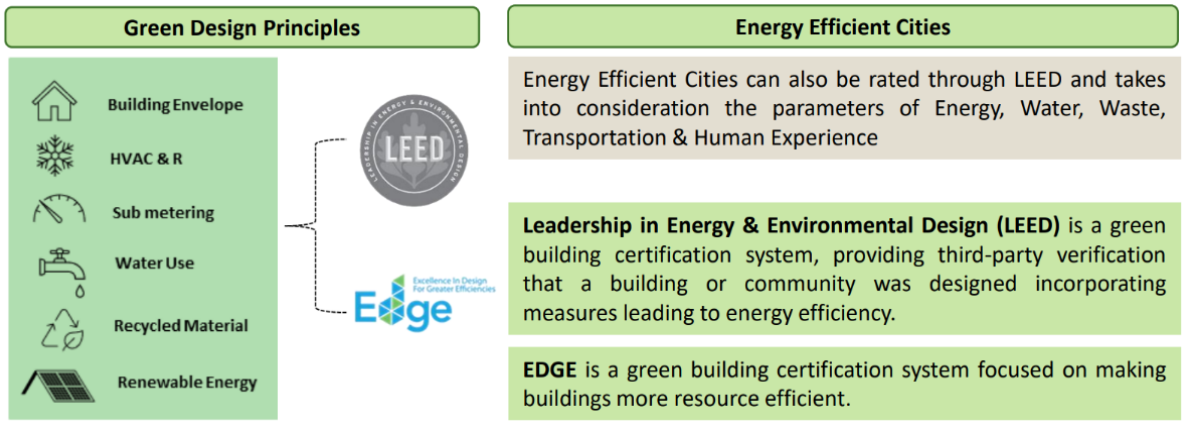


FIGURE 4-23 GREEN DESIGN PRINCIPLES OF THE PROJECT

Source: ARISE Master Plan, 2022

4.4.2.6 STREET LIGHTING

The street lighting will be organized along the roads of the Project (Table 4-19), the lighting facilities include:

- 10 m high lamp posts are to be placed along the roads at 30 m intervals along one side of the roads;
- Six road lighting feeder pillars and
- LT Cross-linked polyethylene (XLPE) Power Cable

These facilities are presented in Figure 4-24.

TABLE 4-19 STREET LIGHTING

	Light Loss Factor	LED Light	Avg. Lux	Uo	**Bracket**
ROW (Right of way) width All roads have a width of 7m (3.5+3.5)					
25 m	0.8	1x170 Watt	34	0.69	Single Bracket
20 m			35	0.74	

Source: ARISE Master Plan, 2022.

The Project aims to use high efficiency lighting fixtures with high lumen output. and low power consumption. For energy saving timers or Astronomical switches in feeder pillars will be provided. Power supply to Road lighting pole be fed through underground 1.1 kV, 4-core, armoured Copper conductor underground cables.

FIGURE 4-24 ROAD LIGHTING NETWORK

Source: ARISE Master Plan, 2022

4.4.2.7 WASTE

The Project Master Plan (December 2022) indicates the vision for the Bugesera SEZ is to promote a zero-waste area. The project is expected to follow a solid waste management strategy as per the following figure.

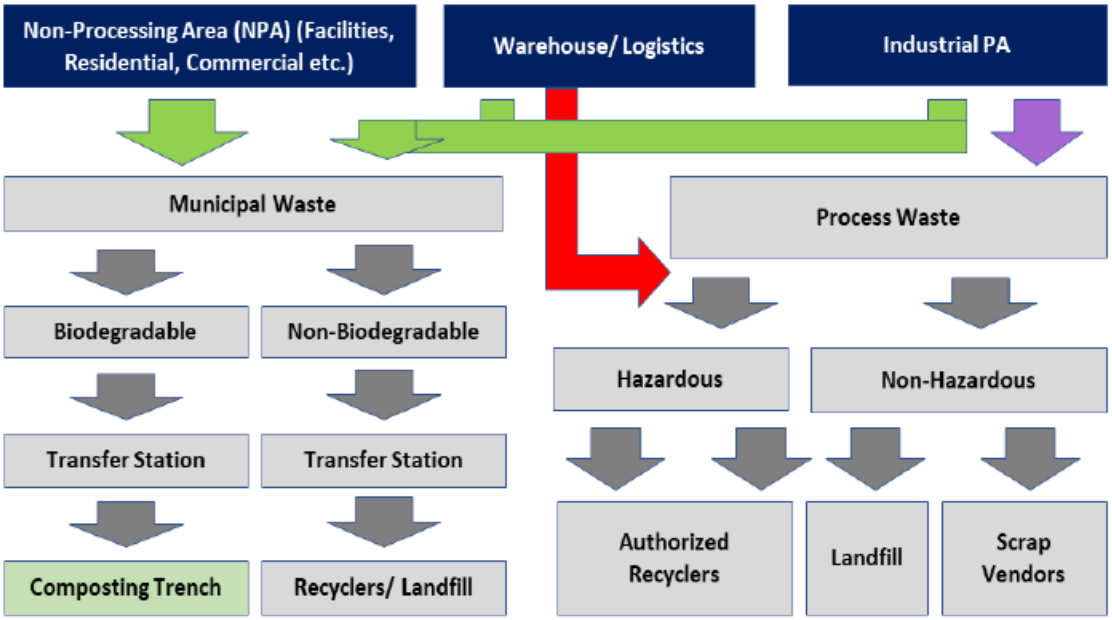


FIGURE 4-25 SOLID WASTE MANAGEMENT HANDLING FLOW DIAGRAM

Source: ARISE, Master Plan (2022).

The solid waste will be classified as:

- **Industrial hazardous waste** – to be handled by individual industries and disposed as per Rwanda environmental laws;
- **Industrial non-hazardous waste** – which can be treated by each industries or to be part of the municipal solid waste;
- **Municipal solid waste** – collected periodically, and to be stored in transfer stations, and to be disposed as per characteristics;
- **E-waste** – this is expected to be recycled; and
- **Construction and demolition waste** – to be recycled or sent to landfill.

In the SEZ, the generated waste will be transported from the collection points to the two transfer stations (planned for Phase 1A and Phase 2) as per Figure 4-26.

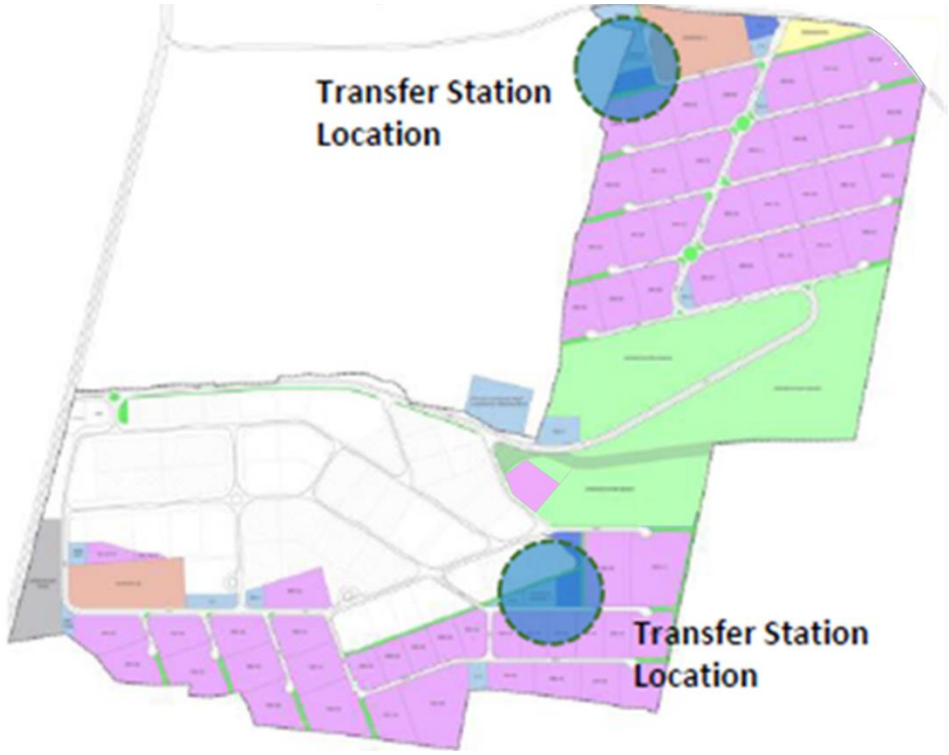


FIGURE 4-26 LOCATION OF TRANSFER STATIONS WITHIN PHASES 1A AND 2

Source: ARISE, Master Plan (2022).

The Municipal Solid Waste (MSW) will be separated into three categories:

- Biodegradable waste (30% of total waste, 2.12 ton/day) will be placed in compost pits;
- Recyclable waste (60% of total waste, 4.24 ton/day) will be sent to recyclers ;
- Inert waste (10% of total waste, 0.71 ton/day) will be transported to the landfill.

The waste collection in the Bugesera SEZ will be contracted by a certified waste collection company, which will be responsible to sort, recycle and send to landfills as needed, and issuing the related certificates. The table below presents and estimate of waste to be generated by zones in the Bugesera SEZ (Table 4-20):

TABLE 4-20 MSW GENERATION

Land Use	Estimated Waste Generation, kg/day
Industrial	4,605
Logistics	88
Residential	234
Facilities/Utilities	25
Green	2,120
Total	**7,072**

Source: ARISE Master Plan 2022.

4.4.3 ASSOCIATED FACILITIES

As defined by IFC Performance Standard 1 (PS1), the associated components/ facilities are the (often third-party) facilities which are not funded as part of the Project and that would not have been constructed or expanded if the Project did not exist and without which the Project would not be viable.

The main associated facilities identified for the Bugesera SEZ are the following:

- Power supply facilities:
    - 110/30 kV Main Receiving Sub-Station (MRSS) will be constructed by Rwanda Energy Group (REG), from which the electricity will be distributed to Zonal Switching Stations (ZSS) of the phases by underground and overhead cables;
    - 110 kV Incoming transmission line from the national grid to MRSS; and
    - Bulk Power Transmission to Industrial Zone
- Water supply:
    - Water treatment plant located 11 km away from the SEZ, connected to the project area by an existing pipeline, that will supply water to the whole SEZ.

4.4.4 BUGESERA SEZ RESPONSIBILITIES

Within the Bugesera SEZ part of the Project's main infrastructure and associated facilities will be constructed by the GoR and state-owned companies, BSEZ Ltd., GoR and REG. The responsibilities for construction, operation and maintenance of the Project's infrastructure are presented in the table below (Table 4-21).

REG will be responsible for un-interrupted robust power supply from the national grid including construction of main receiving substation (MRSS), incoming transmission line and bulk power transmission to the industrial zone. BSEZ Ltd. will be responsible for further development of the power distribution network and supply to the end users including construction of 30kV HT infrastructure, 30kV Zonal Substations, overhead power distribution network and sale of electricity to consumers inside industrial zones.

TABLE 4-21 BUGESERA SEZ RESPONSIBILITIES

Project Facilities and Activities	Construction	Operation	Maintenance
Industrial facilities	Tenants	Tenants	Tenants
Administrative offices	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Warehouse facilities	BSEZ Ltd.	BSEZ ltd.	BSEZ ltd
Logistics Zone	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Residential facilities	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.

Project Facilities and Activities	Construction	Operation	Maintenance
Common Effluent Treatment Plant (CETP)	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
LV Plants and sale of electricity inside industrial zone	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
30 kV Zonal Substations	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
30 kV MV Main Network	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Road network	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Hazardous Products Storage Area	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Green Areas	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Truck Terminal as part of logistic park	BSEZ Ltd. (as per GoR's directives)	BSEZ ltd	BSEZ ltd
Fire Station	GoR	GoR	GoR
Medical Centre	GoR	GoR	GoR
Police station	BSEZ Ltd.	GoR	GoR
Canteen	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Vocational training institute	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Bus stops	BSEZ Ltd.	BSEZ ltd	BSEZ ltd
Food kiosks	BSEZ ltd	Tenants	Tenants
Street Lighting	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Site peripheral Infrastructure	BSEZ Ltd.	BSEZ Ltd.	BSEZ Ltd.
Security booth	BSEZ Ltd.	BSEZ ltd	BSEZ ltd
Security and additional infrastructure	BSEZ Ltd.	BSEZ ltd	BSEZ ltd

Project Facilities and Activities	Construction	Operation	Maintenance
(CCTV surveillance, welcome gate in Phase 1 and weigh bridges)			
Public Toilets	BSEZ Ltd.	BSEZ ltd	BSEZ ltd
Solid waste transfer station	BSEZ Ltd.	BSEZ ltd	BSEZ ltd
Associated Objects			
Main Receiving Sub-Station	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)
Incoming Transmission Feeders	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)
Centralised Power Generation Plant	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)	Rwanda Energy Group (REG) and Energy Development Limited (EDCL)

Source: BSEZ Ltd/ ARISE, October 2023

4.5 LAND OWNERSHIP & COMPENSATIONS

Land for the Bugesera Special Economic Zone has been initially designated by the Government of Rwanda and the Ministry of Trade and Industry (MINICOM), who is the custodian of the land earmarked for zone development. This responsibility went with the workload of preparing projects documents for zones development until private investors are selected to partner with the Government to develop and operate the zones. For that, the GoR was in charge of expropriation of land in earmarked zone, the keeping of land titles for earmarked zone, for the feasibility studies for zone development and the participation to the negotiation process to select strategic investors for the zone development.

It must be noted that the original Bugesera SEZ required the resettlement of a number of households from SEZ site approximately 10 years ago. Prior to land expropriation, the

area of Bugesera SEZ was owned by MINICOM. At the time of carrying out the site visit, it was observed that the land was used by local farmers for crop production.

The GoR via RDB allotted to BSEZ Ltd (joint venture between ARISE IIP and the Government of Rwanda) an area of 266.37 ha and currently the land ownership statute comprises a 49 year lease starting from 22/06/2023. The BSEZ Ltd. Is currently in the process of obtaining the land title for the remaining 51.11 ha of the full Bugesera SEZ, as considered the Masterplan, and no development will take place in this land in absence of land transfer. This is part of agreements made between ARISE IIP and the GoR. For the purpose of development of this EIA and related impact assessment, the full area has been considered.

It should also be noted that from the total 335.68 ha, a total of seven plots with 18,2 ha is held by private investors within BSEZ area as per Table 4-22.

TABLE 4-22 PRIVATE INVESTORS PLOTS WITHIN THE BUGESERA SEZ

S no	UPI Number	Company Name	Area (Ha)
1	3413	Power X	1,8331
2	3412	Sunrise Overseas Ltd	1,0625
3	3434		1,5124
4	5158		2,5541
5	3427	MAHWI Grain Milers Ltd	1,584
6	3396		1,6621
7	4384	Rwanda Fertilizer Company (OCP)	8,0071
Total for 7 plots			**18,2153**

The remaining area will not be developed without the requisite land registration or land rights documents.

The resettlement process was carried out in 2011 by the Government of Rwanda through MINICOM as part of the Bugesera SEZ Phase 1 development. The information pertaining to this process is confidential, as it contains sensitive information. For the next phase of development (this Project), it is understood that there has been an agreement reached between ARISE and the GoR that Arise will monitor grievances lodged by the local communities and resettled households through the formal external grievance mechanism detailed in the SEP (Appendix D).

Should any grievances be raised regarding the historical resettlement process during this next phase, ARISE will not be responsible for resolution, but ensure that the GoR handles and closes out the grievances in a manner that is aligned with local legislation and international standards. Schedule for the implementation of Project and Activities Sequencing

4.5.1 PROJECT SCHEDULE

Figure 4-27 presents the project schedule. Construction activities for Phase 1& Phase 1A are expected to last until August 2024. The development of Phase 2 start after Phase 1A finalization.

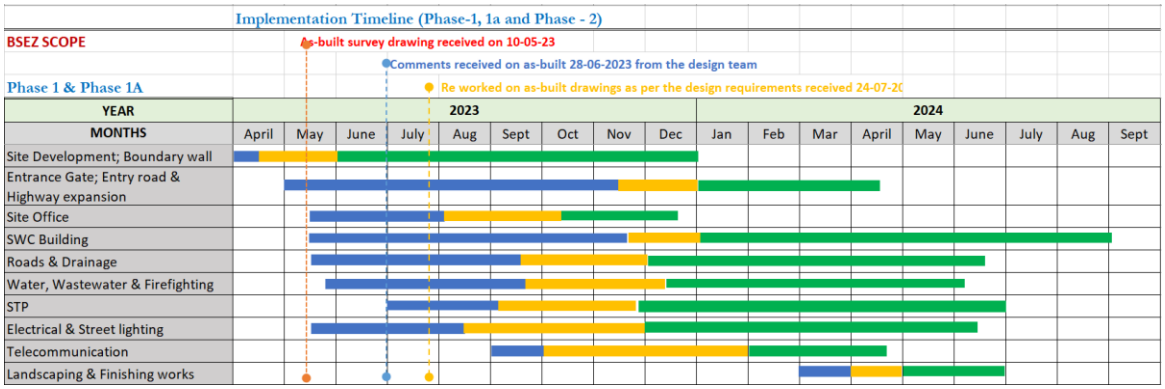


FIGURE 4-27 PROJECT SCHEDULE

Source: ARISE, November 2023

4.5.2 CONSTRUCTION ACTIVITIES AND SEQUENCING

ARISE's role is to conceptualise the Project, build the basic infrastructure, provide management, carry out maintenance and promote the zone to investors. The construction of the Phase 1A and Phase 2 areas of the Project are scheduled to start after obtention of EIA certificate from RDB, and last for 24-30 months. Basic pre-construction work of phase 1A is planned in early 2024.

Construction works to establish essential infrastructure will include following construction activities

- Site installation, Land Clearing & Disposal
- Grading Works
- Road Network
- Natural Streams
- Storm Water Drains & Culverts
- Water Supply System
- Firefighting System
- Wastewater System
- Electrical System
- Telecommunication System
- Landscaping
- Administration Buildings
- Establishment, Manpower & Administration
- Consultancy, Studies, Investigations
- Security Systems
- Landscape and Finishing works.

4.5.2.1 CONSTRUCTION EMPLOYMENT

During construction phase no workers camp is planned as workforce is expected to come from the SEZ vicinity. The workforce is expected to be sourced from the neighbouring sectors, mainly from the Gashora sector and Rweru sector, and if needed, from the greater Bugesera District. BSEZ Ltd. is collaborating with the administration of Gashora sector to develop a list of unemployed people in the area, which will be distributed to contractors and industries to be implemented in the SEZ.. At peak of construction works it's expected to have 800 workers employed at the site.

Regarding activities safety, an agency is hired to ensure security during construction and operations. They are briefed on and signatory of the BSEZ Ltd.'s HSE requirements for contractors, which include clauses on adequate treatment of people. The security company is also affiliated to the ISPSP (Infrastructure Security and Private Security Provider), receiving regular briefs and training on proper conduct and professionalism.

ARISE is also putting up grievance boxes to collect grievances from all parties impacted by the project.

4.5.2.2 TECHNOLOGY AND EQUIPMENT TO BE MOBILISED

During construction of the Project various contractors will be involved and several equipment is expected to be on site, especially focused for the following activities:

- Earth clearance and movement;
- Levelling;
- Concrete and asphalt works; and
- Utility placement etc.

Quantity of excavation material and backfill material are not currently available.
The following technology and equipment is planned to be mobilised during construction:

TABLE 4-23 EQUIPMENT AND TECHNOLOGY PLANNED FOR THE CONSTRUCTION PHASE

No.	Equipment
1	Baby roller
2	Backhoe loader- JCB
3	Bitumen plant
4	Bitumen sprayer
5	Cement stabilization-Rotostab
6	Circular saw
7	Compactor
8	Compressor
9	Concrete cutting machine
10	Concrete miller mixer
11	Concrete Millers-RMC

No.	Equipment
12	Crane
13	DG set
14	Diesel tanker
15	Dozer
16	Drilling machine
17	Excavators
18	Generator
19	Grader
20	HDPE butt welding machine
21	Iron Cutter
22	Ladders
23	Light source
24	Loader
25	Needle Vibrator
26	Pavers
27	PTR-Tyre mounted roller
28	RMC-Plant
29	Scaffolding
30	Tandom roller
31	Thermoplastic paint machine
32	Tippers
33	Tractor
34	Truck mounted crane
35	Water tankers

Source: ARISE, July 2023.

The BSEZ Ltd will be building main infrastructures of Phase 1A and Phase 2, and also the site offices, warehouses, the CETP and a canteen.

4.5.2.3 TEMPORARY CONSTRUCTION FACILITIES

Temporary construction facilities are the facilities that are funded as part of the Project and will be removed and reinstated to its original condition upon completion of the construction activities. Temporary construction facilities are listed in Table 4-24.

TABLE 4-24 PROJECT TEMPORARY CONSTRUCTION FACILITIES

Facility	Details	Provider
Temporary laydown Areas for Construction	Storage areas for the materials used for construction.	Contractor is responsible for storing their materials in the space provided by BSEZ Ltd.

Fuel Tanks	Fuel is expected to be used during the construction phase. Should fuel tanks be needed to supply equipment and generators, these will be contracted externally.	Contractor is responsible for its fuel supply
Dumpsites/ Landfills	Temporary dumpsites for construction work located close to the construction site and compliant with the country's laws. Waste is collected by contracted licensed company, which will be responsible for collection and disposal. Final disposal and landfill location was not known at time this ESIA was developed.	Licensed Contractor
Administrative Area	Office area for technical and administrative teams.	BSEZ Ltd
Water Storage Tanks	Temporary water storage for construction purposes. Water supply is expected to be provided from the WASAC water line.	BSEZ Ltd and contractor

4.5.2.3.1 Construction Worker Accommodations and Laydown Areas

BSEZ Ltd plans to establish a central office on site with all permanent facilities and will provide the required space for each contractor to set up temporary/rest areas, sanitary facilities and drinking water required for workers and subcontractors.

No purpose-built worker camp or accommodation will be planned during the construction phase.

4.5.2.3.2 Access Roads

The Project site is accessible through the NR5 along the west limit of the Bugesera SEZ and the current project plans to enlarge the existing roundabout to benefit the circulation of traffic and will construct new roads that will distribute traffic within the SEZ. Phase 1 roads are already constructed and paved and will connect to the proposed Phase 1A and Phase 2 road network.

4.5.2.3.3 Fuel Tanks

Any fuel tanks considered needed during the construction phase will be provided by third parties. All necessary training and technical assistance are going to be agreed between BSEZ Ltd and the authorised third parties involved (contractors) in the fuel supply for machinery operations.

4.5.2.3.4 Dumpsites, Administrative & Common Area, Warehouse

Temporary dumpsites for construction works will be located close to the construction sites, which will be compliant with the country's laws and operated by BSEZ Ltd. Waste is collected by a licensed company contracted by the BSEZ Ltd, which will be responsible for transport and disposal at proper landfill. Additionally, each construction related contractor for each plot will be responsible for their own waste production, collection and disposal during construction, who will then contract their accredited waste collection company.

BSEZ Ltd will also operate the administrative as well as common area and warehouses on the Project sites during the construction phase of the Project.

Water Storage Tanks

Water storage tanks during the construction phase will be provided by third parties and to be arranged by the respective contractors, and water supply will be provided from the public network (WASAC).

4.5.2.4 ASSOCIATED FACILITIES

4.5.2.4.1 Drainage Network

BSEZ Ltd. is providing the drainage network for rainfall and stormwater runoff for Phase 1A and Phase 2 of the Bugesera SEZ, considering Phase 1 network is already constructed. Information on the drainage network and its characteristics can be found in Section 4.4.2.4.

The proposed drainage network considers the grading site to convey runoff to the central green valley and central green valley to channelize the rainwater into the existing storm water drain.

The Project area is divided into a single drainage catchment, which has considered rainfall runoff of 2.2 million cubic meters. Design rainfall considered a 5-year frequency rainfall – 60 mm/hour. (see Section 4.4.2.4 for more details)

The drainage network will include two types of constructions: storm water drains and culverts. The existing stormwater drainage network of Phase 1 will be connected with the network of Phase 1A and Phase 2. The whole area can be divided into ten catchment areas. Each of these areas will have a collecting point (outfall). The water will be collected through the drainage network and discharged into the natural drains/streams.

4.5.2.4.2 Wastewater Network

A sewage network which will also be built by BSEZ Ltd. For its technical specifications please refer to Section 4.4.2.3.

4.5.2.4.3 Water Supply Network

Piped water is currently supplying the SEZ from the Kanyonyomba treatment plant located 11 km away from the SEZ. To transport the water from the plant a 250 mm existing pipeline goes along the highway NR5. Then, distribution is made through pipeline extension lines to ground level storage reservoirs (GLSRs). GLSRs will be made of zincalume steel with a self-supporting dome roof. They will be lined by Reinforced PVC, anti-algae, UV stabilized material. The lifetime of these facilities is 30-35 years. The water works area (water reservoirs) will be placed at the locations with highest elevation to use the gravity for water supply. The water supply lines are expected to have as minimum 200 mm.

The construction phase will also consider this source of water and water access for planned activities and workers supply will be ensured by contractors, who will take care of workers water supply. The water is expected to be supplied from public network, with potential use of temporary water tanks for distribution (to be provided by specific contractor) and contractors are expected to comply with BSEZ Ltd management plans/ procedures established for the project (refer to ESMP section 10.5.3).

4.5.2.4.4 Power Generation and Distribution

During the construction phase, power will be generated by connection to the existing Phase 1 grid connection and in case fuel generators is needed, the contractors will be responsible for equipment and fuel supply.

Contractors during construction are expected to comply with the BSEZ Ltd management system and management plans in place for the Project (refer to ESMP section 10.5.3).

4.5.3 OPERATION AND MAINTENANCE ACTIVITIES

According to the Master Plan public buildings will be maintained by BSEZ ltd., and REG and EDCL will be responsible for the maintenance of incoming transmission feeders, MRSS and centralized power generation plant.

BSEZ Ltd. will be responsible for the operation and maintenance of the basic infrastructure serving the tenants, e.g., water supply, sewerage/water treatment plant, gas supply, electrical power, road maintenance, landscaping, and general security.

4.5.3.1 EMPLOYMENT

Direct employment includes those employed directly by Bugesera SEZ (all the three phases). At the highest level there will be approximately 7,500 employed, 80% of those are assumed to be locals.

Indirect employment includes the employees employed due to indirect job creation (local suppliers). The estimated amount of indirect jobs is 2,500, according to the Business Plan Report (March, 2023).

4.5.3.2 SECURITY ARRANGEMENTS

During operations, BSEZ Ltd. will manage the overall site security. Each operator within the Project Bugesera SEZ will then be in charge of specific security arrangement for their plots.

4.5.3.3 ASSOCIATED FACILITIES

BSEZ Ltd will be responsible for maintaining and operating the networks of water supply, electricity, stormwater drainage and sewage serving the tenants within the Project area.

The facilities and utilities outside the Project area are the main receiving substation, transmission line from national grid connection and bulk power transmission to the SEZ will be managed and operated by REG.

The Kanyonyomba water treatment plant that ensures water supply to the BSEZ is managed and operated by the Rwanda Government (WASAC).

4.5.4 CLOSURE OR REHABILITATION PHASE

At this stage of the Project development there are no plans yet regarding closure or rehabilitation of the Project components. It can be assumed that periodic upgrade/rehabilitation will be undertaken in line with wear-and-tear of the components. This will be done in line with the applicable Rwanda technical standards and E&S regulations.

At some distant time in future the whole Project site (or parts thereof) will be closed and dismantled-decommissioned. This will be performed in accordance with E&S laws that are then in force, including foreseeable maximum recycling-reuse of materials.

4.6 EMBEDDED CONTROLS

Embedded controls include procedures or technical/design aspects that will be employed to avoid or minimise potential environmental or social impacts of the Project, these controls are considered an integral part of the Project design. The impact assessments on individual topics in this EIA assume that these controls are already implemented and that any supplemental mitigation measures would therefore be 'above and beyond' any existing/planned embedded controls to address specific risks that are not sufficiently mitigated by these controls. Embedded controls that have already been applied or will be integrated into the next phase of the Project's design are as follows:

- Rwanda Environmental and Social Laws/Regulations;
- IFC General EHS Guidelines; and
- BSEZ Ltd./ ARISE Technical Standards and Applicable Design Criteria.

International Best Practices Example: the improper storage of fuels and hazardous liquids or wastes in the field poses a risk of spillage and consequential contamination of local soils, vegetation and potential surface or groundwater. However, the proper storage, handling and labelling of such materials (including containment/bunding, spill-response, etc.) is addressed in the Bugesera SEZ Environmental and Social Management System currently being updated, Rwanda regulations, IFC Guidelines and is standard practice of ARISE (BSEZ Ltd.). Therefore, these embedded controls are deemed sufficient to address the normal risks of such material storage, including the practice of routine inspection/monitoring of these storage locations under a construction management system that will be applied. As such, no supplemental mitigation measure is warranted in the EIA to adequately manage these risks. An exception to this might be in case there are some particularly vulnerable/sensitive receptors in any of the Project site, and it may then be justified to implement some further restrictions/protective measures as an enhanced mitigation measure.

In summary, several E&S risks of related to Project construction and operation will be sufficiently managed by the numerous embedded measures, and only the more significant or unique risks will require supplemental mitigation measures. The Impact Assessment for each individual topic therefore focuses mainly on the case-specific measures, as it assumed that BSEZ Ltd. has already adopted and/or has committed to applying the embedded measures in the Project's design and implementation.

4.7 BEST PRACTICE APPLICABLE TO THE PROJECT

This section defines the general mitigation measures applicable for the design, construction, and operation phases of the industrial zones. It includes international best practices and requirements of IFC EHS Guidelines for each topic. The measures have been tailored to the Project's scope and are presented in Table 4-25. These will be considered during the pre-construction phase, to be implemented as much as feasible.

TABLE 4-25 INTERNATIONAL BEST PRACTICES

Subject	International Best Practices
Solid Waste	Potential impact on soil, groundwater, and surface water, in the context of protection, conservation and long-term sustainability of water and land resources, should be assessed when land is used as part of any waste or wastewater treatment system.
Hazardous Chemicals	Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures.
	Develop and implement a plan for responding to accidental releases.
Noise	Ensuring noise surveys are conducted to quantify the noise in the workplace and set boundaries for limits using noise zones. Ensuring workers needs are considered during the planning and organising of work. Ensuring adequate controls are in place to eliminate or reduce workers exposure.
Socio-Economic	Stakeholder Engagement Strategy / Plan – (aligned with Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets) outlining the legal requirements, principles for participatory engagement, identification and analysis of external stakeholders, approach and record keeping of all external stakeholder engagement, monitoring and evaluation criteria/indicators.
	Grievance Redress Mechanism – including a robust procedure and sufficient resources to ensure grievance are managed effectively throughout the lifecycle of the project.
	Labour / Workers Policy – including worker rights and grievance mechanism to be applied across the Bugesera SEZ
	Human Rights Policy – including overview of potential Human Rights risks and management processes put in place and committed to by the Bugesera SEZ
	Community Health and Safety Plan – including emergency preparedness and management for local communities
Cultural Heritage	Implementation of procedures and adherence to roles and responsibilities outlined in the Cultural Heritage Management Plan or other Environmental Management Plans that set out the pre-construction, construction and operation phase requirements for the protection of cultural heritage;
	Implementation of a Chance Find Procedure to address construction phase heritage impacts in accordance with international standards;
	Implementation of the Grave Relocation Plan (In the event of human remains being encountered during pre-construction or construction phase works);

Subject	International Best Practices
	Implementation of the Community Grievance Mechanism;
	Critical heritage should not be removed unless in exceptional circumstances where impacts are unavoidable. In such cases external experts should be retained to assist in its protection and assessment;
	Public involvement, access and sharing of information (with due consideration of the need for keeping certain site-specific information confidential, as per international common practice).
Accidents and Injuries	Implement a confined spaces entry program that is consistent with applicable national requirements and internationally accepted standards. Valves to process tanks should be locked to prevent accidental flooding during maintenance;
	Use fall protection equipment when working at heights;
	Maintain work areas to minimise slipping and tripping hazards;
	Implement fire and explosion prevention measures in accordance with internationally accepted standards;
	When installing mains adjacent to roadways, implement procedures and traffic controls, such as: Establishment of work zones so as to separate workers from traffic and from equipment as much as possible; Reduction of allowed vehicle speeds in work zones; Use of high-visibility safety apparel for workers in the vicinity of traffic; and
	Locate all underground utilities before digging.
Community Health	Restrict access to waste management facilities by implementing security procedures, such as: • Perimeter fencing of adequate height and suitable material, with lockable site access gate. • Security cameras at key access points, and security alarms fitted to buildings and storage areas. • Use of a site visitor register. • Light the site where necessary. As this may cause light nuisance to neighbours, the lighting installations should be selected to minimise ambient light pollution.
Safeguards Assessment	• Evaluating the social and environmental considerations for the proposed SEZ with respect to relevant national requirements and international commitments, providing a proposed impact mitigation and management strategy, and influencing the demand and investment costs for the park as well as its competitiveness[13].
Surface drainage[13]	• Drainage on all roadways. • Gravity-based rainwater harvesting.

[13] UNIDO, 2020. International Guidelines for Industrial Parks

Subject	International Best Practices
	• Rainwater storage tanks.
Water supply[13]	• Sufficient drinking and non-potable water, with separate distribution networks. • Wells, boreholes and reservoirs. • Water pumping station. • Water treatment plant. • Smart water metering.
Sewerage[13]	• Sewage and effluent collection and storage systems (separate for industrial and household needs). • Systems for removal of contaminants from wastewater, storm run-off, and domestic sewage, through primary treatment of effluents. • Physical, chemical and biological treatment processes. • Treated and recycled water system. • Smart sewage metering.
Safety and security[13]	• 24x7 public safety infrastructure, including lighting and CCTV surveillance systems. • The security contractor shall undergo a due diligence process and an induction prior to working on site. They shall primarily be responsible for controlling site access and perimeter security. • Emergency response centre/s (including for accidents and first aid, fire and chemical hazards, security incidents, natural disasters and crises, etc.). • Health care centre, medical facilities. • License plate monitoring and speed control.

5 CONSIDERATION OF ALTERNATIVES

5.1 PROJECT ALTERNATIVES

This section provides a summary of Project alternatives, based on the information available at the time of writing this report.

5.2 ALTERNATIVE LOCATION

The entire Bugesera SEZ is specifically zoned and intended for industrial/ logistic development and the BSEZ Ltd has an approved Master Plan for the development of the SEZ area.

No alternatives were considered for the Project location, since the development is in response to the zoning of the site for industrial use by the Government of Rwanda, as part of the country's National Development Plan. The Bugesera SEZ has been zoned industrial and the Government of Rwanda has allocated individual plots within the broader zoned area and contiguous to the Phase 1 area for future use (Phase 1A and Phase 2). Note that Phase 1 is already licensed and under construction, and main infrastructures will be common to Phase 1A and Phase 2.

The location of the Bugesera SEZ development is therefore governed by compatible zoning laws and regulations of Rwanda concerning where such development can be located. These decisions are outside of BSEZ Ltd's level of control or management. BSEZ Ltd (Joint Venture between ARISE IIP and GoR) has been allocated with the selected development by the GoR (via RDB), with no alternative locations provided. BSEZ Ltd. will be responsible for the full SEZ management/operation, including Phases 1, 1A and 2 and for licensing, construction and development of planned Phases 1A and 2.

5.3 ALTERNATIVE DEVELOPMENT TYPE

No alternative development types have been considered, as the site is zoned for industrial use by the Government of Rwanda (See Section 4.1.2). Only compatible uses and activity types were considered in alignment with this land use zoning type (this essentially constitute a mixed use consisting of industrial, logistics, commercial, utilities and facilities and residential components with retention of some open/green areas (planned to act as corridors between zoning areas or as conservation / drain buffers – see Section 4.4.1).

5.4 ALTERNATIVE LAYOUTS CONSIDERED FOR THE PROJECT

5.4.1.1 LAYOUT PLANNING TO AVOID ENVIRONMENTAL IMPACTS AND KEY ISSUES ON BIODIVERSITY

The majority of the land cover within Phase 1A and 2 of the BSEZ is currently fallow and cultivated land. Therefore, these areas have been considered of low ecological importance as they are highly unlikely to provide suitable habitats for the continued presence or breeding areas within the AoI for key biodiversity, such as important habitats and species of fauna and flora of conservation importance (e.g., threatened

species). The baseline biodiversity assessment as part of this EIA suggests that these habitats are largely incompatible and unsuitable for key species of conservation importance screened.

The land use and habitats identified suggest that a timber plantation has been removed from the area (especially at Phase 2) since 2020 and replaced by fallow & cultivated land (see Section 6.3.6). At the time of the site visit carried out in September/ October 2023, the land within the SEZ was observed to be in use by local farmers for crop production. BSEZ Ltd confirmed there has been an agreement with locals to use the land while construction activities didn't start, and, subsequently to harvest their crops prior land clearing activities. As part of agreements with local Authorities, and for this purpose, a dedicated entry way is to be ensured to farmers safe access to site. According to the biological baseline no critical habitats could be confirmed within the AoI or prior 2020 clearings carried out within the SEZ expansion area.

The main habitats identified in the proposed areas are fallow and cultivated land, and a narrow strip of wetland at the central area of the BSEZ. According to the BSEZ Masterplan layout this central area is planned as Conservation Green and Green Corridor areas, which are designated to act as green lungs and service corridors and/or storm water paths. According to the BSEZ Masterplan and Zoning these areas will not consider construction and the central area of the BSEZ will consider forest plantation and to be maintained as green zone to prevent potential floods and/or erosion.

5.4.1.2 LAYOUT PLANNING TO AVOID SOCIAL-CULTURAL IMPACTS

There are several local communities in the wider area around the Bugesera SEZ, with clusters of human settlement identified. As mentioned, the entire Bugesera SEZ is designated as a Special Economic Zone and BSEZ Ltd. has developed a Master Plan for the Project – previously approved by the RDB and currently seeking to obtain the environmental licensing for Phase 1A and Phase 2. The planning discussion has been done in partnership with RDB in a way that minimises social and cultural repercussions on the Bugesera SEZ.

The basis for this planning is that RDB has assured BSEZ Ltd the SEZ area and that the expropriation of any formal or informal land users within the Bugesera SEZ has been previously conducted by GoR/MINICOM (responsible for the land earmarked for zone development until the developer was selected). Expropriation and resettlement took place approximately 10 years ago by GoR/MINICOM, having the BSEZ Ltd been allotted by the GoR (via RDB) of the BSEZ area through an MoU in September 2022, with the lease starting at June 2023.

The resettlement process was led by MINICOM and the process involved the resettlement of 76 households who have since been compensate and relocated. It should be noted that that BSEZ Ltd has not been involved in the resettlement process. Where appropriate land registration documents have not been obtained, BSEZ Ltd will not

commence construction activities and will work closely with RDB to ensure due process is followed.

5.5 ALTERNATIVE DESIGNS FOR THE PROJECT

5.5.1.1 BASIC INFRASTRUCTURE

The site design is relatively straightforward, comprising of the standard basic infrastructure required to accommodate industries units and companies at the site (such as warehouses, utilities, facilities, logistic and parking areas, internal road networks, drainage, and sewerage, etc.). The service and utilities infrastructure will be developed following standard designs and building procedures. No alternative infrastructure designs were considered, nor are these considered necessary.

5.5.1.2 WASTEWATER MANAGEMENT

The management of industrial and domestic wastewater from the industrial site and residential plots is a key environmental consideration, particularly from a water quality and water resources perspective (pollution/contamination risk).

The collected wastewater to be generated by the industries will flow directly to the central effluent treatment plant (CETP) located at Phase 2 that will concentrate the generated wastewater from Phase 1, 1A and 2, being the SEZ Ltd. responsible for its management. Should more polluting industries be installed in the SEZ area, these might be required to have a pre-treatment system within their facilities prior discharging their effluents into the CETP.

No alternative infrastructure designs were considered, nor are these considered necessary.

5.5.1.3 STORMWATER DRAINAGE AND PRECIPITATION RUNOFF

The Project will be connected to the existing Phase 1 drainage system where it is already developed and will include the considerations to those parts that are still under development for Phase 1A and Phase 2

Within the Project area, storm water systems will be designed following standard good practice international guidelines and procedures and will be also guided by the design assumptions followed in the other developments (i.e., enterprises) in the Bugesera SEZ. A holistic approach will be adopted while sizing the primary drainage network considering effects of both internal catchment and external catchment contributing to the Project area. The BSEZ area will be divided into catchment areas and each of those will have a collecting outfall that will take the water into the drainage network and to be discharged into natural drains. The proposed drainage network uses natural gradient and the proposed central green valley will channelize the rainwater into the existing storm water drain. No alternative infrastructure designs were considered.

5.5.1.4 WATER SUPPLY

The Bugesera SEZ project layout took into consideration the elevations and slopes, having the water works being defined for the areas with higher elevations for optimized planning (based on gravity flow).

The Bugesera SEZ will be supplied by public means (water treatment plant located 11km from the SEZ) and is connected to the SEZ through an existing pipeline, from which water will be stored into reservoirs that will ensure the SEZ water supply needs.

Regarding firefighting network, Phase 1 (under construction) has an independent network, water pipes, hydrants and pumps, different from the proposed for Phase 1A and Phase 2 (See Section 4.4.2.2 for further details).

These have been the options considered for the Project and no alternatives are available.

5.5.1.5 FUEL & ENERGY

The BSEZ will be connected to governmental electrical network owned by Rwanda Power Group (REG). A main receiving sub-station (MRSS) will be built by the government for the Project supply.

BSEZ Ltd. considered measures to reduce use of fossil fuels (potential diesel for generators and for construction equipment), and dependency on hydrocarbons as well as improve resource use efficiencies. During construction, activities are expected to use the electrical system in place for Phase 1, and should fuel tanks be needed to supply construction equipment, it will be contracted externally by contractors and provided by third parties.

BSEZ Ltd is planning to install solar panels on rooftops of warehouses and at the moment this ESIA was developed. BSEZ Ltd is also considering the possibility that part of the project demand could be covered by solar energy, however, no further details/estimates/ capacity of energy to be generated are currently still being studied.

Additionally, several measures have been incorporated into the design strategy for energy efficiency, such as including efficient fixtures as part of electrical design components, intelligent system for road lighting and efficient/sustainable solutions as part of building design (green buildings) such as LEED/EDGE rated for buildings maintained by BSEZ Ltd and services/ incentives for design and certification of private buildings (refer to Section 4.4.2.5 for further detail).

Furthermore, during the construction phase ARISE does not foresee the need for night work, which will lower energy requirements in terms of night lighting for the construction zone.

5.5.1.6 ROAD DESIGN

The BSEZ is connected to the existing NR5 highway (contiguous to the site) and to ensure good traffic flow around the Project area, the SEZ has already constructed an internal traffic distribution network (for Phase 1) that will ensure the subsequent connection to planned Phases 1A and 2. The connection is made from the highway

through a major road network inside the Phase 1 giving access to the individual plots and different areas through smaller distribution roads. The SEZ Masterplan also promotes walkability and safe public spaces (refer to Section 4.4.2.1 for further details)

The current masterplan considered for the proposed Phase 1A and Phase 2 plans the following activities:

- enlarging the main access roundabout from the NR5 highway located at Phase 1 – that will be the main access to the SEZ, providing appropriate diameter for traffic manoeuvres and movements from the external road into the SEZ and accommodating the traffic increase from the SEZ expansion;
- projected road network for Phase 1A and 2 (central arterial roads and smaller distribution roads); and
- parking areas.

These have been the options considered for the Project and no alternatives are available.

5.6 SUPPLY CHAIN

The level of control that BSEZ Ltd can exercise over its supply chain is considered limited, especially for suppliers further along the supply chain. Primary supply chain elements for the Project may include quarries providing gravel and/or other construction materials. Quarries are not yet selected and suppliers to the Project have not been identified at this stage (e.g., for construction materials and equipment).

Furthermore, BSEZ Ltd's sub-contractors will be also responsible for the supply chain of materials for the constructions once procured. Additionally, and considering that each plot owner will be responsible for developing each industry, these will also be responsible for plot construction related supply chain definition.

BSEZ Ltd. aims to choose from contractors that recruit from neighbouring communities or source materials locally (e.g. for the construction of the site office, BSEZ Ltd. choose a contractor that, when compared with other conventional contractors, provided nearly 70% of materials made locally).

5.7 NO-PROJECT DEVELOPMENT SCENARIO AND IMPLICATIONS

Under the No-Project scenario, the site would not be developed by the BSEZ Ltd and would probably be developed for other industrial use by another company as part of a joint venture with the GoR, having this area been designated part of the national strategy for country development and partially licensed and under construction (Phase 1).

Thus, the conservation of any existing habitats or species on the site is highly unlikely to be achievable in the future. Given that the habitats are mostly modified or disturbed and of low biodiversity importance, whether the site is developed or not is probably of relatively low consequence for biodiversity at the local or regional level, especially considering the current construction works and operations already ongoing at Phase 1

and the ones planned for the contiguous Phase 1A and Phase 2 now, currently seeking to be licensed.

Traffic and social impacts would also not be prevented by a No-Go option, as the zoning status of the site presumes that some form of industrial development will take place in accordance with the Government of Rwanda plans for the country development and land expropriation and resettlement already carried out nearly ten years ago, which was led by the GoR/MINICOM.

Given the above analysis, the No-Go/ no Project is not a favourable alternative and was considered further in this assessment.

6 BASELINE ENVIRONMENT

6.1 Introduction

Baseline information (environmental and social characteristics and conditions) has been collated, based upon desk-based information available at the time of the assessment and site visits undertaken by the Environmental Consultant.

6.2 PHYSICAL ENVIRONMENT

6.2.1 CLIMATE AND METEOROLOGY

Rwanda has a tropical climate characterized by its hilly landscape stretching from east to west. The country has four primary climatic regions: eastern plains, central plateau, highlands, and regions around Lake Kivu. The eastern plains receive an annual rainfall of between 700 mm and 1,100 mm, with mean annual temperature oscillating between 20°C and 22°C. The central plateau region enjoys rainfall of between 1,100 mm and 1,300 mm, with an annual mean temperature of between 18°C and 20°C. The highlands, including the Congo-Nile Ridge and volcanic chains of Birunga, benefit from an annual rainfall of between 1,300 mm and 1,600 mm and experience annual mean temperatures between 10°C and 18°C. Regions around Lake Kivu and Bugarama plains get annual rainfall of between 1,200 mm and 1,500 mm with annual mean temperatures between 18°C and 22°C.

6.2.1.1 TEMPERATURE

In Rwanda, the high degree of interannual and interdecadal climate variability and lack of historical records has made climate trends in the country difficult to determine[14]. Rwanda's average annual temperature ranges between 15°C to 17°C in high altitude areas and up to 30°C in lowlands in the east and southwest[15]. Regional temperatures for central-east Africa saw average increases of 0.29°C per decade from 1985 to 2015. Temperature increases have been experienced, from 1971 to 2016 showing an increase in the mean temperature between 1.4°C and 2. 6°C in the south-west and eastern regions of Rwanda[16]. Additionally increased interannual variability in the recent years have observed, for example average temperature from 2012 to 2014 increased by 0.79°C[17].

[14] GERICS (2015). Climate-Fact-Sheet, Burundi – Malawi – Rwanda – Tanzania
[15] Netherlands Commission for Environmental Sustainability (2015). Climate Change Profile – Rwanda: URL: https://ees.kuleuven.be/eng/klimos/toolkit/documents/687_CC_rwanda.pdf
[16] Republic of Rwanda (2020). Update Nationally Determined Goals. URL: https://unfccc.int/NDCREG
[17] https://climateknowledgeportal.worldbank.org/sites/default/files/2021-09/15970-WB_Rwanda%20Country%20Profile-WEB.pdf

0.1.1.1 PRECIPITATION

According to the world Bank (2021)[18], the mean annual precipitation for Rwanda is 1,177.6 mm. Rainfall is experienced throughout the year in Rwanda, with most significant rainfall occurring from September to May (Figure 6-1).

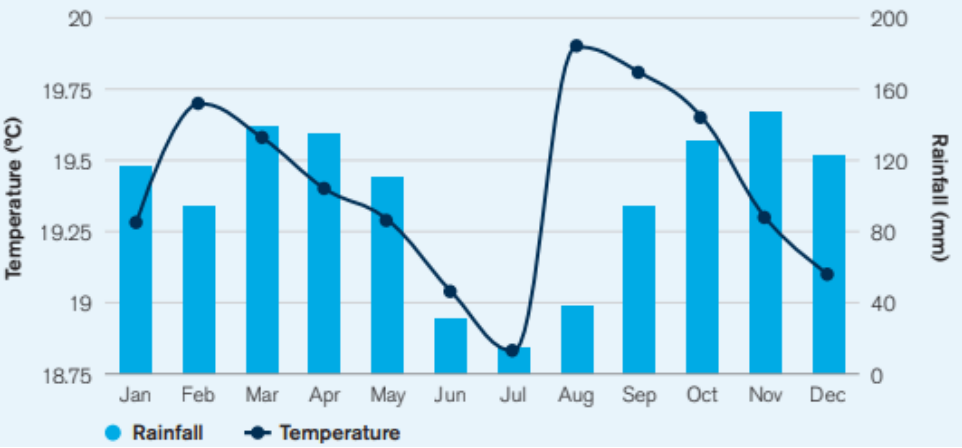


FIGURE 6-1: AVERAGE MONTHLY TEMPERATURE AND RAINFALL FOR RWANDA, 1991–2020

Source: World Bank Knowledge Portal[19]

According to the Rwanda's Ministry of Environment (2016) [20], rainfall trends have shown an increasing occurrence of extremes since the 1960's across various regions of the country. The annual rainfalls in Rwanda exhibited high fluctuations since 1961 to 2016. Additionally, the Netherlands Commission for Environmental Sustainability (2015)[21], indicates that the eastern region where BSEZ is located has experienced rainfall deficits which have alternated with rainfall excesses.

According to BSEZ masterplan (2022), the Project area has a typical tropical savanna climate with an average annual precipitation of 400-600mm, rarely exceeding a maximum of 800 mm per year. The dry season runs from June to September while the onset of wet season is October and runs through to May (Figure 6-2). Average precipitation of 417 mm/year was reported in the masterplan with April being the wettest month and July as the driest month.

[18] https://climateknowledgeportal.worldbank.org/sites/default/files/2021-09/15970-WB_Rwanda%20Country%20Profile-WEB.pdf

[20] Ministry of Environment (2018). Third National Communication under the United Nations Framework Convention on Climate Change. URL:https://unfccc.int/sites/default/files/resource/nc3_Republic_of_Rwanda.pdf

[21] Netherlands Commission for Environmental Sustainability (2015). Climate Change Profile – Rwanda. URL: https://ees.kuleuven.be/klimos/toolkit/documents/687_CC_rwanda.pdf

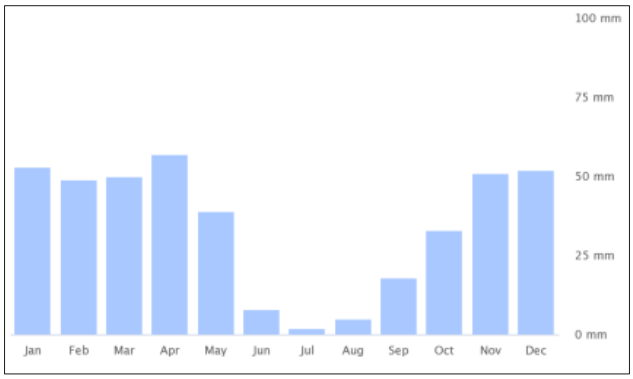


FIGURE 6-2: MONTHLY AVERAGE PRECIPITATION IN THE PROJECT AREA

0.1.1.2 TOPOGRAPHY

Bugesera District is located in the Eastern Province. The Eastern Province is considered as relatively flat within Rwanda and referred to as the Eastern Plains region with an altitude ranging between 1 000 and 1 500 metres above mean sea level (mamsl).

At the Project area, the topographical elevation range between 1341 and 1 460 mamsl. The topography generally dips to the southeast from the highest point to the north and northeast from the highest point in the west (Figure 6-3).

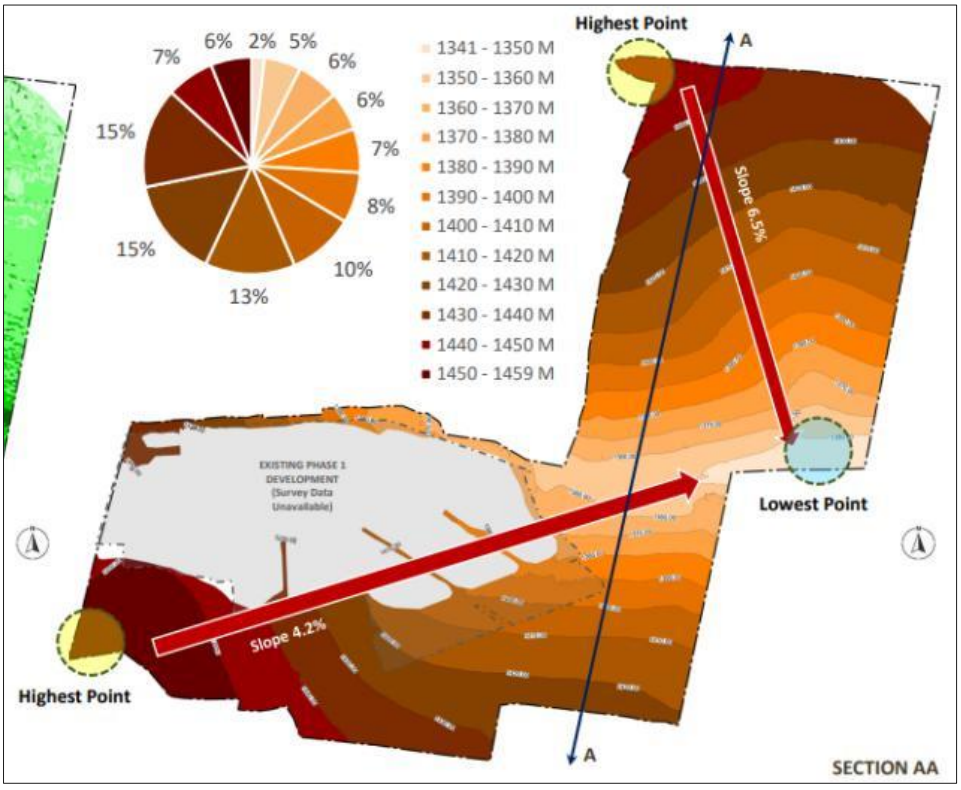


FIGURE 6-3: TOPOGRAPHY OF THE PROJECT AREA

Source: BSEZ Masterplan (2022)

It can be observed that the predominant slope is between 5-10 percent. The area with slopes less than 10 percent was considered for industrial development while those with slopes greater than 10 percent will be used for conservation/plantation.

6.2.1.2 CLIMATE CHANGE RISKS

A climate change risk assessment for the BSEZ Project was undertaken by BSEZ Ltd. Table 6-1 lists the climate hazards currently presented, which are outlined and ranked according to risk thresholds from very low to high. Climate Change Risk Assessment report is presented in Appendix H of this ESIA report.

TABLE 6-1: RELEVANT CLIMATE HAZARDS IN THE BUGESERA SEZ

Hazard	Hazard Level Valuation[22]
River flood	**High**
Wildfire	**High**
Extreme heat	**Medium**
Urban flood	**Low**
Landslides	**Low**
Water scarcity	**Very low**

Source: ARISE, CCRA (Nov 2023)

This section presents a summary of the key risks identified:

6.2.1.2.1 Flooding

ThinkHazard classifies floods into three categories: river floods, urban floods, and coastal floods. The BSEZ is located about 7 km from Lake Cyohoha and about 160km from the ocean. Hence the baseline physical risk of coastal flooding according to Think Hazard - can be assessed as negligible and this risk is therefore not featured in table above. In the following section, the risks of river floods and urban floods are examined.

There are several surface water drainages and lakes near the Project:

Mubanza Creek to the west of the Project, drains to Lake Cyohoha, Mbunganzeru Creek to the south of the Project, drains to Lake Gaharwa. A man-made drainage channel within the Project Area, drains to Lake Gaharwa. Surface water drainage (topographic low) to the north of the Project, drains to Lake Kilimbi.

6.2.1.2.1.1 River (Fluvial) Flooding

In the Bugesera district, river flood hazard is classified as high which means that potentially damaging and life-threatening river floods are expected to occur at least once in the next 10 years. By 2060, the change in maximum daily river discharge is projected

[22] thinkhazard.org (2022)

to increase by Project planning decisions, project design, and construction methods must consider the level of river flood hazard. Surface flood hazard in urban and rural areas is not included in this hazard classification and may also be possible in this location.

TABLE 6-2: RISK PROJECTION FOR FLUVIAL FLOODING [23]

Baseline		Projections					Preliminary Risk rating
Hazard Level	Risk Return Period	Year	2030		2060		
		Parameter	SSP 2-4.5	SSP 5-8.5	SSP 2-4.5	SSP 5-8.5	
High	1 in 10 years chance	Change in maximum of daily river discharge in percentage	+6.8	+10.8	+16.4	+1.9	Moderate increase
		Relative change in precipitation (percent)	+2.6	+3.6	+7.3	+14.1	Moderate Increase

6.2.1.2.1.2 Urban Flooding

Although relative change in precipitation is projected to increase moderately by 2060 (ARISE CCRA, 2023), it may pose a risk in urban and industrial areas due to the sealing of surfaces. Thus, an increase in urbanization may increase the risk of urban flooding in the future due to a greater built-up area decreasing percolation into the subsurface and increasing runoff which is projected to increase by 21.7 percent and 37.6 percent in the SSP 2-4.5 and 5-8.5 scenarios respectively (Table 6-3).

TABLE 6-3: RISK PROJECTION FOR URBAN FLOODING[24]

Baseline		Projections					Preliminary Risk **rating**
Hazard Level	Risk Return Period	Year	2030		2060		
		Parameter	SSP 2-4.5	SSP 5-8.5	SSP 2-4.5	SSP 5-8.5	
Very Low	>1 in 1000 years	Relative change in surface runoff in percent	+10.7	+11.7	+21.7	+37.6	Moderate Increase
		Relative change in precipitation (percent)	+2.6	+3.6	+7.3	+14.1	Moderate Increase

6.2.1.2.2Wildfires

Climate data for wildfires is provided in Table 6-4 below. This climate data is provided in baseline and future projected climatic conditions.

[23] *Source: Climate Analytics — Climate impact explorer, Rwanda - Mean Projections Expert | Climate Change Knowledge Portal (worldbank.org)*
[24] *Source: World Bank Knowledge Portal (2022)*

TABLE 6-4: RISK PROJECTIONS FOR WILDFIRES[25]

Baseline		Projections					Preliminary Risk rating
Hazard Level	Risk Return Period	Year	2030		2060		
		Parameter	SSP 2-4.5	SSP 5-8.5	SSP 2-4.5	SSP 5-8.5	
High	1 in 2 years chance of wildfire prone weather	Land fraction to Wildfires in percent	-0.01	-0.01	-0.02	-0.07	Minimal Change

In the Bugesera district, the wildfire hazard is classified as high which means that there is greater than a 50 percent chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year. The land fraction exposed to wildfire in Bugesera, which is the annual aggregate of land area burnt at least once a year by wildfires, is projected to change minimally in the future. Therefore, the risk of wildfires is considered as the most significant risk to the BSEZ Project.

6.2.1.2.3Water Scarcity

The project is in a low (<10 percent) water stress region – according to the WRI Aqueduct Water Stress tool. Similarly, Think Hazard valuates it as medium level hazard, which means that there is up to 20 percent chance droughts will occur in the coming 10 years.

TABLE 6-5: *BASELINE AND PROJECTED WATER STRESS CLIMATE DATA*[26]

Baseline		Projections Water Stress*[27]					Preliminary Risk rating
Hazard Level	Risk Return Period	Year	2030		2060		
		Parameter	SSP 2-4.5	SSP 5-8.5	SSP 2-4.5	SSP 5-8.5	
Medium	1 in 20 years chance	Projected change in water stress	No change	No change	2.8x or greater increase	2.8x or greater increase	Moderate increase

At the Project area, near normal conditions in water stress are predicted for 2030 while in 2060 a 2.8x or greater increase is predicted (See Table 6-5 above).

6.2.1.2.4Extreme Heat

Climate data for extreme heat in BSEZ is provided in Table 6-6 below. The climate data is provided in baseline and future projected climatic conditions.

[25] *Source: Climate Analytics — Climate impact explorer*
[26] *Source: Aqueduct Water Risk Atlas (wri.org)*
[27] *Percent chance of entering a period of water stress. Water stress occurs when the demand for water exceeds the available amount during a certain period or when poor quality restricts its use. Water stress is an indicator of competition for water resources and is defined informally as the ratio of demand for water by human society divided by available water.*

TABLE 6-6: *BASELINE AND PROJECTED EXTREME HEAT CLIMATE DATA*[28]

Baseline		**Projections**					**Preliminary Risk rating**
Hazard Level	**Risk Return Period**	**Year**	**2030**		**2060**		
		Parameter	**SSP 2-4.5**	**SSP 5-8.5**	**SSP 2-4.5**	**SSP 5-8.5**	
Low	1 in 20 years chance	Change in maximum air temperature in ºC	+0.9	+1.0	+1.7	+2.5	Moderate change
		Change in labour productivity due to heat stress in percent	-2.8	-3.2	-5.7	-9	Moderate change
		Days with >35 ºC	0	0	0	0	Minimal change

Rwanda's average temperature varies according to its topography. Low temperatures are observed in the regions of high altitude with average temperatures ranging between 15 and 17°C. In some parts of the volcanic region, temperatures can go below 0°C. Moderate temperatures are found in areas with intermediary altitude where average temperatures vary between 19 and 21°C. In the lowlands (east and southwest), temperatures are higher, and the extreme can go beyond 30°C in February and July-August.

6.2.1.2.5Landslide

Based upon Think Hazard's valuation landslides are characterised under low risk for Bugesera Autonomous district (Table 6-7). Change in Precipitation is projected to increase moderately in 2060 in both SSP 2-4.5 and 5-8.5 scenarios, respectively. Thus, the risk of landslides is likely to remain low over the course of next decades.

TABLE 6-7: *BASELINE AND PROJECTED LANDSLIDES CLIMATE DATA*[29]

Baseline		**Projections**					**Preliminary Risk rating**
Hazard Level	**Risk Return Period**	**Year**	**2030**		**2060**		
		Parameter	**SSP 2-4.5**	**SSP 5-8.5**	**SSP 2-4.5**	**SSP 5-8.5**	
Very Low	>1 in 1000 years	Relative change in precipitation (percent)	+2.6	+3.6	+7.3	+14.1	Moderate Increase

6.2.2 AIR QUALITY BASELINE

This baseline air quality section was informed by site visits undertaken by the EIA team between 14th – 18th August 2023. The team observed that construction activities within the Bugesera Special Economic Zone (BSEZ) – at Phase 1 - have commenced with some

[28] *Source: Rwanda - Mean Projections Expert | Climate Change Knowledge Portal (worldbank.org)*
[29] *Source: Think Hazard - Bugesera - Landslide*

industrial activities already undergoing such as lead acid battery recycling, paper bag manufacturing, grain milling, and plastic waste recycling. Visible air emissions from various industries were noted in addition to airborne dust arising from vehicles movement, road construction and unpaved roads.

During the site visits, existing agricultural activities were identified in different parts of the Project area. Air emissions from such activities are usually limited to times of ploughing and harvesting, and potentially dust lift from fields during dry, windy periods. These activities will cease upon the construction phase of the Project.

Near the conservation green area of the Project, there was some soil stockpiling from neighbouring construction sites (Figure 6-4). Stockpiling activities generate dust emissions during loading and unloading of the piles, and from wind erosion of the stockpile itself, but noting that the stockpile will naturally vegetate over time. Secondary emissions from track-out also occur, whereby mud and debris are brought onto the roads and dust is re-suspended; these are typical of construction activities.

FIGURE 6-4: STOCKPILING OF EXCAVATED SOIL

Source: ERM Site visit, August 2023

As these activities affect the local air quality, efforts have been made to keep distance from the construction areas during the installation of the baseline monitoring equipment to minimise the influence on the monitoring and thus to facilitate the identification of the true baseline.

The districts of Bugesera, Nyarugenge, Kicukiro, Rwamagama and Ngoma, will be sub-Areas of influence which will experience both direct and indirect and social impacts from construction and operation of the Industrial Park. The Kagasa Market/Village is the nearest sensitive human receptors in the study area and are considered of medium sensitivity.

6.2.2.1 BASELINE AIR QUALITY MONITORING

ERM has undertaken a baseline monitoring exercise with the assistance of a local partner Earth Systems Africa. The key rationale for baseline study is to determine the current state of the airshed[30] in the Project area. The approach to the baseline monitoring was informed by the International Finance Corporation (IFC) General Environmental, Health, and Safety (EHS) Guidelines: Environmental: Air Emissions and Ambient Air Quality (2007)[31] and ERM profession judgement and experience.

The baseline study encompassed ambient monitoring of nitrogen dioxide (NO_2) and particulate matter less than 10 microns (PM_{10}) and PM less than 2.5 ($PM_{2.5}$). The pollutants of interest are based on a review of the proposed activities against the relevant IFC sector specific guidance, namely increased traffic (exhausts from vehicle engines), boilers and electricity generation (from diesel generators) and emissions from process-related activities.

Dust impacts during construction are discussed further in this report (Section 8.2.1). However, dust was not considered as a pollutant of interest for the operational phase. Considering the assumption of adequate management of the Project activities with appropriate mitigation in place, the emissions of dust during the operational phase is negligible.

East Africa Community has resolved to the import low sulphur fuel, to avoid the emission of sulphur oxides, Rwanda has reduced the content of sulphur in fuel to 50 ppm[32]. On this basis, SO_2 is not a pollutant of interest for the Project. No monitoring of SO_2 has been undertaken.

6.2.2.2 MONITORING TECHNIQUES

6.2.2.2.1 Nitrogen dioxide (NO_2)

NO_2: passive monitoring was undertaken using Palmes-type diffusion tubes (see Figure 6-5), provided and analysed by Gradko Laboratories and deployed for approximately 30 days per sampling round. Two rounds of consecutive sampling were undertaken at eight monitoring locations. The first round of NO_2 monitoring continued from 18th August 2023 until 22nd September 2023, capturing part of the dry season. The second round of NO_2 sampling started on 22nd September 2023 until 22nd October 2023 capturing a part of the wet season. The diffusion tubes were sent for laboratory analysis to determine the period mean concentration.

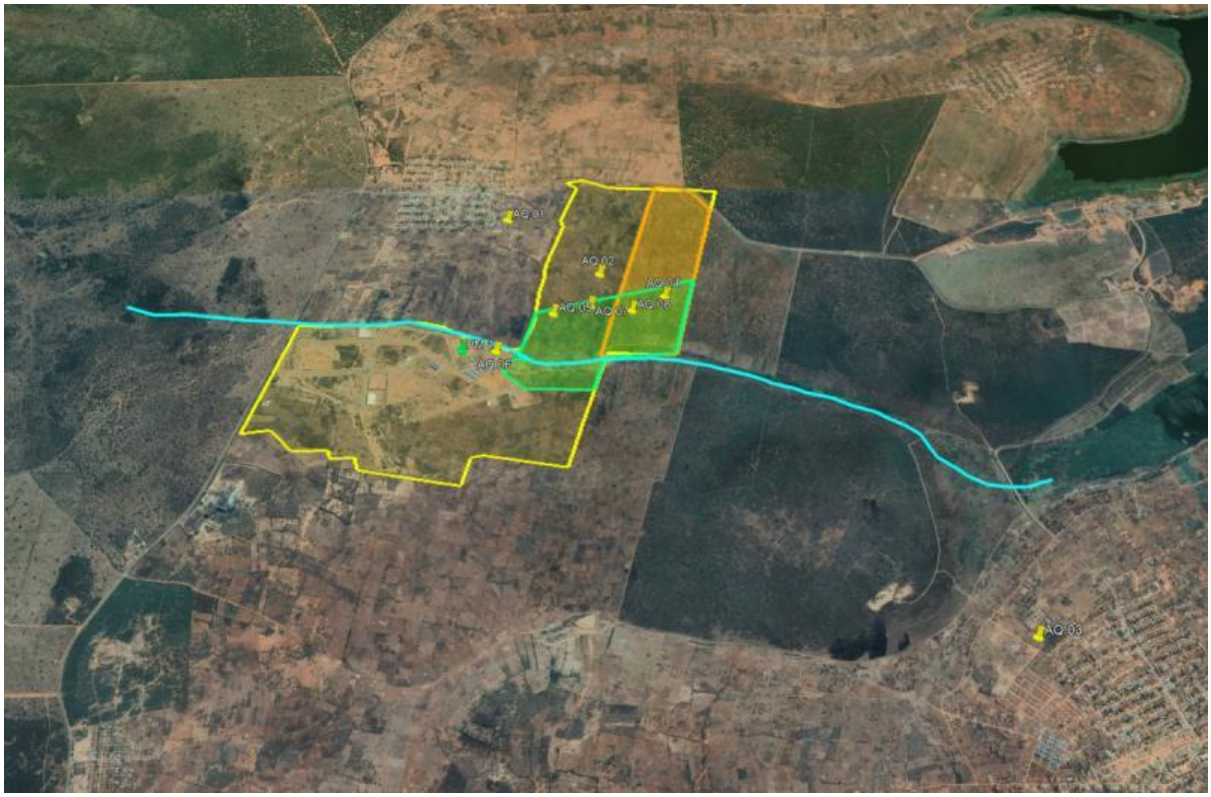
[30] An airshed is an area that shares a common flow of air and that is exposed to the same conditions which may become uniformly polluted or stagnant.
[31] Available at: https://www.ifc.org/content/dam/ifc/doc/2000/2007-general-ehs-guidelines-air-emissions-and-ambient-air-quality-en.pdf

[32] The Five East African Community Countries Discuss Ultra-Low Sulphur Fuels (unep.org)

FIGURE 6-5 DIFFUSION TUBES

Source: ERM, 2023

The locations of the NO_2 diffusion tubes are shown in Figure 6-6 below. Points marked as "AQ" refer to diffusion tube locations.



Source: ERM, 2023 from Google Earth ®

FIGURE 6-6 MONITORING LOCATIONS FOR NO_2

The exact location for each monitoring point is given in Table 6-8.

TABLE 6-8: MONITORING LOCATIONS FOR NO_2

Monitor location	Location Coordinates (UTM)		
Location	**Zone**	**m E**	**m S**
AQ 01	36S	191438.00	9748096.00
AQ 02	36S	191637.00	9747995.00
AQ 03	36S	192100.00	9747671.00
AQ 04	36S	192077.00	9747835.00
AQ 05	36S	191345.00	9747686.00
AQ 06	36S	191372.00	9747574.00
AQ 07	36S	191585.00	9747750.00
AQ 08	36S	191863.00	9747721.00

Each sampling campaign included 8 diffusion tubes at 8 different locations. Among the 16 diffusion tubes that were installed during both sampling rounds, a few of the tubes were removed by unknown third parties (indicated in the section below). Nevertheless, the results of the remaining locations are presented in Table 6-10 below. While the removal of some samples has reduced the sample size, the key locations of upwind, downwind, and crosswind of the Project area have been captured by the remaining samples.

6.2.2.2.2Particulate Matter (PM_{10} and $PM_{2.5}$)

PM monitoring was undertaken by Earth Systems Africa and ERM for one-month dry season. The monitor used was a DustTrak device, located at point PM 1 (Table 6-9) shown in Figure 6-7. The location was chosen based on the following factors: accessibility, security, power supply, proximity to the Project area and sensitive receptors. Data from the DustTrak was downloaded after every 7 days; the periods of missing data are attributed to power cuts in the area.

TABLE 6-9 LOCATION OF THE PM MONITOR

		UTM Coordinates	
Points	Zone	m E	m S
PM1	36 S	190757	9747397

FIGURE 6-7: MONITORING LOCATION FOR PM

Source: ERM, 2023 from Google Earth ®

6.2.2.3 RESULTS

6.2.2.3.1.1 Nitrogen dioxide (NO_2) ambient concentration

The table below shows the averages of the first round of NO_2 monitoring. During the first month (dry season) of monitoring, three tubes went missing on site. Table 6-10 below presents the dry season data with placeholders for wet season.

TABLE 6-10: BASELINE CONCENTRATION OF NO2 (µG/M3)

Location	Monthly Ambient Concentration (µg/m3)		
	First (dry) month	Second (wet) month	Average
AQ 01	NA	9.89	9.89
AQ 02	NA	NA	NA
AQ 03	6.94	NA	6.94
AQ 04	10.03	11.01	10.52
AQ 05	7.42	NA	7.42
AQ 06	8.39	NA	8.39
AQ 07	NA	9.00	9.00
AQ 08	8.90	8.60	8.75
Average	**8.34**	**9.63**	**8.98**

Source: ERM, 2023

The monitoring data shows that monthly average concentrations for NO_2 are well below the annual air quality standard (AQS) for Rwanda and IFC (refer to *Section 2.3.1* of this EIA report) at all measured locations. The overall average ambient NO_2 is 8.98µg/m^3.

The short-term baseline (1 hour or 24 hour) value can be assumed as being twice the long-term value[33]. On this basis, the short-term baseline concentrations at all locations were well below the 24-hour AQS. The overall average short-term concentration is 17.9 µg/m^3, which is 11.9% of the Rwandan standards and 8.95% of the IFC 1-hour AQS.

6.2.2.3.1.2 Particulate Matter (PM_{10} and $PM_{2.5}$) ambient concentration

The results of the PM monitoring from the Dust Trak for PM_{10} and $PM_{2.5}$ (24 hour) are presented in the Table 6-11 below.

TABLE 6-11: BASELINE CONCENTRATION OF PM10 AND PM2.5 (µG/M3)

Data download frequency Pollutant	Dry Season	Annual Average
PM_{10} monthly average	11.2	11.2
$PM_{2.5}$ monthly average	11.2	11.2

Source: ERM, 2023

The monitoring data shows that the annual average concentrations for PM_{10} is 11.2 µg/m^3 respectively, which is well within the Rwandan and IFC annual AQSs. The monitoring data shows that the annual average concentrations for $PM_{2.5}$ is 11.2 µg/m^3, which is also within the national and the IFC annual AQS.

[33] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#calculating-averaging-periods

The baseline data shows that the airshed is not degraded for PM_{10} and $PM_{2.5}$ (i.e., the baseline concentration is lower than the national and IFC AQS).

6.2.3 NOISE BASELINE

6.2.3.1 INTRODUCTION

ERM has prepared this Noise Baseline Report at the request of ARISE Integrated Industrial Platform (referred to as "the Client"). The report sets out the regulation context, methodology, results, and conclusions of the baseline survey conducted for the Bugesera Special Economic Zone Expansion (BSEZ) (referred to as "the Project") in Bugesera, Rwanda.

An important part of the noise assessment is the quantification and understanding of the existing acoustic environment, including the identification of the baseline noise levels at potentially Noise Sensitive Receptors (NSRs). The baseline environment can be defined as the conditions that would prevail in the absence of the Project. The quantification of baseline noise levels provides the basis for the assessment of potential noise impacts at NSR's as a result of the Project.

The noise survey was conducted during the month of October 2023 by Earth Systems Ltd (ERM local subcontractor).

6.2.3.2 NOISE CRITERIA

This baseline report has been undertaken according to the following acoustic standards and guidelines:

- Rwanda Standard[34] 236 RS 236: 2020 Acoustics — Noise Pollution —Tolerance limits; and
- International Finance Corporation's (IFC)[35] Environmental, Health, and Safety (EHS) Guidelines – Section 1.7 – Environmental Noise Management (IFC EHS Guidelines 1.7 Noise).

6.2.3.3 METHODOLOGY

6.2.3.3.1 Equipment and Setup

To evaluate the existing conditions, long-term noise measurements were performed during October 2023 at a selected number of identified receptors. The monitoring locations were selected by ERM in order to provide a broad understanding of the existing background noise levels across the Area of Impact (AoI).

ERM provided the noise baseline methodology, and the survey was undertaken by Earth Systems Africa (local subcontractor). During the site visit, the survey team was in

[34] Rwanda Standard Board – RS 236:2014 Acoutsics-Noise Pollution-Tolerance limit. Second edition (2020).
[35] IFC (International Finance Corporation) 2007. Environmental, Health, and Safety (EHS) General Guidelines, April 30, 2007.

communication with ERM acoustic team about the progress of the noise on survey. The recorded data were analysed by ERM acoustic team.

The noise monitoring procedure was undertaken in accordance with ISO 1996 -1:2003, which specifies that noise monitoring should be carried out using Type 1 (RION NL 52) sound level meter (SLM) as per IFC standards. The equipment was mounted so that the microphone was installed at approximately 1.5 m above the ground. The systems were in free-field conditions (i.e., at least 3.5 m from the nearest hard reflective surface). The sound level meters were calibrated before and after each measurement. The calibration level was checked, and no significant drift (i.e., > 0.5 dB) was noted. A picture of the SLM is shown in Figure 6-8.

FIGURE 6-8 NOISE MONITORING SETUP

Source: Earth Systems Africa, October 2023

6.2.3.4 NOISE MONITORING LOCATIONS

Noise baseline measurements were proposed to be conducted at 4 locations. These locations were considered to be representative of the acoustic environment around the vicinity of the Project. The coordinates and the description of each measurement location are provided in Table 6-12. Figure 6-9 shows a map with the location of each measured site.

TABLE 6-12 DESCRIPTION OF EACH LONG-TERM NOISE MONITORING LOCATION

Station ID	Date of survey	Measurement duration (h)*	Coordinates UTM 36S		Description
			X (m)	Y (m)	
N1	18/10/2023	12	191300	9748879	Mix residential and rural area
N2	19/10/2023	3	190986	9748423	Mix residential and rural area
N3	20/10/2023	19	194299	9745449	Mix residential and rural area
N4	21/10/2023	21	193571	9749713	Mix residential and rural area near Colline Kayovu village

**Measurement duration was subject to the conditions of the site*

Source: ERM 2023

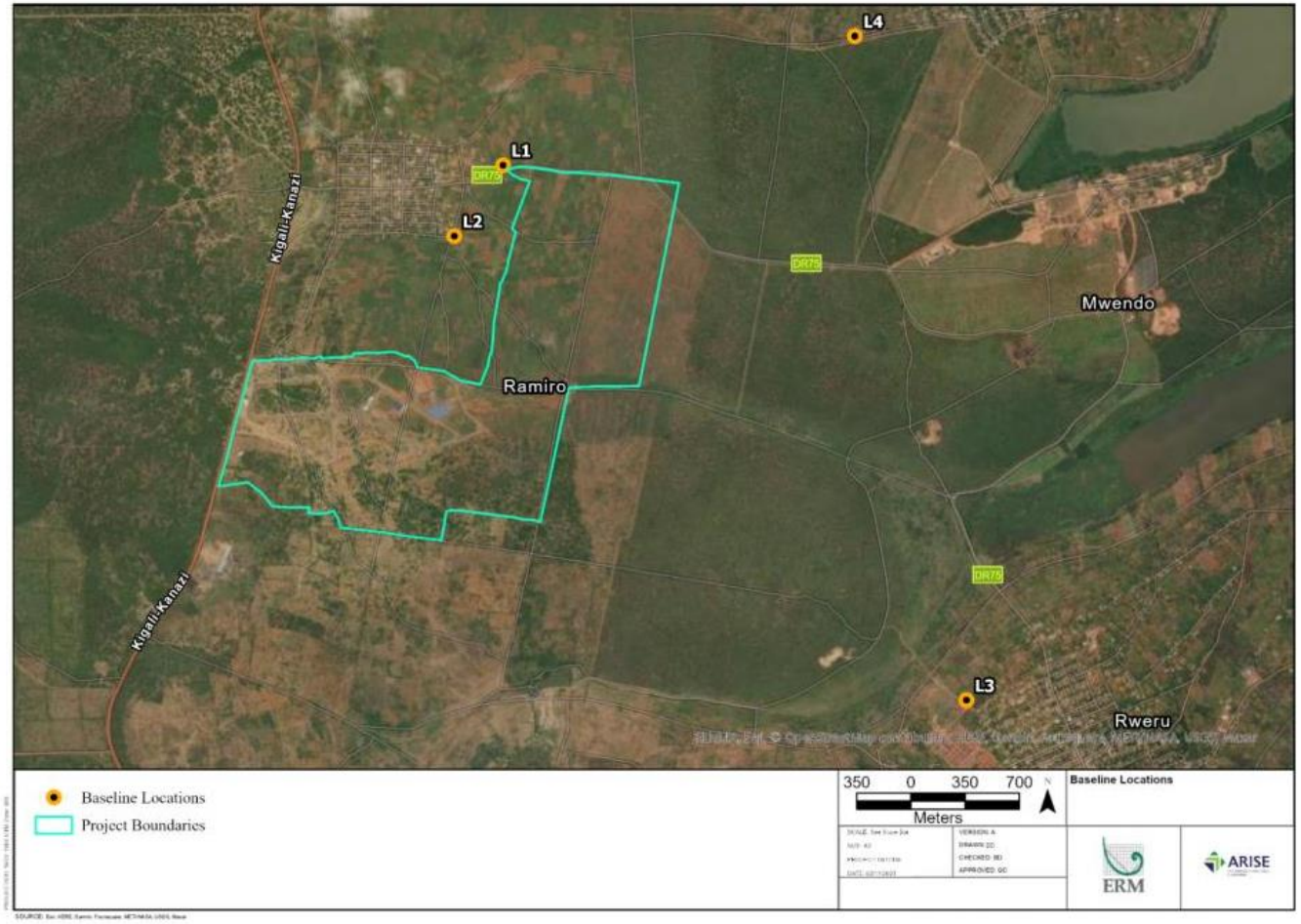


FIGURE 6-9: NOISE MONITORING LOCATIONS

ERM2023

6.2.3.5 DATA RECORDING

Ideally, long-term noise measurements over a 24-hour period should have been conducted as part of the baseline survey. However, due to constraints imposed by location conditions, this baseline survey was limited in duration. The duration of each measurement is detailed in Table 6-12.

These measurements recorded different metrics, including the LAeq, LA90, LAmax, LAmin, and LA10. A brief description of all such noise metrics is provided in this section.

The unattended noise monitoring results for each location were divided into day (0600–2100 hours), and night (2100–0600 hours) period (as per Rwandan Guidelines) to understand the variation of the baseline environment.

The LAeq metric is the steady, continuous equivalent sound level, which has the same acoustic energy as the actual varying sound levels over the same time. The letter "A" in both metrics denotes that "A"-weighting has been used. The "eq" in LAeq indicates that an equivalent level has been calculated. Therefore, LAeq (T) is the A-weighted continuous sound level, measured over period "T."

The LA90 metric is a percentile noise level, which represents the noise level exceeded for 90 per cent of the monitoring period (T) being considered. It represents the quiet lulls between noise events, such as cars or locomotives going by or planes flying overhead. The LA90 metric is the near-minimum baseline level that only occurs, by definition, 10 per cent of the time. The LA90 level is often referred to as the "background" noise level and is commonly used as a basis for determining noise criteria for assessment purposes. For this monitoring assessment, the LA90 metric would be used to represent background noise levels.

Aside from the LAeq and LA90, other sound metrics typically collected during sound surveys are LAmax, LAmin, and LA10. The LAmax and LAmin metrics are the maximum and minimum noise levels in a noise sample, respectively. The LA10 metric is also a percentile representing the noise level exceeded for 10 per cent of the monitoring period (T).

The noise meter automatically logs these environmental noise measurement parameters. For the purposes of this study, the LAeq is the noise parameter of most interest, as it is this parameter that needs to be directly compared to the applicable noise standards of the International Finance Corporation (IFC).

6.2.3.6 NOISE MEASUREMENT RESULTS

Long-term measurements result at each monitoring locations are summarised in Table 6-13.

TABLE 6-13 LONG TERM UNATTENDED NOISE MONITORING RESULTS

ID	Period (T)	Measurement Parameter, dBA		
		LAeq*	LA10**	LA90**
L1	Daytime	50	45-59	32-53
	Night-time	46	47-55	37-42
L2	Daytime	46	36-52	29-35
	Night-time	-	-	-

ID	Period (T)	Measurement Parameter, dBA		
		LAeq*	LA10**	LA90**
L3	Daytime	64	31-74	17-69
	Night-time	38	24-50	20-33
L4	Daytime	56	40-68	29-61
	Night-time	57	46-62	39-59

Period T = 15 hours for Daytime (06:00–21:00) and 9 hours for night-time (21:00–06:00) as per Rwandan Guidelines
** Log-average values*
*** Range values*

Source: ERM 2023

The measured data shows that existing noise levels at locations L3 and L4 exceed the daytime criteria for residential area by 9 dB and 1 dB respectively, as per Section 6.2.3.2. During nighttime period, measured noise levels at location L1 and L4 exceed the criteria by 1 dB and 12 dB. At measurement location L3 night time measured noise levels are lower than the relevant criteria.

6.2.3.7 SUMMARY

Baseline noise measurements were conducted during October 2023 at 4 monitoring locations, carefully selected to provide a comprehensive representation of the noise baseline in the vicinity of the Project. These measurements were taken during both daytime and nighttime period, although, in some cases (e.g., L2), the measurement duration was constrained by the conditions in the surrounded area. The measured values indicate that L3 and L4 exceed both national and international criteria for daytime period, while L1 and L4 exceed the criteria for nighttime period.

6.2.4 GROUNDWATER BASELINE

6.2.4.1 PROJECT AREA OF INFLUENCE

From a groundwater perspective, the project area of influence is defined as the total sub-catchments within which the proposed project will be located. The sub-catchments are delineated based on natural groundwater flow boundaries such as rivers and topographical highs. With specific reference to the groundwater resources, the area of influence (AoI) includes the aquifers that occur within the sub-catchments (Figure 6-10).

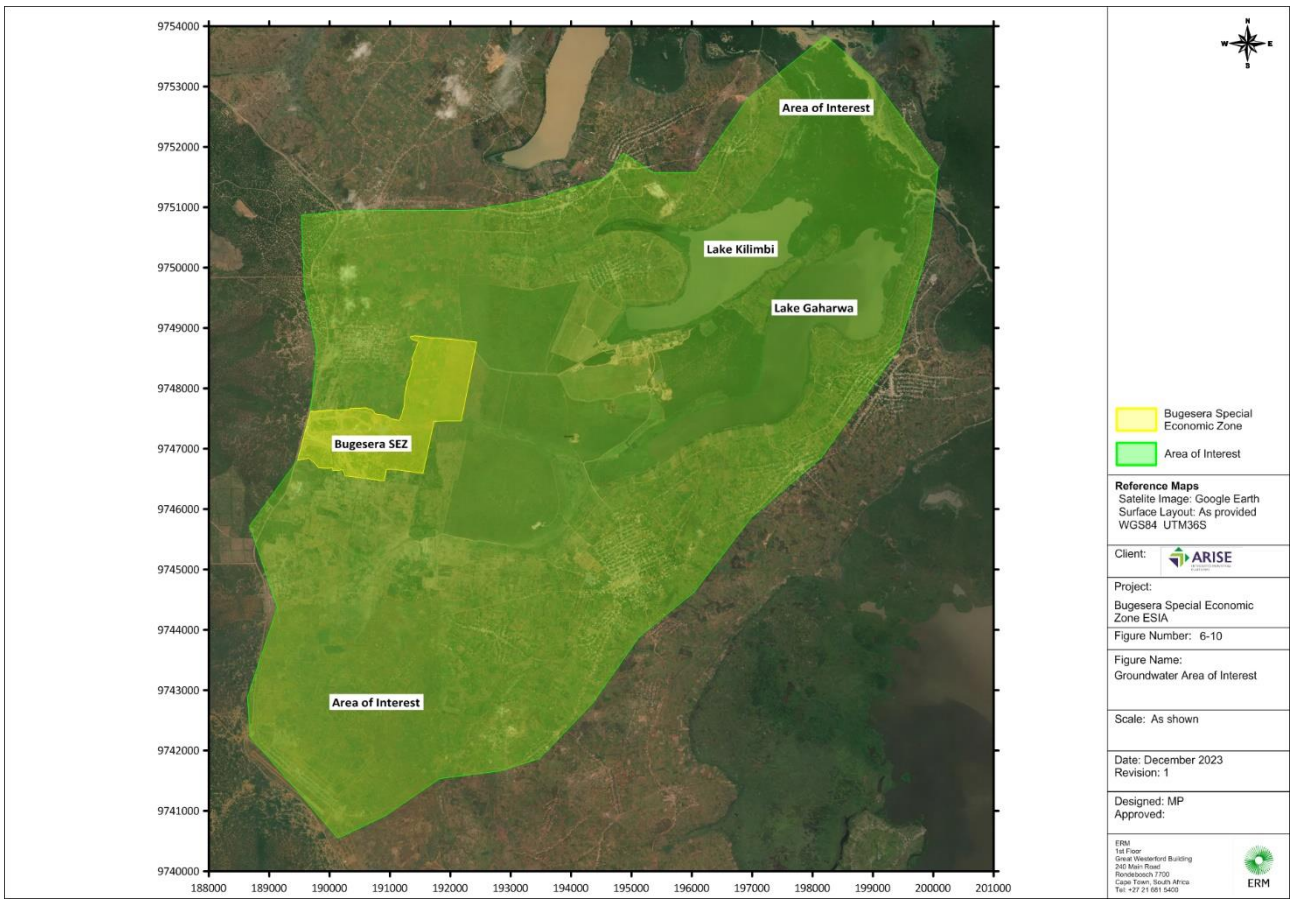


FIGURE 6-10: AREA OF INFLUENCE

6.2.4.2 METHODOLOGY

The baseline characterization is done based on:

- Literature study.
- Site-specific information collected by Earth Systems during a site visit conducted during the dry season of 2023. From a groundwater perspective, the site visit entailed:
    - Hydrocensus of the region during which existing wells in the area were identified. The ownership details and current groundwater use was recorded. The depth to groundwater level could not be measured due to the existing equipment in the wells blocking access.
    - Collection of 1 groundwater sample for chemical analysis (well GWQ4). The well was selected based on its location within BSEZ. The well was sampled because it is the only well that is currently in use.

The details of the wells identified during the Earth Systems hydrocensus are summarized in Table 6-14. The well positions are shown graphically in Figure 6-11.

TABLE 6-14: HYDROCENUS RESULTS (FROM EARTH SYSTEMS)

Hydrocensus Point	Description	Ownership	East Coordinate (UTM36S, WHS84)	South Coordinate (UTM36S, WHS84)
GWQ1	Disused borehole located within field of crops	Not in use – no ownership details available	194 610	9 750 845
GWQ2	Disused borehole located within field of crops	Not in use – no ownership details available	194 509	9 750 464
GWQ3	Disused borehole located within field of crops	Not in use – no ownership details available	194 841	9 749 464
GWQ4	Wet borehole in the northernmost part of the land owned by the paper recycling factory within the BSEZ.	Paper recycling works within the BSEZ	191 038	9 747 345

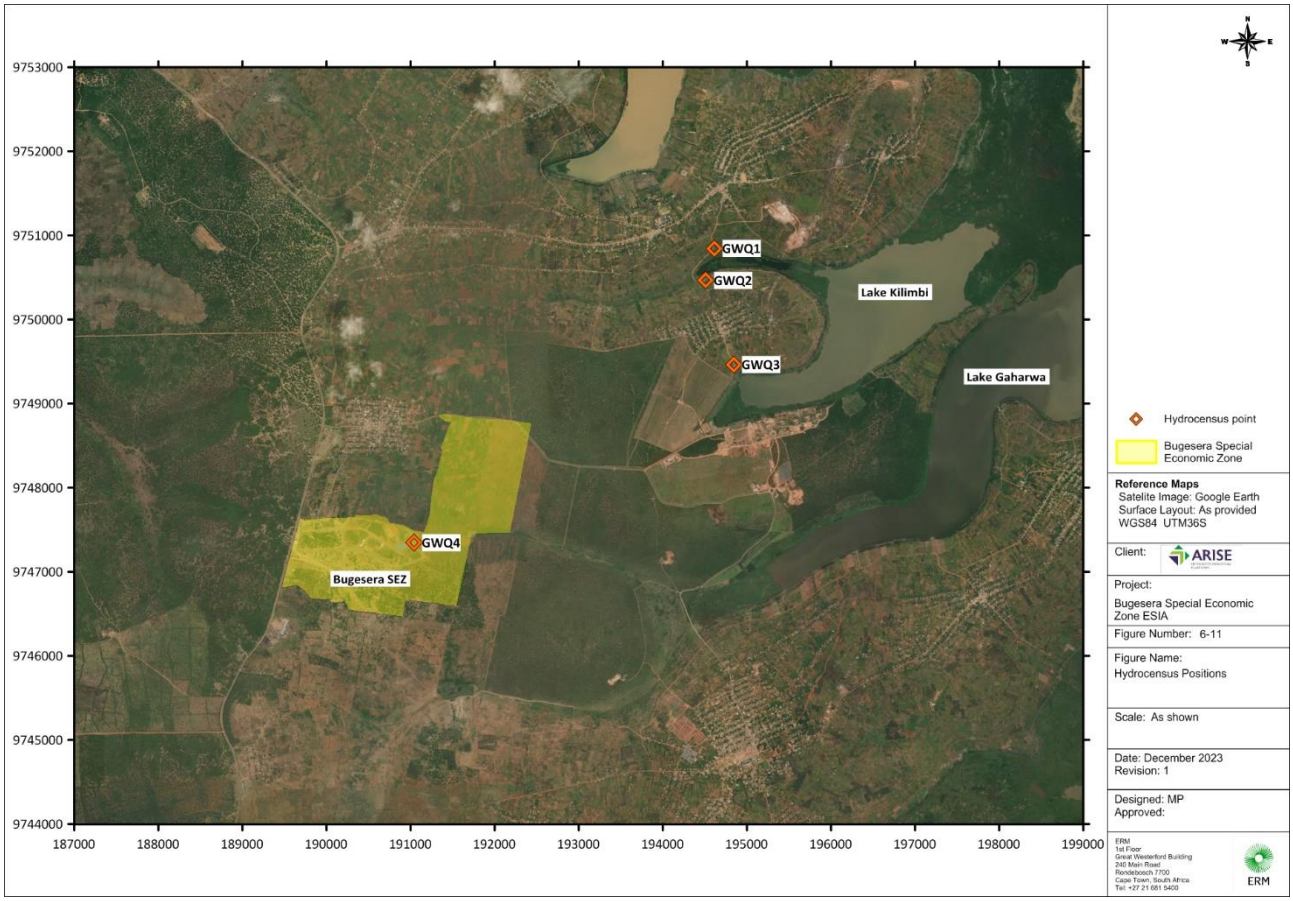


FIGURE 6-11: HYDROCENSUS POSITIONS

The Bugesera SEZ is located in the eastern province of Rwanda, directly to the east of the NR5 road that connects Kigali and the border with Burundi. Surface runoff will drain towards the east, where Lake Gaharwa and Lake Kilimbi lie approximately 5 km from the site. Please refer

to Figure 6-11 to view the lake positions. Geologically, Rwanda forms part of the Karagwe-Ankole belt (KAB) of Central Africa which is mainly composed of Mesoproterozoic metasedimentary and metavolcanic rocks. The geology of Rwanda generally consists of the Mesoproterozoic Burundian Supergroup (sandstones alternating with shales) intruded by granite bodies throughout the country (Buurman, 2018).

6.2.4.3 AQUIFERS PRESENT IN THE STUDY AREA

6.2.4.3.1 Regional aquifers located in the Rwanda Eastern Province

There are three lithologies located in the Eastern Province that are known to be groundwater bearing (Groundwater, 2023):

- Granites: These are located mainly around Bugesera and Nyagatare. The granites are overall competent and relies on fractures for recharge and transmissivity.
- Schists: The schists are considerably less competent than granites and easy to fracture and erode. The fractures easily fil up with weathered material.
- Quartzites: These are interbedded throughout the less competent schists and is more competent that the granite. The transmissivity and recharge into the lithology is very low where the quartzites are not fractured.

6.2.4.3.2 Aquifers present on Site.

Aquifers present at the Bugesera SEZ site are determined by the local geology. The main groundwater bearing lithology on the site is granite. There are also isolated areas of alluvial deposits associated with the streams that occur in the area.

Aquifers present in the Bugesera SEZ area are expected to include:

- Weathered material aquifer.
- Fractured rock aquifer; and
- Alluvial aquifers.

6.2.4.3.3 Weathered material Aquifer.

The weathered material aquifer lies within the upper weathered zone. The material consists of highly weathered and decomposed host rock (granite).

Rainfall recharging into the weathered material will migrate vertically into the soil. The lower permeability of the underlying competent rock will reduce the vertical infiltration and cause accumulation of water above the contact between the weathered material and the competent rock, thereby forming the weathered material aquifer. The weathered material can have a thickness of more than 10 m (African Development Bank, January 2018).

Groundwater flow in the weathered material aquifer is expected to be relatively homogenous and in a down gradient direction towards the low-lying Lake Gaharwa and Lake Kilimbi 5 km to the east of the site. At the lakes the groundwater will exit the groundwater system and join the surface water system in the form of baseflow contribution.

The weathered material aquifer will be seasonally variable due to the dependence on rainfall recharge and can become dry in areas during the dry season. It is possible that the water flow direction will be reversed during the dry season so that the lakes become losing lakes that

contribute water to the underlying aquifers in areas where the groundwater level drops to below the elevation of the lakebed. This aquifer will be most vulnerable to contamination from surface, or shallow, contamination sources.

6.2.4.3.4Fractured rock aquifer

A percentage of the water in the weathered material aquifer will recharge into the underlying competent rock aquifer in areas where the competent rock is fractured due to intrusion and cooling of the granites or development of fault lines. Other sources of recharge into the competent rock aquifer can be in areas where the fractured rock is exposed on surface without a cover of weathered material, or where the fractured rock is in direct contact with the surface water bodies. Groundwater flows in the competent rock aquifer will mostly be associated with individual fracture zones.

6.2.4.3.5Alluvial aquifer

The alluvium mostly consists of clayey soils which are deposited by streams. In some cases, coarse sediments are deposited. Coarse sediments are more common close to meandering fast flowing rivers.

The alluvial aquifer is recharged mainly by surface water in the streams with which the alluvial deposits are associated. The extent of the alluvial deposits is restricted to the immediate vicinity of specific sections of streams, and this aquifer is therefore not aerially extensively present in the study area. The limited extent of the alluvial material restricts the volume of groundwater available in alluvial deposits.

Based on a survey of satellite imagery of the area, it is not expected that the alluvial aquifer will play a notable role in the groundwater environment in the study area.

6.2.4.4 DEPTH TO GROUNDWATER LEVEL AND GROUNDWATER FLOW PATTERNS

To determine the depth to groundwater level reference was made to the data collected by Earth Systems during the hydrocensus that was performed. Reference was also made to publicly available literature for information on the depth to groundwater level in the study area.

The depth to groundwater level in the weathered material aquifer is expected to be relatively shallow during the rainy season due to recharge from rainfall, and in the vicinity of streams where interaction with the stream can stabilize the groundwater level near surface. No site-specific information on the depth to groundwater level in the weathered material aquifer is available. The Rwanda Water Resources Board (Groundwater, 2023) has a network of monitoring wells, two of which are located close to the village of Karumuna north of the Bugesera SEZ. The depth to groundwater level in these wells range between 1.09 and 1.50 metres below ground level (mbgl).

The depth to groundwater level in the fractured rock aquifer could not be measured in the wells visited during the Earth Systems hydrocensus. However, the site owner of well GW4, which is the only well that was identified which is in use, reported that the depth to groundwater level in the well is in the order of 65 m. The depth to groundwater level in the fractured rock aquifer is also obtained from one groundwater well that is monitored by the Rwanda Water Resources Board (Groundwater, 2023) which is located southwest of the

Bugesera SEZ, next to the NR6 highway that connects the town of Nyanza to the border with Burundi. The depth to groundwater is reported at 50.4 m.

(Bakundukize, 2012) quotes a database of 157 piezometric measurements and 126 topographic elevations of springs in Bugesera region. Conclusions reached from analysis of the database show:

- A local component towards the perennial and ephemeral streams and a regional component flow from the southern and eastern highlands towards the complex of marshlands and lakes which forms the main discharge area. Analysis of the inter-annual variation of groundwater levels shows a decreasing trend between 1991 and 2006, whereas between 2006 and 2008, a maximum is observed in 2007. This pattern of groundwater level fluctuation is in agreement with the amount of recharge calculated for each hydrologic year, the highest groundwater level corresponding to high recharge.
- Analysis of the seasonal variations of groundwater levels for 2008 shows a trend which closely follows that of the monthly rainfall. However, it was observed that peak of groundwater levels occurs at different times in northeastern (May), central (April) and southwestern pasts (June). This important observation is related to the duration of travel of the recharge across the unsaturated zone and confirms the high hydraulic conductivity which characterises the Undifferentiated Complex Formation situated in the central part of the study area.

From the above, it is concluded that:

- Groundwater flow patterns mimic topography, as is expected in an area with relatively homogenous groundwater flow through the weathered material and fractured rock aquifers, and where no large-scale groundwater abstraction takes place; and
- Groundwater flow directions are from higher lying areas, in the case of the Bugesera SEZ the topographically higher lying area to the west of the site, towards the low-lying areas represented by Lake Gaharwa and Lake Kilimbi which lie approximately 5 km to the east of the site.

6.2.4.5 AQUIFER TRANSMISSIVITY

The aquifer transmissivity is obtained from literature. Bakundukize (2012), evaluated the hydraulic parameters based on the analysis of 41 constant-rate pumping tests conducted during two field campaigns, from September to December in 2007 and from July to October in 2008 in the Project surrounds.

Overall, the transmissivity varied between 1 m^2/d and 377 m^2/d with an average of 33 m^2/d, whereas the hydraulic conductivity ranges between 0.1 m/d and 166 m/d with an average of 14.8 m/d. The wide variability is typical of basement aquifers (Bakundukize, 2012).

The average hydraulic conductivity for the weathered overburden is in the order of 0.30 to 0.66 m/d.

6.2.4.6 GROUNDWATER QUALITY

One groundwater sample was collected during the hydrocensus performed by Earth Systems. The sample was submitted to WASAC laboratory (approved by RDB) in Kigali for chemical analysis in August 2023. The results are summarized in Table 6-15. From the table it can be

seen that, except for E.Coli, all parameters comply with both the Rwanda Standards for Drinking Water and the World Health Organization (WHO) Drinking Water Standards.

The groundwater chemical analysis results have been interpreted by the ESIA consultant based on results obtained in September 2023. The results of the hadrochemical analysis are presented below:

- Groundwater quality within the Project Area is characterised by near-neutral pH, and low water hardness.
- Concentrations of major ions were very low, and all below relevant water quality guidelines at the only operational monitoring location.
- Concentrations of all dissolved metals were also lower than the national standards.
- The E-coli concentration far exceeded the WHO Drinking Water Guideline and the national standards (absent/not detectable). As the project area and its surroundings have been used for agricultural and residential purposes for a long time, the high levels of E. Coli could be due to agricultural livestock and/or untreated human sewage.

TABLE 6-15: GROUNDWATER CHEMICAL ANALYSIS RESULTS (FROM EARTH SYSTEMS, 2023)

Parameter	Units	Rwanda Standards for Drinking Water (2018)	WHO Drinking Water Guidelines (2017)	BSEZ Groundwater (GW4)
E.Coli	MPN/100mL	Not detectable	Absent	249.5
Turbidity	NTU	5	-	3.36
pH		6.5 – 8.5	6.5 – 8.5	7.44
Total suspended solids	mg/L	Not detectable	-	2
Total hardness	mg/L	300	-	80
Total dissolved solids	mg/L	1 000	1 000	149
Total alkalinity	mg/L	300	-	102
Chloride	mg/L	250	250	4.3
Fluoride	mg/L	1.5	1.5	0.60
Cyanide	mg/L	0.01	0.07	0.001
Nitrites	mg/L	0.9	3	0.004
Nitrates	mg/L	45	50	4.1
Phosphates	mg/L	2.2	-	0.45
Sulfate	mg/L	400	250	17
Calcium	mg/L	150	-	24
Magnesium	mg/L	100	-	0.48
Iron	mg/L	0.3	0.3	0.06

Parameter	Units	Rwanda Standards for Drinking Water (2018)	WHO Drinking Water Guidelines (2017)	BSEZ Groundwater (GW4)
Manganese	mg/L	0.1	0.4	0.008
Aluminium	mg/L	0.2	0.2	0.009
Arsenic	mg/L	0.01	0.01	<0.01
Cadmium	mg/L	0.003	0.003	<0.003
Chromium VI	mg/L	0.05	0.05	0.006
Copper	mg/L	1	2	0.01
Lead	mg/L	0.01	0.01	<0.01
Zinc	mg/L	5	3	0.03

6.2.4.7 GROUNDWATER RECHARGE

The main source of groundwater recharge in the study area is precipitation. The long-term average groundwater recharge, estimated using the soil moisture budget technique for a period of 35 hydrologic years (1974/75-2008/2009), is calculated to be between 185 and 243 mm/year calculated using different models (Bakundukize, 2012).

6.2.4.8 GROUNDWATER POTENTIAL

The groundwater potential is analysed and classed by the Rwanda Water Resources Board (Groundwater, 2023). The yield potential is divided into 3 classes:

- Low potential: 1 to 3 m^3/hr. More typical for the granite and consolidated sediment aquifer types, unless something significant happens that increases potential.
- Medium potential: 3 to 5 m^3/hr. More typical for the schist aquifer types. Less likely to have significant changes (not impossible in conjunction with quartzite aquifer type) but higher over the board potential compared to granite aquifer type.
- High potential: 5 to 10 m^3/hr. More typical for the quartzite/schist aquifer type. This aquifer type is most heterogeneous resulting in the highest number of clustered high yielding boreholes, giving this interpolation result.

Alluvial aquifers have good groundwater potential if they contain coarse material that are hydraulically connected to the current river course. Borehole drilled in coarse grained deposits of Akagera river near Kigali yielded 50 m^3/hr on average from a depth of less than 20 m. The sediments near the Akagera river along the southeastern and eastern border of the Eastern Province could also have a higher groundwater potential (Bakundukize, 2012).

From the above, and the expected geology on site (granite), the groundwater potential at the Bugesera SEZ is classified as low (1 to 3 m^3/h).

6.2.5 SURFACE WATER BASELINE

The following data and information sources were utilized in preparation of the surface water baseline:

- Rainfall information - Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3.
- Rainfall information – Rwanda Meteorology Agency.
- FAO. 2021. AQUASTAT Database. http://www.fao.org/aquastat/statistics/query/index.html.
- Bugesera Special Economic Zone (SEZ) Project: Dry Season Hydrology, Hydrogeology and Water Quality Baseline Report. Report to ERM by Earth Systems, October 2023.

6.2.5.1 CLIMATE

The climate for the study area is classed as an equatorial savannah with dry winter according to the Köppen-Geiger climate classification[36]. The hydrological year, a 12-month period where precipitation totals are measured, runs from September to August. Table 6-16 shows the average monthly potential reference evapotranspiration (ETo) for Bugesera District that could occur assuming no limitations are placed on available moisture.

TABLE 6-16: AVERAGE MONTHLY EVAPOTRANSPIRATION FOR BUGESERA DISTRICT

EVAPOTRANSPIRATION (ETo) FAO'S AQUASTAT TOOL[37]													
Month	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
ETo (mm)	124	123	105	106	110	107	113	100	103	112	125	133	1361

Figure 6-12 shows the Mean Annual Precipitation (MAP) for Rwanda and Figure 6-13 a time series of the annual precipitation for Bugesera District. MAP ranges from 800 mm in the east of Rwanda to over 1500 mm in the western region of the country. The MAP for the project site in the Bugesera District is approximately 1000 mm. Rwanda experiences a bimodal pattern of rainfall, which is driven primarily by the progression of the Inter-Tropical Convergence Zone (Rwanda Meteorology Agency, 2023). Figure 6-14 shows the two rainy seasons from March to May and the other October to December.

[36] Kottek, M., J. Grieser, C. Beck, B. Rudolf, and F. Rubel, 2006: World Map of the Köppen-Geiger climate classification updated. Meteorol. Z., 15, 259-263. DOI: 10.1127/0941-2948/2006/0130.
[37] FAO. 2021. AQUASTAT Database. http://www.fao.org/aquastat/statistics/query/index.html. Date accessed: 12 December 2023

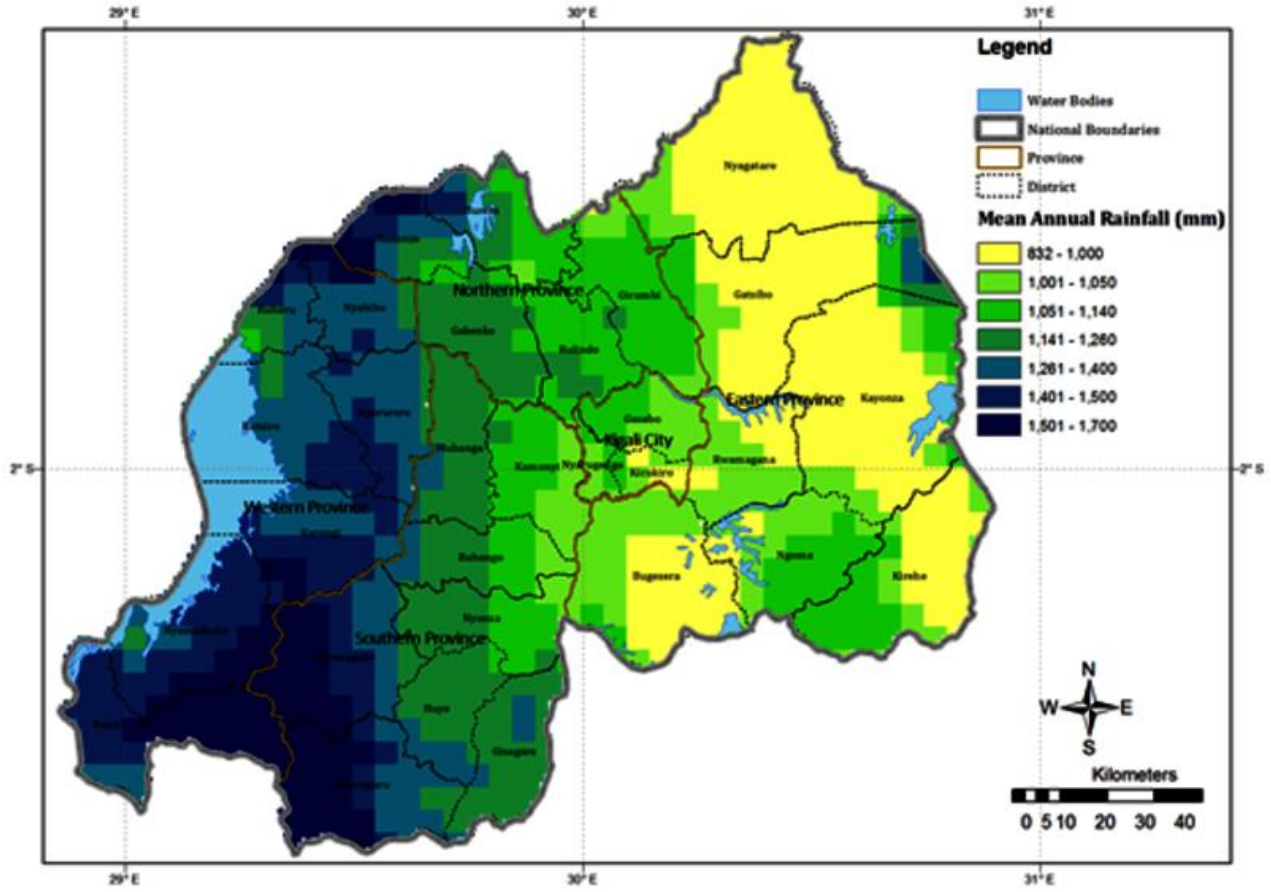


FIGURE 6-12 MEAN ANNUAL PRECIPITATION OF RWANDA[38]

[38] Rwanda Meteorology Agency (2023) Climatology of Rwanda Climatology of Rwanda (meteorwanda.gov.rw)

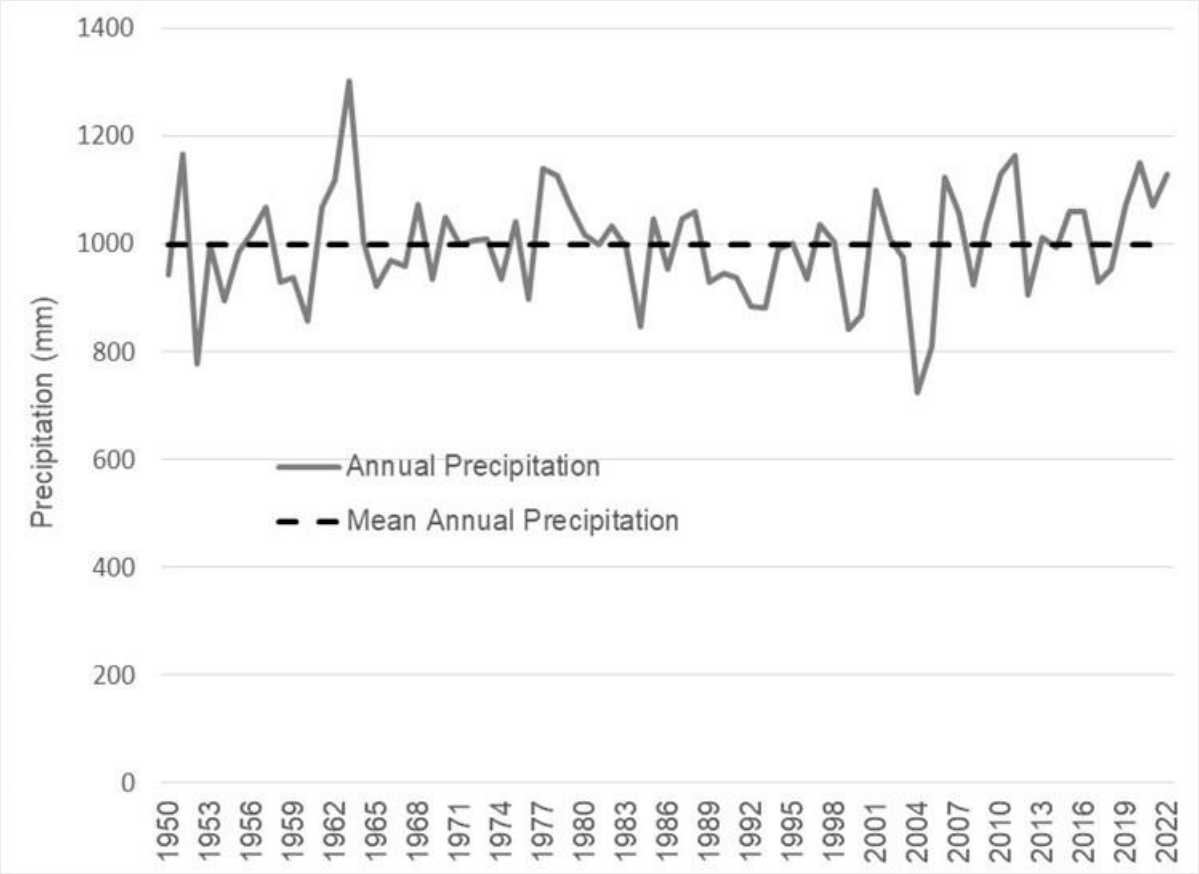


FIGURE 6-13 ANNUAL PRECIPITATION FOR BUGESERA DISTRICT 1950-2022 (HARRIS ET AL., 2020)[39]

Figure 6-13 shows annual precipitation for against MAP for Bugesera District. The interannual variability of precipitation is the magnitude of the year-by-year change and can be measured using the Coefficient of Variation (CV) statistic. The CV is the ratio of the standard deviation to the mean of a dataset. CV has been applied in long-term hydroclimatic variability studies and a global data set of 11,791 rainfall stations report by Chen et al.,[40] (2014) had a mean CV of 27%. The interannual variability of rainfall for the Bugesera District dataset is low by global standards as the CV is 9.8%.

The box and whisker chart (Figure 6-14) shows the distribution of monthly rainfall information into quartiles, highlighting the mean (x) and outliers (o). The lines extending vertically from the boxes indicate variability outside the upper and lower quartiles, and any point outside those lines or whiskers is considered an outlier.

[39] Rainfall information - Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3.
[40] Chen, J., Wu, X., Finlayson, B.L., Webber, M., Wei, T., Li, M., and Chen, Z., 2014, Variability and trend in the hydrology of the Yangtze River, China: Annual precipitation and runoff, Journal of Hydrology, 403-412.

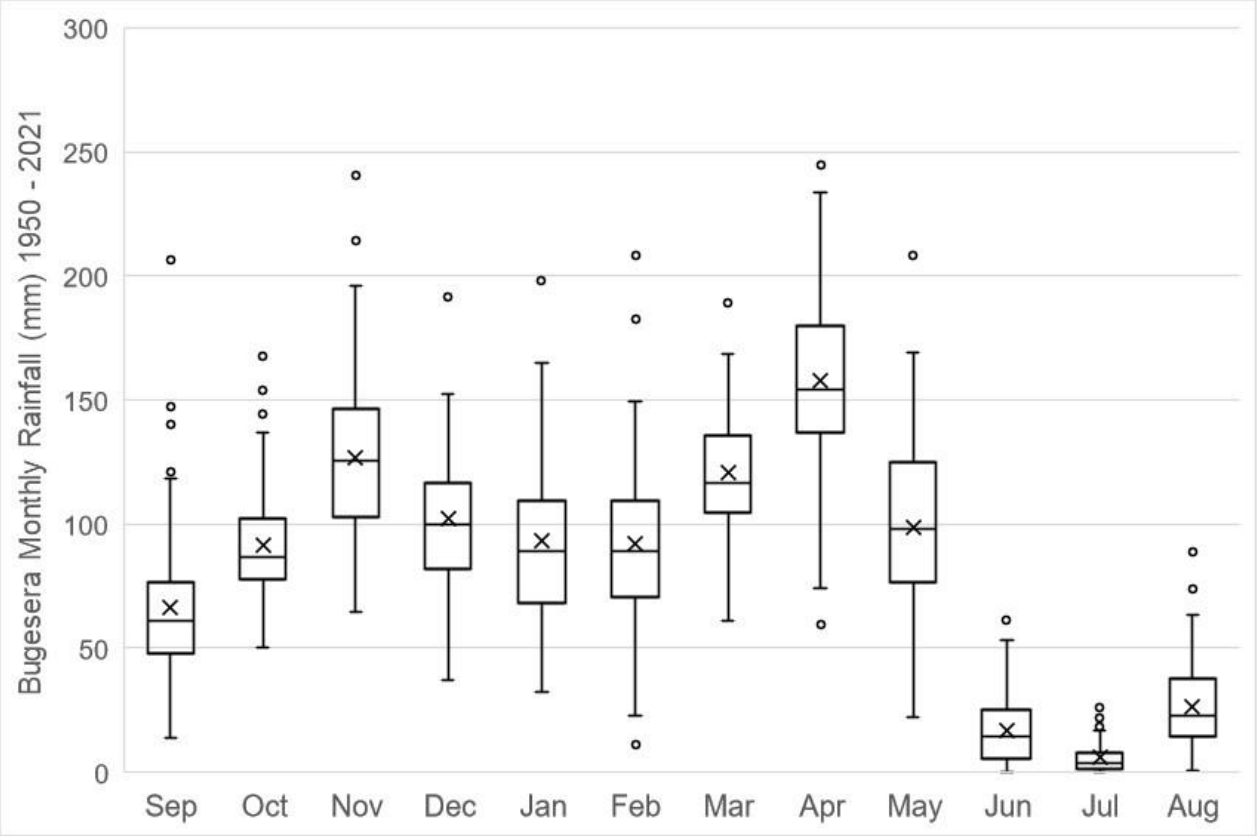


FIGURE 6-14 MONTHLY RAINFALL VARIABILITY FOR BUGESERA 1950-2020 (HARRIS ET AL., 2020)

I terms of drought, the eastern region of the country, including Bugesera District, has experienced drought in the following in La Niña and El Niño years since 1950: 1953-1954, 1963-1964, 1982-1983, 1986-1987, 1991-1992, 1977-2000 and 2005-2006 (see Figure 6-13).

6.2.5.2 TERRAIN AND LAND USE

Bugesera District comprises of small to medium-sized hills characterized by gentle to moderate slopes covered with vegetation including crops like millet, maize, cassava, yams and bananas. Valleys and lowlands are often fertile and suitable for agriculture. Several lakes and wetlands are also a key feature of the landscape.

The BSEZ Project area was previously used for agriculture and covers an area of approximately 335 ha and is situated to the East of the NR5 highways running from Kigali to Burundi with a further road at the northern end of the Project area (Earth Systems, 2023).

6.2.5.3 HYDROLOGICAL NETWORK

The BSEZ Project area is in the upper part of the catchment that supplies Lakes Gaharwa and Kilimbi and it is part of the larger Nyabarongo River catchment (Earth Systems, 2023). The hydrology of the Project area and monitoring points are shown in Figure 6-15.

The BSEZ Project area sits on the eastern face of a raised linear ridge aligned north to south, with surface water runoff draining eastward towards two large lakes, namely, Lake Kilimbi and Lake Gaharwa both of which have a surface area of 230 ha and an average depth of 2.5m[41].

There is an upland ephemeral watercourse (man-made channel) which runs directly from the center of the BSEZ Project area downstream, into Lake Gaharwa roughly 4 km east of the BSEZ Project area. There are two other ephemeral watercourses (altered but not man-made) that could receive runoff from the northernmost and southernmost limits of the BSEZ Project area (see Figure 6-15), including the following:

- To the north of the BSEZ Project area, a surface drainage system runs from SWQ5 eastward, into Lake Kilimbi.
- To the south of the BSEZ Project area, another drainage system (locally named Mbunganzeru Creek) likely receives water falling on the southern limits of the BSEZ Project area. This drains from SWQ6 eastward into Lake Gaharwa (Earth Systems, 2023).

[41] Charles and Jevan (2013) Managing and coping with drought in Bugesera natural region of Rwanda: Kavumu Village Rainwater Conservation Plan, East African journal of Science and |technology, Vol. 3, 88-103.

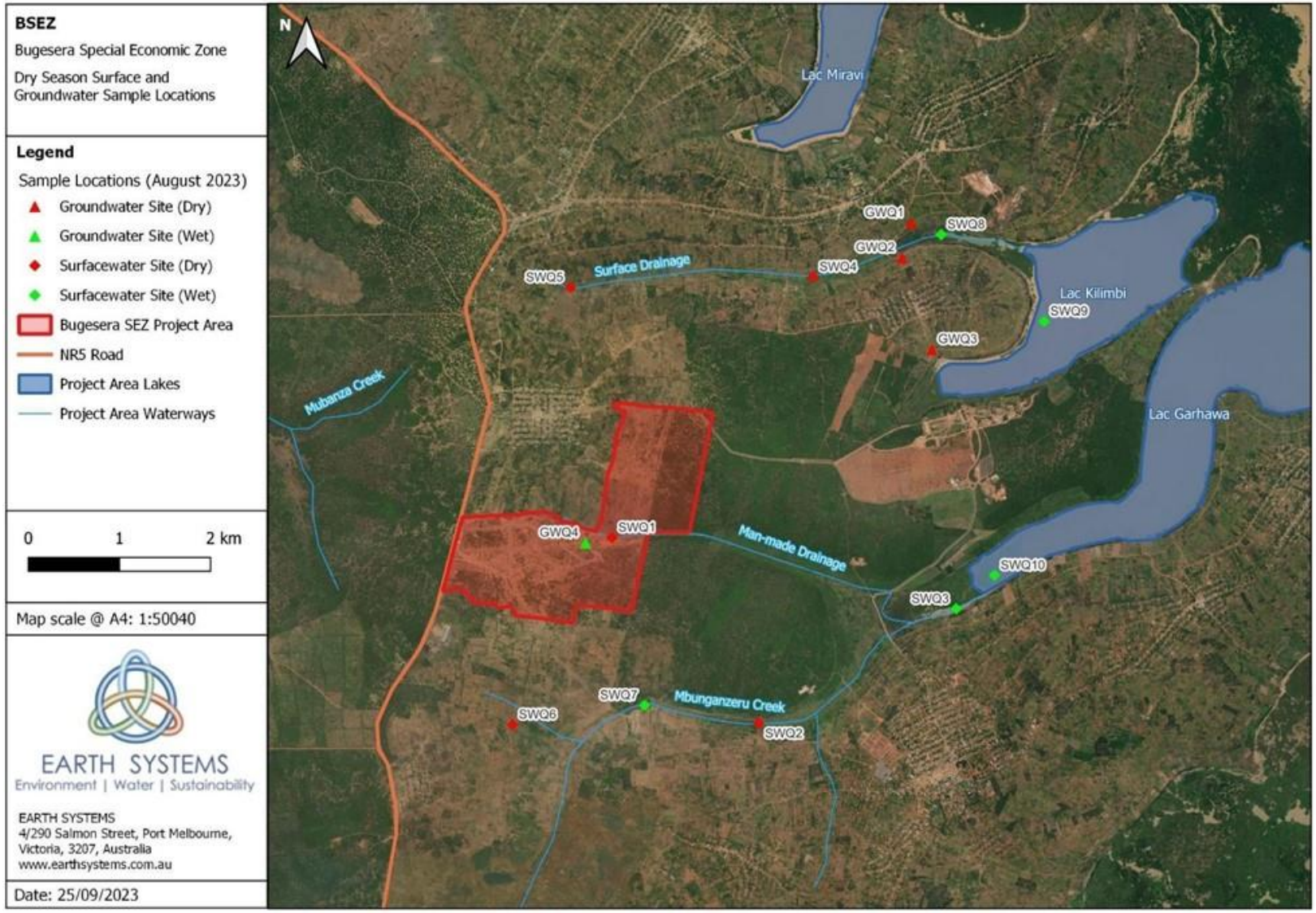


FIGURE 6-15 HYDROLOGICAL FEATURES AND MONITORING SITES (EARTH SYSTEMS, 2023).

6.2.5.4 WATER ABSTRACTIONS

The Water and Sanitation Corporation (WASAC) has installed pumps within and around the Project area for the local use, this water is currently used during existing activities in the Project area and for basic needs by the local community including drinking, cleaning, and cooking.

The Project area is located close to Lake Kilimbi (4 km) and Lake Gaharwa (3.8km) and associated wetlands as well as a small dam on Mbunganzeru creek. These lakes provide water for livestock in the area, for agriculture and serve the local population that can't afford to pay for water from WASAC pumps. In such instances, lake water is used by the villages for drinking, cooking, animal watering and washing.

The ephemeral watercourse in the Project area currently serves companies operating in the Project area and the local community during the wet season (Earth Systems, 2023).

6.2.5.5 FLOOD RISK

The Bugesera District is prone to flooding from the Nyabarongo River[42]. The BSEZ Project area sits on the eastern face of a raised linear watershed aligned north to south and is not situated in the Nyabaraongo floodplain. Fluvial flood risk is therefore low.

Surface water runoff from the BSEZ Project area predominantly flows into the man-made drainage ditch that crosses the site (Figure 6-15). Given the topography of the Project area flooding from surface water runoff is a moderate risk. Runoff will be managed so as not increase downstream flows from the Project area and to protect infrastructure in the Project area from surface water flooding.

6.2.5.6 SURFACE WATER QUALITY MONITORING

Water quality monitoring locations are shown in Figure 6-15 and Table 6-17, and monitoring data for the five surface water sampling sites (SWQ3, SWQ7, SWQ8, SWQ9, SWQ10), are shown in Table 6-18.

Surface water monitoring sites were chosen to represent surface water within the Project area, upstream and downstream including sites along Lake Kilimbi and Lake Gaharwa.

TABLE 6-17: SURFACE WATER QUALITY MONITORING LOCATIONS (UTM ZONE 29N).

Site ID	Site Description	Easting	Northing
Surface Water Quality Monitoring Sites			
SWQ1	Surface water site in the man-made drainage channel	191329	9747402
SWQ2	Surface water site on Mbuganzeru Creek. This site is located on a small bridge where a road crosses the drainage.	192946	9745381
SWQ3	Standing stagnant pools on the edge of the wetland area on the western side of lake Gaharwa. This site is likely submerged during the wet season.	195113	9746631

[42] Republic of Rwanda, Ministry of Disaster Management and Refugee Affairs (2012) Disaster High Risk Zones on Floods and Landslides, Kigali, March 2012.

Site ID	Site Description	Easting	Northing
SWQ4	Surface water site running through cropland. According to locals this flows during the wet season.	193534	9750250
SWQ5	Surface water site running through cropland. According to locals this runs during the wet season.	190867	9750130
SWQ6	Surface water site on Mbuganzeru Creek.	190240	9745356
SWQ7	Man-made dam on Mbuganzeru Creek has created a small lake.	191690	9745571
SWQ8	Rwandarushya lake. The wetland area (connected to Kilimbi) to the west of lake Kilimbi.	194940	9750715
SWQ9	The head of lake Kilimbi. Sample taken from the middle of the lake.	196073	9749770
SWQ10	The head of lake Gaharwa. Sample taken from the middle of the lake.	195532	9746997

Key surface water quality results of the sampling sites are outlined below:

- Water quality across the five sampling sites is characterized by near-neutral pH (ranging between 7.14 and 7.49) and generally low water hardness (between 30 and 80 mg/L), alkalinity (between 50 and 110 mg/L) and dissolved solids (between 76.35 and 133 mg/L).
- Baseline water quality is the poorest in Mbunganzeru Creek, located to the south of the BSEZ. Water quality is monitored at an upstream site (SWQ7) and a downstream site (SWQ3). Water quality in this creek is characterized by very high E. Coli concentrations, high organic content and elevated dissolved metal concentrations including iron, manganese chromium (VI) and cyanide. Water quality relating to each parameter is discussed in more detail below.
- At all five monitoring sites, concentrations of E. Coli consistently exceeded the WHO Drinking Water Guidelines and the Rwanda National Standards/East African Community Standards for Potable Drinking Water (RS EAS 12: 2018, Third Edition), which is an indication of faecal pollution.
- Dissolved metal concentrations were found to be generally low and consistently below relevant water quality standards, except for concentrations of iron, manganese and chromium (VI) which showed some exceedances.
- At all sampling sites, concentrations of iron exceeded the WHO Drinking Water Guideline and the Rwanda National Standards/East African Community Standards for Potable Drinking Water (RS EAS 12: 2018, Third Edition).
- Dissolved manganese concentrations exceeded WHO Drinking Water Guideline at SWQ3 the Rwanda National Standards/East African Community Standards for Potable Drinking Water (RS EAS 12: 2018, Third Edition) were exceeded at SWQ7.
- Dissolved chromium (VI) exceeded applicable Rwanda National Standards for drinking water and industrial effluent as well as WHO Drinking Water Guideline (all 0.05 mg/L) at the upstream site in Mbunganzeru Creek (SWQ7).
- Concentrations of the following parameters were below the guideline limit at all monitoring sites: Chloride, Fluoride, Nitrites, Nitrates, Magnesium, Phosphates and Calcium.

- Cyanide concentrations exceeded the Rwanda National Standards/East African Community Standards for Potable Drinking Water (RS EAS 12: 2018, Third Edition) at both monitoring sites in Mbuganzeru Creek (SWQ3 and SWQ7), ranging between 0.013 and 0.017 mg/L. It is uncertain whether these values reflect analytical error or true values. Cyanides can occur both naturally or from anthropogenic sources. Natural sources include several plant types including millet and cassava, amongst others, (ATSDR, 2006[43]) both known to be grown locally. Alternatively, certain industrial effluents could contribute cyanide to surface water, however there are no current indications that this is the case in Mbunganzeru Creek. Further monitoring of surface water should be undertaken to verify these results (Earth Systems, 2023).

[43] Agency for Toxic Substances and Disease Registry, ATSDR (2006), Toxicological profile for Cyanide. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

TABLE 6-18 SURFACE WATER QUALITY DATE FOR THE DRY SEASON BASELINE

Parameter	Unit	Mbunganzeru Creek		Unnamed Surface Drainage	Lake Kilimbi	Lake Garhawa	Rwanda Standards for Drinking Water (2018)	WHO Drinking Water Guidelines (2017)	EAC Industrial Wastewater Effluent Standards
		SWQ3 Downstream	SWQ7 Upstream	SWQ8	SWQ9	SWQ10			
Microbiological parameter									
E-coli	MPN/ 100ml	>2419.6	>2419.6	14.2	12.8	15.6	Not detectable	Absent	-
Physical parameters									
Turbidity	NTU	987	233	5.56	13.8	29.1	5	-	
pH	Log units	7.31	7.15	7.14	7.49	7.48	6.5-8.5	6.5-8.5	
Total suspended solids	mg/L	674	674	6	11	29	Not detectable	-	50
Total hardness	mg/L	80	50	46	30	50	300	-	-
Total dissolved solids	mg/L	87.15	99.6	133	76.35	79.65	1000	1000	-
Total Alkalinity	mg/L	69	50	110	67	65	300	-	-
Major Ions									
Chloride	mg/L	146.8	27.0	15.1	6.7	14.1	250	250	-
Fluoride	mg/L	<0.02	0.50	0.44	0.39	0.46	1.5	1.5	-
Cyanide	mg/L	0.017	0.013	0.002	0.001	0.001	0.01	0.07	-
Nitrites	mg/L	0.002	0.005	0.003	0.001	0.00	0.9	3	-
Nitrates	mg/L	6.0	0.7	0.6	0.7	0.6	45	50	-
Phosphates	mg/L	0.65	0.34	0.82	0.75	0.41	2.2	-	-
Sulfate	mg/L	<2	5	<2	<2	1	400	250	-
Calcium	mg/L	20	16	13.6	11.2	12.8	150	-	-
Magnesium	mg/L	0.72	0.24	0.288	0.048	0.432	100	-	-
Dissolved Metals									

Parameter	Unit	Mbunganzeru Creek		Unnamed Surface Drainage	Lake Kilimbi	Lake Garhawa	Rwanda Standards for Drinking Water (2018)	WHO Drinking Water Guidelines (2017)	EAC Industrial Wastewater Effluent Standards
		SWQ3 Downstream	SWQ7 Upstream	SWQ8	SWQ9	SWQ10			
Iron	mg/L	5.2	4.29	1.08	1.26	2.59	0.3	0.3	3.5
Manganese	mg/L	1.0	0.210	0.014	0.028	0.051	0.1	0.4	-
Aluminium	mg/L	0.312	0.013	0.013	0.011	0.015	0.2	0.2	-
Arsenic	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01
Cadmium	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	0.003	0.01
Chromium VI	mg/L	0.003	0.066	0.004	<0.01	<0.01	0.05	0.05	0.05
Copper	mg/L	0.88	0.72	0.04	0.03	0.05	1	2	3.0
Lead	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.1
Zinc	mg/L	<0.01	0.01	0.01	0.01	<0.01	5	3	5.0
Other Parameters									
COD	mg/L	533	82	18	184	70	-	-	250
BOD_5	mg/L	153.15	22.1	5	48	20.5	-	-	50

6.2.6 SUMMARY OF PHYSICAL ENVIRONMENT SENSITIVITIES

- The natural environment, including the aquifers present in the study area:
    - The closest surface water bodies are Lake Gaharwa and Lake Kilimbi which lie approximately 5 km to the east of the site. Please refer to Figure 6-11 to view the lake positions; and
- Human receptors, who are users of the groundwater and surface water resources:
    - Satellite imagery shows the presence of a village approximately 750 m to the north of the northern boundary of the SEZ, and directly to the east of the NR5 highway. Two buildings lie between 500 and 1,000 m south of the site on either side of the NR5 highway. The source of water used is not currently known.

6.3 BIOLOGICAL ENVIRONMENT

Two iterative approaches were undertaken during this EIA study to understand the biodiversity baseline and abiotic conditions influencing biodiversity composition and dynamics in the Project area.

Initially, a desktop review was compiled using data from official websites, internationally recognised databases, and peer-reviewed literature.

Information collated from this informed the Critical Habitat Screening – providing a preliminary list of priority biodiversity features that could trigger critical habitat within the AoI.

The AoI considered for the biodiversity baseline took the topography into account, considering where and how far potential runoff could reach, as well as the potential extent of unplanned noxious emissions, distribution of seeds of alien invasive plants as well as land most likely to be cleared to compensate for loss of currently cultivated land within the Project area.

Second, two field surveys were conducted, first between 14 to 18 August 2023 (dry season) and again between 24 and 26 October 2023 (early wet season) by ERM. Surveys investigated the AoI and nearby natural habitats as have been on some of the site prior to clearing. The area covered during the field investigation is shown in Figure 6-16.

6.3.1 DESKTOP SURVEY

Reconnaissance of the project area and its immediate surroundings was done together with a desktop review to gather information from previous survey reports and available information for the target area. The literature study included the Potential Natural Vegetation (PNV) map of Eastern Africa version 2.0 (VECEA: http://vegetationmap4africa.org/), as well as species lists from the Global Biodiversity Information Facility (GBIF).

6.3.2 FIELD SURVEYS

The specific objectives of the field surveys (full methods contained in the biodiversity baseline report) were to:

Establish a biodiversity baseline for vegetation habitats, herpetofauna, mammas, avifauna, wetlands and key aquatic micro-organism assemblages that can be used to interpret the state of downstream aquatic habitats – the latter to be used in future monitoring;

Identify highly sensitive habitats and species within the AoI, including priority areas for avoidance, mitigation, rehabilitation and monitoring;

Search for Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and Near-Threatened (NT) species, collectively referred to as species of conservation concern (SCC) (including potential suitable habitat for these species) and verify the presence or absence of critical habitat; and

Map the extent of habitats prior to clearing the expansion areas, as well as currently encountered for the AoI.

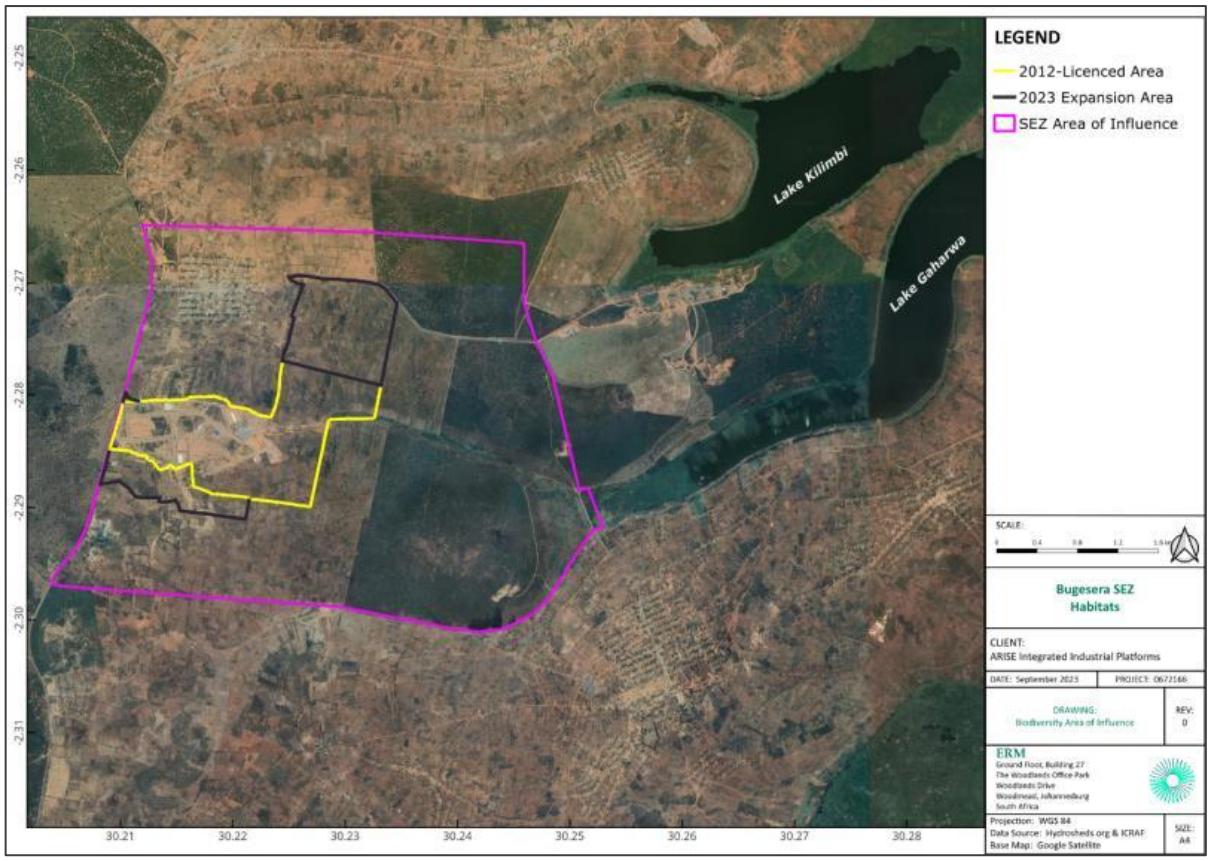


FIGURE 6-16 PROJECT AREA AND POTENTIAL AREA OF INFLUENCE INVESTIGATED

6.3.3 CONSERVATION AREAS

A 25 km buffer area outside the Project Boundary was scanned for protected areas, key biodiversity areas (KBAs), biodiversity hotspots and Ramsar sites[44]. In summary, the most important habitat just over 2 km east of the site boundary is the Rweru-Mugesera wetland, currently under control of the state following the Law on Governing Land[45]. A summary of these priority biodiversity areas is presented in Table 6-19 below.

TABLE 6-19 CONSERVATION AREAS WITHIN 25 KM OF THE PROJECT BOUNDARY

Area	Classification	Key Aspects
Protected at National Level		
Forêt de Murehe, Burundi	National Protected Landscape	• Approximately 6 km south of the Project boundary
Lacs du Nord, Burundi (connected to the Lake Rweru wetland complex)	National Protected Landscape	• Approximately 12 km south-east (Lake Rweru portion) and 15 km south-west (Lake Cyohoha portion) of the Project boundary

[44] https://www.ramsar.org/country-profile/rwanda, accessed 16 August 2023
[45] Rwanda Law No 27/2021, published in the Official Gazette Special of 10 June 2021, viewed on: https://gazettes.africa/akn/rw/officialGazette/government-gazette/2021-06-10/Special/mul@2021-06-10

Area	Classification	Key Aspects
		• Also referred to as Paysage Aquatique Protégé du Nord
Lake Cyohoha	National protected wetland	• See information on Lake Cyohoha KBA below
Mugesera downstream wetland	National protected wetland	• See *information on Nyabarongo wetlands/Lake Rweru KBA below*
Internationally Recognised Biodiversity Areas		
Nyabarongo wetlands including Lake Gaharwa and Rweru and Nyabarongo River	KBA[46]	• Closest point approximately 2.2 km east of Project boundary • This includes the portion of Lacs Du Nord area protected in Burundi • Landscapes included cover forest, shrublands, grasslands and wetlands, with between 40 and 50 percent of the area modified. • Species triggering the KBA: eight bird species and two fish species, of which several are endemic to Lake Victoria Basin • Endemic fish species include Synodontis ruandae and the Critically Endangered fish *Labeo victorianus*
Lake Cyohoha South including Paysage Aquatique Protégé du Nord and Forêt de Murehe, both Burundi	KBA[47], Ramsar Site	• Closest point approximately 12 km south-west of Project boundary • This is a complex of eight perennial freshwater lakes and swamps in the upper reaches of the Nile basin. • Biodiversity is high with several IUCN Red Listed species including the endemic fish species *Barbus acuticeps* and *Synodontis ruandae*, the CR fish *Labeo victorianus*, the Madagascar Pond Heron (*Ardeola idea)*, and the EN Grey Crowned-Crane (*Balearica regulorum)*. • The site is important habitat for waterbirds and migratory birds.
Akanyaru wetlands	KBA[48]	• *Closest point approximately 22 km west of Project boundary* • Swamps and riverine forest areas under immense pressure from agricultural modification. • Species triggering the KBA: nine bird species, of which several are endemic to the Lake Victoria Basin

[46] Key Biodiversity Areas Partnership (2023) Key Biodiversity Areas factsheet: Nyabarongo wetlands, Lake Rweru. Extracted from https://www.keybiodiversityareas.org/site/factsheet/100094 on 16 August 2023

[47] Key Biodiversity Areas Partnership (2023) Key Biodiversity Areas factsheet: Lake Cyohoha South. Extracted from https://www.keybiodiversityareas.org/site/factsheet/100090 on 16 August 2023

[48] Key Biodiversity Areas Partnership (2023) Key Biodiversity Areas factsheet: Akanyaru wetlands. Extracted from https://www.keybiodiversityareas.org/site/factsheet/6777 on 16 August 2023

6.3.4 FLORA, VEGETATION AND HABITATS

The Potential Natural Vegetation (PNV) map of Eastern Africa[49] identified potentially four major vegetation types across or in close proximity to the SEZ, of which three could be confirmed in a natural or near-natural state within the AoI investigated. In addition, several modified habitats were identified.

The extent of vegetation habitats is summarised in Table 6-20, with examples of natural and modified habitats shown in Figure 6-17.

TABLE 6-20 EXTENT OF HABITATS IDENTIFIED

Habitat	Type	Site Ecological Importance / Habitat Sensitivity	Extent of Habitat by 2020 (ha)		Extent of Habitat post 2020 (ha)	
			Project Site	AoI (incl.)	Project Site	AoI (incl.)
Broad-Leaved Thicket	Natural but disturbed	High	58	692	0	514
Riparian Thicket (*including Modified Wetland*)	Modified	Medium	5	118	-	93
Modified Wetland	Modified	Medium	8	78	8	78
Fallow and Cultivated Land	Modified	Very Low	171	618	231	810
Timber Plantations	Transformed	Very Low	-	3	1	4
Quarries	Transformed	Very Low	-	5	-	5
Townships	Transformed	Very Low	-	71	-	71
Industrial Areas	Transformed	Very Low	95	116	95	116
Totals			335	1627	335	1627

Broad-Leaved Thicket – part of the 'Evergreen and semi-evergreen bushland and thicket' as described by the PNV map – is a structurally high and variably dense thicket with few emergent trees, the latter mostly *Euphorbia candelabrum*. This habitat originally covered sections of the SEZ expansion areas but has been cleared around 2020 within the SEZ.

Riparian Thicket – being a mixture between 'Evergreen and semi-evergreen bushland and thicket' and 'Riverine Thicket' as per PNV map was found along the valley bottom east of the Project site, into which the stormwater drainage of the SEZ flows before potentially reaching Lake Gaharwa. The prevalence of alien invasive species, notably *Senna* species, *Tithonia diversifolia* and *Lantana camara* was significant, whilst the vegetation structurally resembled a variably dense high shrubland with no emergent trees.

[49] Kindt, R., van Breugel, P., Lillesø, J-P. B., Minani, V., Ruffo, C. K., Gapusi, J., ... Graudal, L. (2011). Potential Natural Vegetation of Eastern Africa (Ethiopia, Kenya, Malawi, Rwanda, Tanzania, Uganda and Zambia). Volume 9: Atlas and Tree Species Composition for Rwanda. Department of Geosciences and Natural Resource Management, University of Copenhagen. IGN Report. GIS layers for VECEA available at http://vegetationmap4africa.org/

- **Modified Wetland** – this highly variable habitat was found within the above Riparian Thicket and part of the modified wetland also originates in the central eastern portion of the SEZ. Vegetation within the SEZ is entirely modified and dominated by alien species, whilst east of the SEZ has patches of stoloniferous grass patches and occasionally inundated areas with emergent sedges.

Fallow and Cultivated Land covered the largest extent of the Project area and AoI – outside settlements and entirely transformed industrial sites – prior to 2020 and currently and consist of a mixture of cultivated fields separated by narrow 'green fences' of *Euphorbia tirucalli*, *Lantana camara* and *Agave* species and occasional stands of *Eucalyptus* plantations. The most commonly cultivated crops are maize, legumes, sweet potatoes and cassava.

Timber Plantations consisted mostly of *Eucalyptus* species, with no noticeable undergrowth due to the allelopathic effect of *Eucalyptus* litter.

Quarries – these were found outside the SEZ, but not in use by the SEZ as far as could be established. These were not further investigated but were devoid of any vegetation (see maps in Section 6.3.6 (Figure 6-22)).

Townships and **Industrial Areas** made up the last two habitats, and due to their entirely transformed nature and ongoing anthropogenic disturbance were not further investigated from a biodiversity perspective (see maps in Section 6.3.6).

Broad-Leaved thicket with the emergent *Euphorbia candelabrum*

Variably dense and patchy Riparian Thicket

Modified wetland, with a stormwater drainage canal constructed across its centre

Cultivated and fallow land areas

FIGURE 6-17 EXAMPLES OF THE NATURAL AND MODIFIED HABITATS FOUND IN THE PROJECT AREA OF INFLUENCE

The above habitats (Figure 6-17) were present before the soil clearing in 2020 and as currently encountered during the field work are mapped in Figure 6-21 and Figure 6-22 respectively.

6.3.5 FAUNA

6.3.5.1 HERPETOFAUNA

A single herpetofaunal species (African Striped Skink, *Trachylepis striata*) (Figure 6-18) was observed within the AoI during the dry season survey. However, a range restricted species has been reported in downstream Lake Rweru wetlands, i.e. the Rwanda Long Reed Frog (*Hyperolius rwandae*; LC). Residents have also reported the occasional presence of the Central African Rock Python (*Python sebae*, NT) within the study area. The extent of herpetofauna diversity observed was limited as the project site is highly disturbed, leading to less suitable habitat and areas of refugia.

FIGURE 6-18 AFRICAN STRIPED SKINK (*TRACHYLEPIS STRIATA*) OBSERVED DURING THE DRY SEASON SURVEY

6.3.5.2 MAMMALS

Using observational methods, no mammals were found within the AoI during the dry nor wet season surveys. However, tracks, burrows, and droppings of mammals were observed, possibly belonging to small rodents and the Side-striped Jackal (*Canis adustus;* LC) (Figure 6-19). Moreover, Yellow-winged Bats (*Lavia frons*) were observed outside the project site. Hippo (*Hippopotamus amphibius;* VU) (may still be present in Lake Rweru), Tree Pangolin (*Phataginus tricuspis;* EN), and Ground Pangolin (*Smutsia temminckii;* VU) have been historically reported as present in suitable habitats within the AoI and beyond. The extent of mammal diversity observed was limited due to high disturbance levels and limited suitable habitat.

Mammal droppings possibly belonging to Side-striped Jackal (*Canis adustus*)

Yellow-winged Bat (*Lavia frons*) seeking refuge in a *Euphorbia* after being flushed

Mammal droppings from a small antelope such as Common Duiker (*Sylvicapra grimmia*)

FIGURE 6-19 EVIDENCE OF MAMMALIAN PRESENCE BASED ON SCAT AND DIRECT OBSERVATIONS FOUND IN THE PROJECT AREA OF INFLUENCE

6.3.5.3 BIRDS

Only 63 bird species were recorded in the broader AoI. None of the species observed were of conservation concern and as majority of the proposed development site consists of cultivated or cleared land, species specific to a certain habitat were not present. During the surveys, most of the birds present on the development site were generalist that thrived in various environments. The most commonly observed bird species on the Project Site are listed in Table 6-21 below, as well as in Figure 6-20.

TABLE 6-21 AVIFAUNAL SPECIES OBSERVED IN PROJECT AREA

Species Observed	Common Name (if available)	Conservation Status (IUCN)
Buteo augur	Augur Buzzard	Least Concern (LC)
Calamonastes undosus	Miombo-Wren Warbler	Least Concern (LC)
Cinnyris mariquensis	Marico Sunbird	Least Concern (LC)
Pycnonotus barbatus	Dark-capped Bulbul	Least Concern (LC)
Pytilia melba	Green-winged Pytilia	Least Concern (LC)
Spermestes cucullate	Bronze Mannikin	Least Concern (LC)
Turtur chalcospilos	Emerald-spotted Wood Dove	Least Concern (LC)
Crithagra mozambica	Yellow-fronted Canary	Least Concern (LC)

Augur Buzzard (*Buteo augur*)

Emerald-spotted Wood Dove (*Turtur chalcospilos*)

Green-winged Pytilia (*Pytlia melba*)

Grey-backed Fiscal (*Lanius excubitoroides*)

FIGURE 6-20 COMMON AVIFAUNAL SPECIES OBSERVED DURING THE DRY SEASON SURVEY

6.3.5.4 THREATENED OR RANGE-RESTRICTED (ENDEMIC) FAUNA

Potential presence of threatened or range-restricted endemic fauna was preliminary screened using the GBIF platform and cross-referencing that with literature and the IUCN Red List of Threatened Species. The analysis in the AoI plus the 50 km buffer area (as typically screened for critical habitat) around revealed the potential presence of several Critically Endangered, Endangered and Vulnerable species (as per IUCN Red-list nomenclature[50]) included in Table 6-22. Although some of these species could occasionally frequent the Project site or the AoI and beyond, suitable habitat for the continued presence or breeding within the AoI was not available for any of the historically listed species.

No fauna species that could potentially trigger critical habitats could be confirmed within the AoI.

TABLE 6-22 FAUNA SPECIES OF PARTICULAR IMPORTANCE POTENTIALLY PRESENT IN THE AOI

Scientific and Vernacular Name	IUCN Status	Range-Restricted	Distribution Notes	Presence on Project Site
Herpetofauna: Amphibians				
Hyperolius rwandae Rwanda Long Reed Frog	LC	*Possibly, endemic*	This species is mostly known from Rwanda, observed in ponds, swamps, and open natural wetlands	No, potentially in wetlands and Lake Gaharwa

50 IUCN Red List of Threatened Species (IUCN RL or Red List): international standard for assessing threat status for species. The Red List is compiled by IUCN's global network of experts, specialist groups and partners. For further information, please see the IUCN Red List of Threatened Species website. Red List categories are: Critically Endangered (CR): Highest risk of extinction. A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild. Endangered (EN): Very high risk of extinction. A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild. Vulnerable (VU): Risk of extinction. A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

Scientific and Vernacular Name	IUCN Status	Range-Restricted	Distribution Notes	Presence on Project Site
				downstream of the site
Mammals				
Hippopotamus amphibius Common Hippo	VU	*no*	Sub-Saharan Africa, fragmented habitat availability. Hippos require some form of permanent water in which they can spend the day	No, potentially in Lake Gaharwa downstream of the site
Phataginus tricuspis Tree Pangolin	EN	*no*	Central and western tropical Africa, Rwanda along eastern extent of its range	No suitable habitat
Smutsia temminckii Ground Pangolin	VU	*no*	Across eastern and southern Africa, mostly excluding the tropical areas	No suitable habitat
Birds				
Aquila rapax Tawny Eagle	VU	*no*	Mostly sub-Saharan Africa excluding the tropical forest region and India	Could frequent the AoI
Balearica regulorum Grey Crowned Crane	EN	*no*	Eastern and Southern Africa	No, potentially in wetlands east of the Project site
Calamonastides gracilirostris Papyrus Yellow Warbler	VU	*no*	Mostly restricted to Rwanda, Burundi and Kenya	No, potentially in wetlands east of the Project site
Necrosyrtes monachus Hooded Vulture	CR	*no*	Across Africa	Could occasionally frequent the AoI
Terathopius ecaudatus Bateleur	EN	*no*	Sub-Saharan Africa excluding the tropical forest region	Could occasionally frequent the AoI
Fish				
Labeo victorianus Ningu	CR	*no*	Lake and river systems surrounding Lake Victoria. Spends most of its time in lakes, but migrates along large rivers and streams to spawn in flooded grasslands. *Note: detailed fish studies are beyond the scope of this Project, but it is listed here on a precautionary basis due to*	Potentially still present in the Lake Rweru complex, including Lake Gaharwa

Scientific and Vernacular Name	IUCN Status	Range-Restricted	Distribution Notes	Presence on Project Site
			potential impacts due to an unforeseen large spillage, of which the likelihood happening are considered low	

Abbreviations: CR – Critically Endangered; EN – Endangered; VU – Vulnerable; LC – Least Concern

6.3.6 CRITICAL HABITAT

As per Sections 6.3.6.1 and 6.3.5.4, **no critical habitat** could be confirmed within the AoI or prior to the 2020 clearings within the SEZ expansion area.

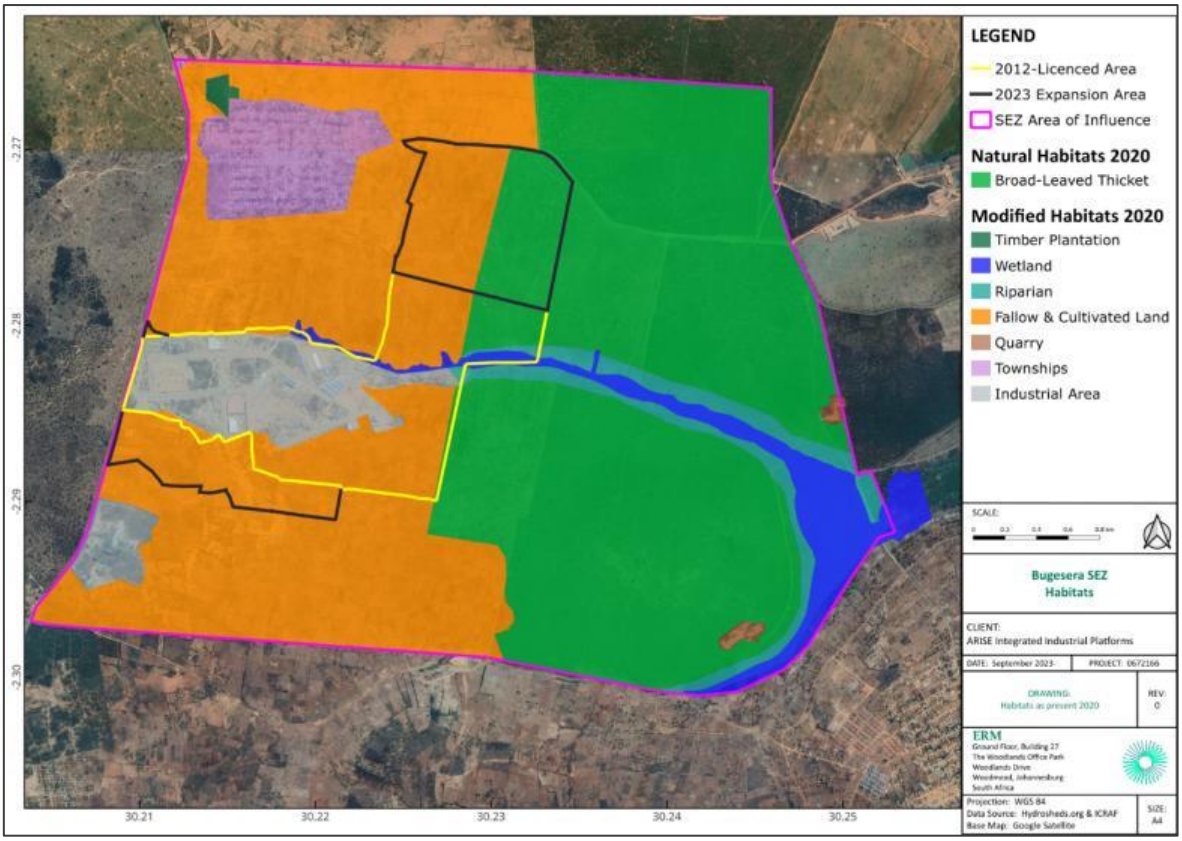


FIGURE 6-21 APPROXIMATE MAP OF HABITATS IDENTIFIED FOR 2020 FOR THE AOI

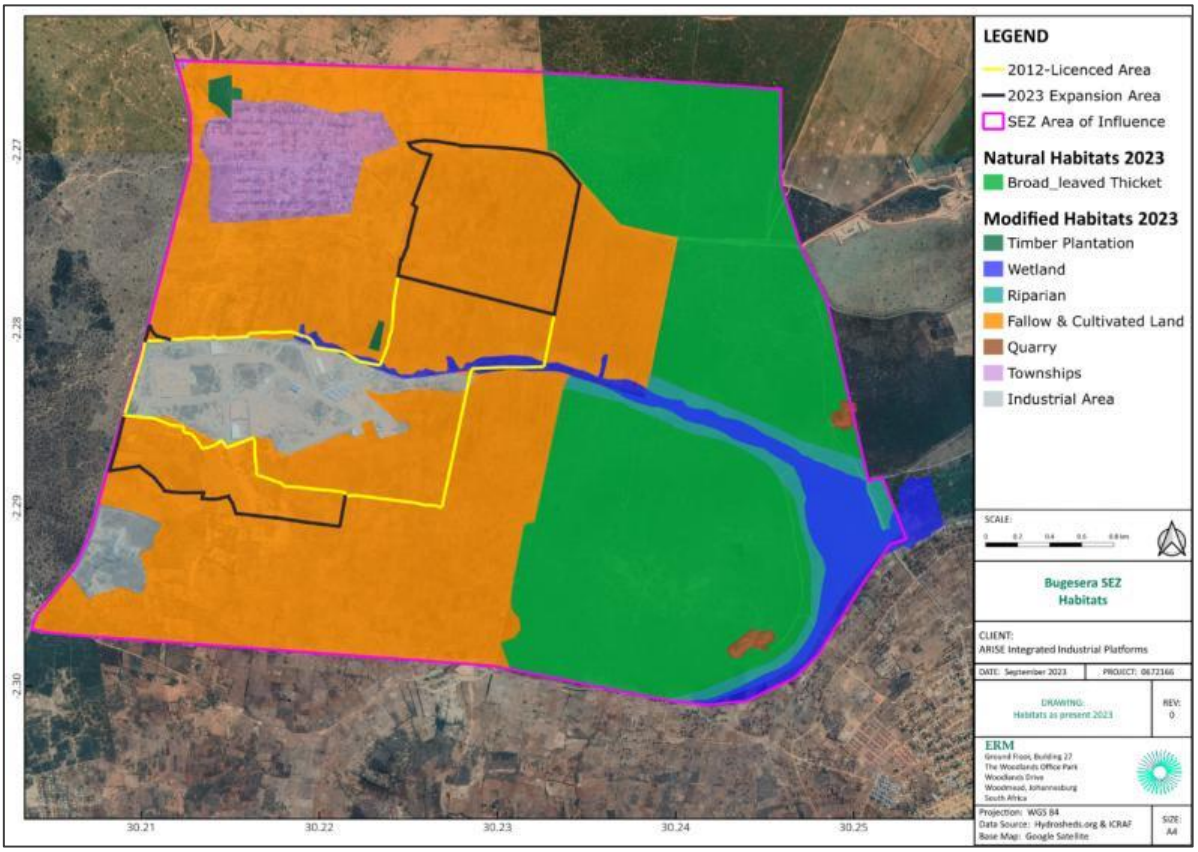


FIGURE 6-22 APPROXIMATE MAP OF HABITATS AS CURRENTLY WITHIN THE AOI.

6.3.6.1 THREATENED AND RANGE-RESTRICTED (ENDEMIC) FLORA

During the dry season survey most of the floristic component was in a dormant state – either without fruit and flower, or entirely absent (as seed, underground storage tuber). A preliminary list of species of conservation concern as identified in the Critical Habitat Screening is listed in Table 6-23 below. A full list of flora of conservation concerns will be presented after the wet season survey. Of note is that if such species are present in the AoI, this will be outside the current Project boundary.

No plant species that could potentially trigger critical habitat could be confirmed within the AoI.

TABLE 6-23 PLANT SPECIES OF PARTICULAR IMPORTANCE POTENTIALLY FOUND IN THE PROJECT AREA

Scientific name	IUCN Status	Range-Restricted	Distribution Notes	Presence on Project Site
Aloe macrosiphon	VU	*no*	Fragmented populations in the DRC, Kenya, Rwanda, Tanzania, and Uganda.	No, potentially in thickets outside the AoI, not observed
Commelina subscabrifolia	CR	*yes*	Two fragmented localities: Kolwezi in the DRC and Rwanda.	Unlikely
Englerina schubotziana	VU	*no*	Patchy distribution in Uganda, eastern DRC, Rwanda and north-western Tanzania	Unlikely due to lack of suitable host trees
Ipomoea lepidophora	EN	*yes*	Fragmented localities restricted to Rwanda and DRC, prefers grassland habitat	Unlikely
Murdannia stricta	EN	*yes*	Small localities restricted to Rwanda and DRC.	No, potentially in the wetlands east of the Project site
Rhipidoglossum bilobatum	VU	*no*	Fragmented populations in Burundi, DRC, Rwanda, and Uganda.	Unlikely
Vernonia sengana	VU	*no*	Patchy distribution Rwanda, Burundi, south-western Tanzania and south-eastern DRC	Uncertain, not observed

Abbreviations: CR – Critically Endangered; EN – Endangered; VU – Vulnerable

6.4 SOCIAL BASELINE

6.4.1 METHODOLOGY

This section describes the context of the socioeconomic environment potentially affected by the Project. The baseline has been established using primary and secondary data collected during the following two processes:

i. On-site baseline data collection to gather primary data from the Project-affected communities.

ii. Additional desktop research conducted, where necessary, to close any data gaps.

6.4.1.1 PRIMARY DATA COLLECTION METHODOLOGY

Primary data was collected through sampling of the Project-affected communities. This was carried out by *Earth Systems* over September and October 2023[51].

Socio-economic data collection was undertaken by social specialists in the following settlements (FIGURE 6-23):

- Village of Kagasa I;
- Village of Kagasa II;
- Village of Biryogo; and
- Village of Rweru II.

It should be noted that the village of Gaharwa, located at approximately 2 km north-east of the BSEZ Project boundary is shown to have village land that intersects the BSEZ. However, no Project affected households owning land in this portion of the BSEZ were identified at the time of the Earth Systems field work in September 2023. Therefore, the village of Gaharwa was not considered in this socio-economic study.

[51] Earth Systems (2023) Technical Memo: Socio-Economic Findings. Ref: ERM2464, 26 October 2023.

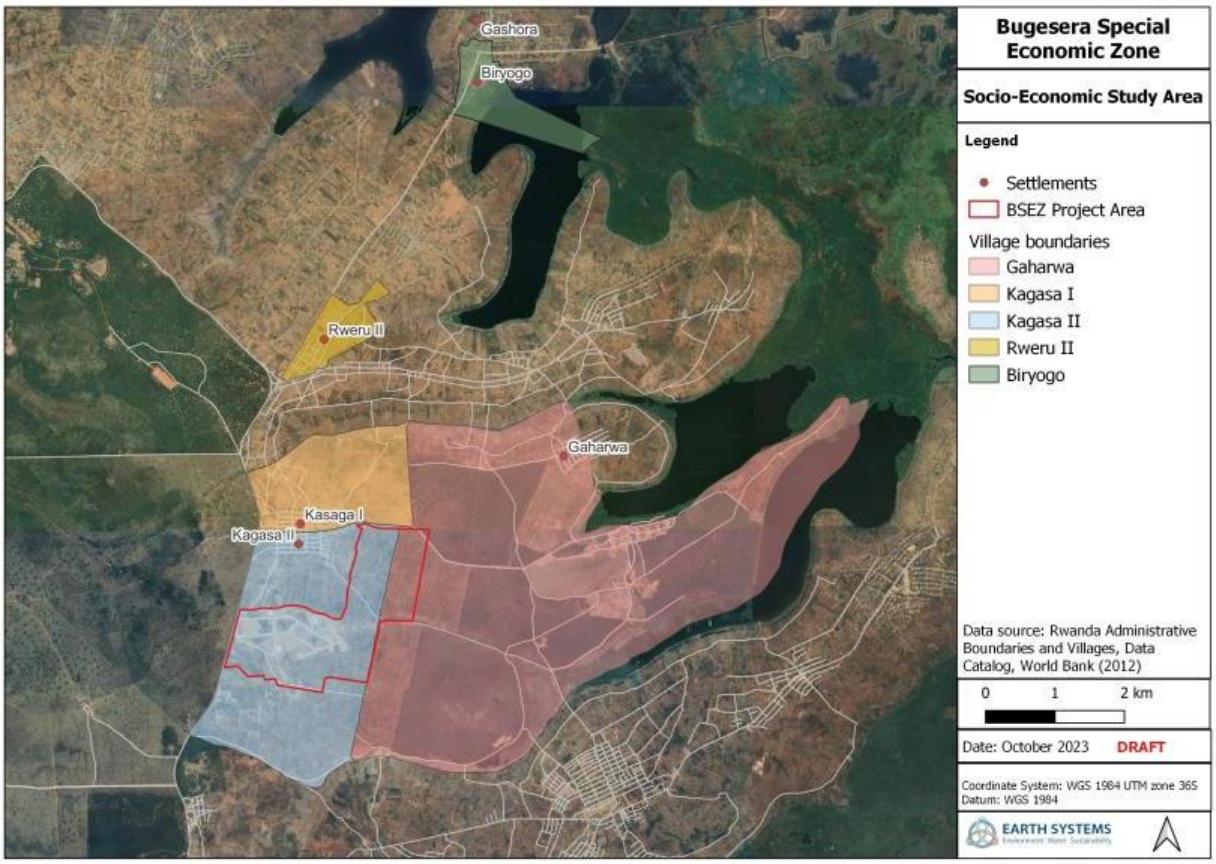


FIGURE 6-23 SOCIO-ECONOMIC SURVEY AREA

The collection of socio-economic baseline data was conducted primarily through:

1) Household surveys
2) Village-level surveys and interviews
3) Cell-level Focus Group Discussions (FGDs)
4) Government Authority Interviews

6.4.1.2 SOCIO-ECONOMIC HOUSEHOLD SURVEYS

Prior to conducting the socioeconomic baseline assessment, Earth Systems engaged Village Chiefs. The purpose of this engagement was to communicate the purpose and scope of the surveys and to request that the Chiefs encourage affected households to participate.

Socio-economic household surveys were conducted with Project resettled households now residing in the villages of Kagasa I, Kagasa II, Biryogo and Rweru II. A total of 76 households were identified and surveyed across the four villages.

6.4.1.3 VILLAGE-LEVEL SURVEYS

Village level surveys were conducted with the village heads of Kagasa I, Kagasa II, Biryogo and Rweru II. These surveys were held at the Ramiro Cell office[52] to gather general

[52] Government office for local authorities within the Ramiro Cell (a subdivision of of Gashora Sector within Bugesera District), located in R

information on each settlement through in-depth interviews in September 2023. Complimentary village-level socio-economic information was collected through separate one-on-one interviews with each village head in October 2023.

6.4.1.4 FOCUS GROUP DISCUSSIONS

Focus Group Discussions were conducted at the cell level, where communities from all surveyed settlements (Kagasa I, Kagasa II, Biryogo and Rweru II) villages attended with key demographic groups to obtain more detailed information on important land practises for local populations including women and youth groups in each of the villages surrounding the BSEZ Project area to ensure their voice and opinions were also captured and aided the development of the baseline understanding. The village surveys helped select members of each focus group which consisted of at least five people per group to be interviewed.

6.4.1.5 GOVERNMENT AUTHORITY INTERVIEWS

Consultations with the local government technical agencies and social service providers in the Gashora Sector were conducted in September 2023. Meetings were held with the following groups as part of the Government consultations:

- District and Sector authorities;
- Cell leaders and Village heads; and
- Rwanda Environment Management Authority (REMA).
- Rwanda Development Board (RDB)

The objectives of the initial meetings were to present the purpose of the initial baseline study and request information such as relevant reports and available statistics and seek authorisation to undertake household and village surveys.

The Gashora Sector representatives provided advice on ensuring the effective and safe conduct of surveys in villages and households. Further, meetings with community social service providers gave a holistic understanding on the failures, difficulties, and needs regarding safety and health aspects for the Study Area communities.

For further information on government consultations please refer to the Stakeholder Engagement Plan (Appendix D).

6.4.1.5.1Secondary Data Collection Methodology

To further understand socioeconomic factors in the macro-environment, desktop research was conducted to corroborate and complement outcomes of primary data collection. Secondary data was collected through the following methods:

- Review of official publications such as the National Population Census Data – National Institute of Statistics of Rwanda (2022);
- Additional desktop-based research, using reliable sources, where available.

6.4.2 AREA OF SOCIAL INFLUENCE (AOI)

The social Area of Influence (AoI) for the Project is used to describe the boundaries of the extent to which the direct or indirect socioeconomic impacts may be felt during the implementation and operation phases of the Project. The AoI can vary depending upon

the type of impact being considered and the attributes of the potentially affected receptors. In each case, the AoI includes all areas within which significant impacts are likely to occur, taking into account the following:

- Physical extent of the proposed works, defined by the limits of land to be acquired or used (temporarily or permanently) by the Project; and
- Nature of the socio-economic baseline environment and manner in which impacts are likely to be propagated beyond the Project boundary.

The AoI will encompass:

- The primary Project site, laydown areas and related facilities;
- Associated facilities whose viability and existence depend exclusively on the Project (when applicable);
- Areas potentially impacted by cumulative impacts from further planned development of the Project; and
- Areas potentially affected by impacts from unplanned but predictable developments caused by the Project.

6.4.2.1 AREA OF DIRECT INFLUENCE

The AoI for the proposed project encompasses the geographical area immediately neighbouring the site up to **1 km** from the site boundary.

This area was identified as the geographical extent most likely to be directly impacted or influenced by the proposed project. Including economic benefits (e.g. direct and indirect employment and socio-economic development), increased pressure on social resources (due to influx of labour and job seekers into the area), and environmental impacts such as noise, air quality, and traffic impacts. This area encompasses primarily agricultural land and formal and rural settlements. Table 6-24 provides a summarized description of the surrounding land uses.

TABLE 6-24 LAND USE SURROUNDING THE SITE

Direction from site	Land use	Name
North	Rural, agriculture (dryland)	Rweru II
Northeast	Formal settlement, agriculture (dryland)	Kagasa (I & II)
East	National road	NR5
	Undeveloped land	Cyaruhiririra
Southeast	Industrial/commercial	Imana Steel
South	Rural, agriculture (dryland)	Rutete
West	Rural, agriculture (dryland)	Gaharwa
	Undeveloped land	

The settlement of Kagasa is a formerly planned residential area laid out in grid street pattern. The community living in Kagasa comprises primarily low-income households.

Key forms of income are generated through agriculture (crop cultivation), salaried or wage work, and /or trades. There are over 494 households within the Kagasa settlement, with an average of four people per household, the population is estimated at 1976 people (Table 6-25).

It must be noted that the original Bugesera SEZ required the resettlement of a number of households from the SEZ site approximately 10 years ago, when resettlement was performed by MINICOM. A total of 76 Project resettled households were identified and surveyed. These Project-affected households now reside in the following four villages:

- Village of Kagasa I
- Village of Kagasa II
- Village of Biryogo
- Village of Rweru II

TABLE 6-25 STUDY AREA SETTLEMENTS POPULATION DATA

Village	Cell	Distance from SEZ boundary	No. of households	Population (estimate)*	No. of resettled HH surveyed in September 2023
Kagasa I	Ramiro	1 km	293	1,172	38
Kagasa II	Ramiro	1 km	201	1,804	29
Biryogo	Biryogo	8.48 km	157	628	3
Rweru II	Ramiro	10 km	257	1539	6

Source: Socio-economic household surveys with Project affected households, September 2023.

*Population estimates calculated based on the average number of members per household according to the National Institute Unit (2021) which is of 4 members per household.

Other settlement within area of Direct Impact (Figure 6-24) comprise rural agricultural settlements not formerly planned. These are generally along roads and pathways for ease of access to transport and fields. The majority of the agricultural area is, however, unsettled with individual plots clearly demarcated, which are presumed to be used by individual households in Kagasa and neighbouring areas for crop farming.

FIGURE 6-24 AREA OF DIRECT INFLUENCE – SOCIAL

6.4.3 COUNTRY CONTEXT AND ADMINISTRATIVE SUMMARY

Rwanda has two layers of government, namely central and local, with six administrative entities. These structures, which were reorganised under the 2005 reform, are complementary. The country is divided into five Provinces, including Southern, Northern, Eastern (project site), Western and Kigali (Capital City). Each province is further divided into districts, then sector, and smaller units called cells. Each cell is further divided into distinct village areas. Each province, district, sector, cell, and village have a formerly designated leadership structure, including governors, executive secretariates, councils, and consultative committees. Each level of governance has a set of responsibilities and reporting structure, which enables data collection and communication between the local areas and central government [53].

[53] https://www.gov.rw/government/administrative-structure

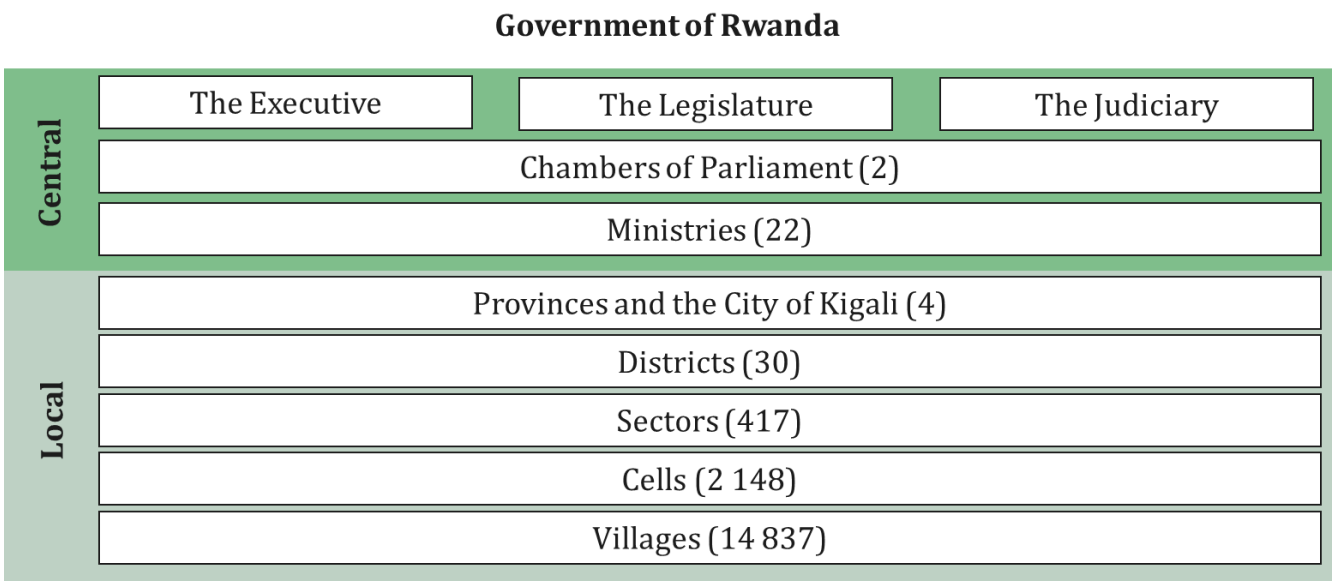


FIGURE 6-25 RWANDAN GOVERNANCE STRUCTURE[54]

6.4.3.1.1Provincial

The administrative structure of provinces consists of the *Governor of the Province*, which is the custodian of the authority of the State and the Government's delegate in the province. The main functions of the Governor of Province are to ensure the execution of and adherence to existing laws and regulations; to ensure the implementation of Government programs; and to take, within its competence and based on instructions from the Government, all measures, and initiatives to promote the general development of the province. The *Provincial Executive Secretary* ensures the coordination of the administrative and technical services of the province. The *districts* (headed by mayors) are entities for the promotion of democracy, solidarity, and a basis for socio-economic development[55].

6.4.3.1.2Local

The local administrative structure consists of *Sectors* which are territorial administrative entity responsible for the implementation of development programs, service delivery, and promotion of good governance and social welfare.

The *Cells* provide basic services and promote sustainable development. The *Villages* are the administrative entity or interface between governance and communities, in which the population directly participates in their own affairs and where they can reconcile their differences.

Each village is governed by a *Council* and an Executive Committee. The *Village Council* comprises all village residents aged 18 years old and above and is responsible for electing the members of the village's executive committee. The *Village Executive Committee* comprises the Village Head, Social Welfare and Family Relations (officer), and

[54] Adapted from Government of Rwanda https://www.gov.rw/overview#:~:text=The%20Government%20of%20Rwanda%20has,other%20but%20are%20all%20complementary.
[55] https://www.gov.rw/government/administrative-structure

Security, Immigration and Emigration (officer), Information and Training (officer), and Development (officer).

6.4.4 DEVELOPMENT CONTEXT

Rwanda has been politically stable since the 1994 and is developing quickly due to this consistent governance and the *National Strategies for Transformation*, which is underpinned by the UN's Sustainable Development Goals. As a result, there has been significant improvement in the national economy and living standards over the past two decades[56].

Key development challenges, however, have indicated that there could be cause for concern in the near future. The country relies heavily on large public investment to drive the economy, which has led to significant external borrowing. It is anticipated that the private sector will need to take the place of public spending, however, the poor domestic savings, shortage of skills and high cost of energy could be a constraint to private investment[57].

According to the African Economic Outlook (2023), Rwanda's GDP growth reached 10.9 percent in 2021 before declining to 8.2 percent in 2022 due to climate shocks on domestic food production; high energy, food, and fertilizer prices; and weak external demand on exports. Inflation rose from 0.8 percent in 2021 to 17.7 percent in 2022, reflecting higher costs for imported goods and low domestic food production. Real GDP growth is projected to reach 7.6 percent in 2023 and 8.0 percent in 2024 on account of continued slow recovery in domestic agricultural production and recovery in exports and conference tourism. Inflation is projected to fall to 7.4 percent in 2023 and 5.6 percent in 2024 on account of a drop in imported inflation[58].

At a provincial level, the Eastern Province has the country's largest farmland area. A high per centage of community in this province rely on agriculture (specifically crop production) for livelihoods and supplementing income. However, drought and over utilisation could threaten future agriculture dependence[59]. Provincial strategies and investment (public and private) are looking to develop forestry within the region and promote protection of environmental resources to sustain agriculture and other forms of development such as tourism.

There are two strategic economic development projects occurring within Bugesera District. Firstly, the construction of Bugesera Airport near Rilima (12 km north of the project site), and the Bugesera Special Economic Zone (the proposed project). Additional strategic projects include the upgrade of roads and associated infrastructure to support these developments. These strategic interventions are aimed at decentralising economic development opportunities out of Kigali and support the national strategy for being one of the core logistics hubs in sub-Saharan East Africa.

[56] https://www.worldbank.org/en/country/rwanda/overview
[57] https://www.worldbank.org/en/country/rwanda/overview
[58] https://www.afdb.org/en/countries/east-africa/rwanda/rwanda-economic-outlook
[59] https://www.greenclimate.fund/project/fp167

6.4.5 VULNERABLE STAKEHOLDERS

Although the country remains politically stable, there are several reports[60] of ongoing Human Rights violations, including refugees and migrants' rights, women's rights, economic, social, and cultural rights, freedom of expression, unlawful attacks, and enforced disappearances.

Rwanda has robust labour laws, aligned with the International Labour Organisation (ILO), and has ratified five ILO Conventions in recent years[61]. However, rights to access unions (collective bargaining) remains flawed, and not aligned with international standards.

On a local scale, the concerns over governance of human rights could be concerning, as a number of rights could be infringed inadvertently due to the cultural and governance characteristics of the country. Care will need to be taken to ensure the rights of labour and the public are monitored and any potential or actual impacts are managed, mitigated, and remediated as required.

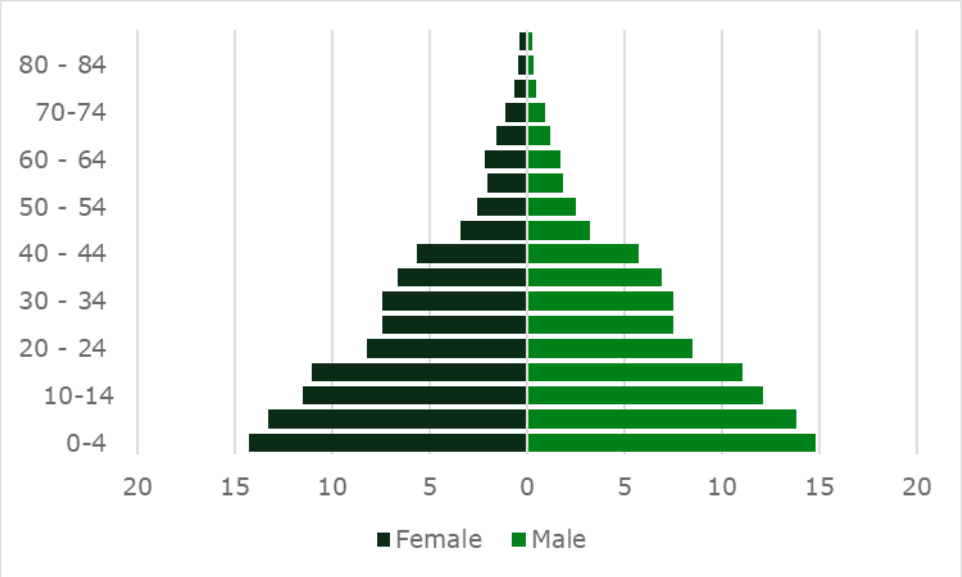
Vulnerable groups are a population that has some specific characteristics that make it at higher risk of falling into poverty than others living in areas targeted by a project[62]. In relation to the project vulnerable people are likely to be disproportionately affected due to their gender, religion, social status, physical or mental disability. These groups are likely to include women, children, refugees (national and foreign), cultural minorities, elderly, and disabled.

6.4.6 LOCAL DEMOGRAPHICS

Rwanda has registered an annual population growth rate of 2.3 percent over the last 10 years, reaching over 12 million in August 2022 and is projected to be 23.6 million by 2052. Females represent 51.5 percent of the population (6,817,068), whereas males represent 48.5 percent (6,429,326) of the total population. The population is characteristic of a developing country, as it dominated by youth with the proportion below 30 years being 65.3 per cent in 2022[63].

The Bugesera District has a population of approximately 550 000 people. The population age profile is characteristic of a developing country, with a high per centage (67 percent) of the population under the age of 30 (Figure 6-26).

[60] United Nations, Human Rights Watch, Amesty International.
[61] Danish Trade Union Development Agency (2022) Labour Market Profile Rwanda – 2021/2022 https://www.ulandssekretariatet.dk/wp-content/uploads/2021/05/LMP-Rwanda-2021-Final.pdf
[62] UN https://archive.unescwa.org/vulnerable-groups#:~:text=Definition%20English%3A,areas%20targeted%20by%20a%20project.
[63] https://hlpf.un.org/sites/default/files/vnrs/2023/VNR%20Rwanda%20Report.pdf



Source: National Institute of Statistics of Rwanda (2022)[64]

FIGURE 6-26 POPULATION PYRAMID – BUGESERA DISTRICT

The proposed project site falls within the Gashora Sector of Bugesera District, and the AoI cuts across three sectors namely Mayange, Rweru and Gashora, which has a combined population of 124 311.

The household surveys for the local communities[65] indicated that 54 percent of the population is under the age of 18 years, which reflects the above statistics for the district. The split between male and female is 49 percent:51 percent, indicating a slightly higher female population, although this is predominantly in the age groups over 50 years.

According to village-head surveys, the population in settlements at the study area is estimated to be approximately 1,172 people in the village of Kagasa and 1, 804 people in the village of Kagasa (Table 6-25).

The majority of Project resettled household heads across the four villages were found to be 72 percent male while 24.8 percent are female. Over half of the surveyed households (57.33 percent) are composed of married monogamous couples.

6.4.7 MIGRATION

The population was reported to have been increasing across the Gashora Sector, primarily because of natural population growth together with a positive net migration trend. Two significant factors contributing to this in-migration are the relocation of individuals from the airport area and the Bugesera Special Economic Zone, as well as the desire to be in proximity to the airport construction sites.

In May 2019, the UNHCR High Commissioner sought assistance to Rwanda, who had previously offered to host up to 30,000 stranded migrants in Libya for assistance in moving at-risk refugees to safety. Rwanda welcomed both refugees and asylum seekers

[64] National Institute of Statistics of Rwanda (2022) Fifth Population and Housing Census, Rwanda, 2022 District Profile: Bugesera - September 2023. Ministry of Finance and Economic Planning
[65] Including Cells: Biryogo, Gashora, Kagasa I, Kagasa II, Karutete, Ramiro and Rweru II

evacuated from Libya under the Emergency Transit Mechanism (ETM). This initiative was formalized with a Memorandum of Understanding signed between Rwanda, UNHCR, and the African Union. The ETM in Rwanda, established in Biryogo Village, Biryogo Cell, Gashora Sector, Bugesera District, is designed to support up to 500 individuals at any given time, evacuating them from conflict zones, including Libyan detention centers, while pursuing long-term solutions. To date, the ETM in Rwanda has successfully facilitated five evacuation flights from Libya, rescuing a total of 515 persons from precarious circumstances[66].

6.4.8 CULTURAL CONTEXT AND INDIGENOUS PEOPLES

The national official languages are Kinyarwanda, French, English, and the main religions are Christianity, traditional beliefs, often combined with Christianity.[67].

The culture within Rwanda is varied due to the complex tribal and colonial history. The Banyaranda people, which comprise of people of subgroup of Bantu peoples, and include the Hutu, Tutsi, and Twa people. While the styles vary between the different groups, core values of patriarchy, communal social support and maintaining traditions remains. However, most Rwandans have adopted a modified western lifestyle, but maintain a number of traditional values, customs, and beliefs. The country was held under German colonial rule (1890s – 1916) and subsequently Belgian control (1916 – 1962). The diverse tribal and colonial history lead to conflict over power, culture, and resources, peaking in 1994 with the Genocide against the Tutsis.

The Twa people (considered the indigenous people of the Great Lakes region, including Rwanda and neighbouring countries68) are thought to be of mixed ancestry, and probably decedents of equatorial rainforest tribes. Their traditional livelihoods include living primarily in high-altitude forest areas and being hunters and gatherers[69]. This community (approximately 600 households) has lost most of their traditional ways of life, conforming to more contemporary ways of living, but maintain a strong and distinct ethic identity.

6.4.9 RELIGION

Christianity is the predominant religion for Project resettled households in all four Study Area villages. These include Protestants that are the majority (38.16 percent) followed by Catholics (23.68 percent), Adventists and Jehovah witnesses (15.79 percent and 13.16 percent, respectively). Other respondents reported practicing more than one

[66] Online (https://reliefweb.int/report/rwanda/unhcr-rwanda-etm-gashora-camp-profile-23-april-2023)

[67] Minority Rights Group International, World Directory of Minorities and Indigenous Peoples - Rwanda, 2007, available at: https://www.refworld.org/docid/4954ce4e23.html [accessed 24 October 2023].

68 In line with IFC and generally accepted methodologies. However wihtin Rwanda this may not be the case

[69] Adekunle, J. O. (2007) Culture and Customs of Rwanda. Greenwood Press, USA. https://books.google.co.za/books?hl=en&lr=&id=u7HOEAAAQBAJ&oi=fnd&pg=PR5&dq=Rwanda+eastern+province+culture&ots=QxAxiA41Uf&sig=TIcUGxQrdyyydaoNUqU70kNbnz8&redir_esc=y#v=onepage&q&f=false

religion; Catholic/Protestants (2.63 percent); Muslim/Catholic and other combinations (15.79 percent). Muslims represent 3.95 percent of the Project resettled population in the Study Area. Figure 6-27 below, presents an overview of the percentage distribution of religion per Project resettled household in the Study Area (Kagasa I, Kagasa II, Biryogo Villages)

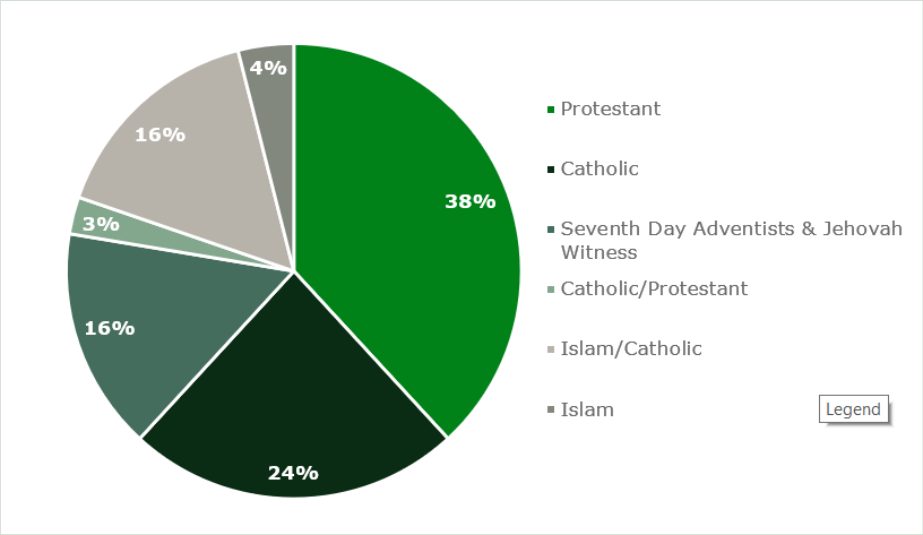


FIGURE 6-27 THE PERCENT DISTRIBUTION OF RELIGION PER PROJECT RESETTLED HOUSEHOLD IN THE STUDY AREA

6.4.10 EDUCATION AND LITERACY

Rwanda operates on a 6-3-3-4 system which comprise of primary school (6 years), junior secondary school (3 years), senior secondary school (3 years) and university bachelor's degree (4 years).

There are two official languages of instruction throughout the Rwandan educational system: Kinyarwanda in primary school and English secondary school through to university. French and Swahili are taught as an elective or a supplemental subject in public primary and secondary schools. Some private primary and high schools have both Francophone and Anglophone systems which use French or English, respectively, as languages of instruction at any and all grade levels. Students in these schools take either language as an elective or a supplementary subject.

Based on the survey conducted in the study area, 43 percent of the households do not have education and 46 percent have primary education. Only 5 percent of the households have secondary education (A levels). Only 3 percent have secondary (O levels) and tertiary education, respectively (Figure 6-28).

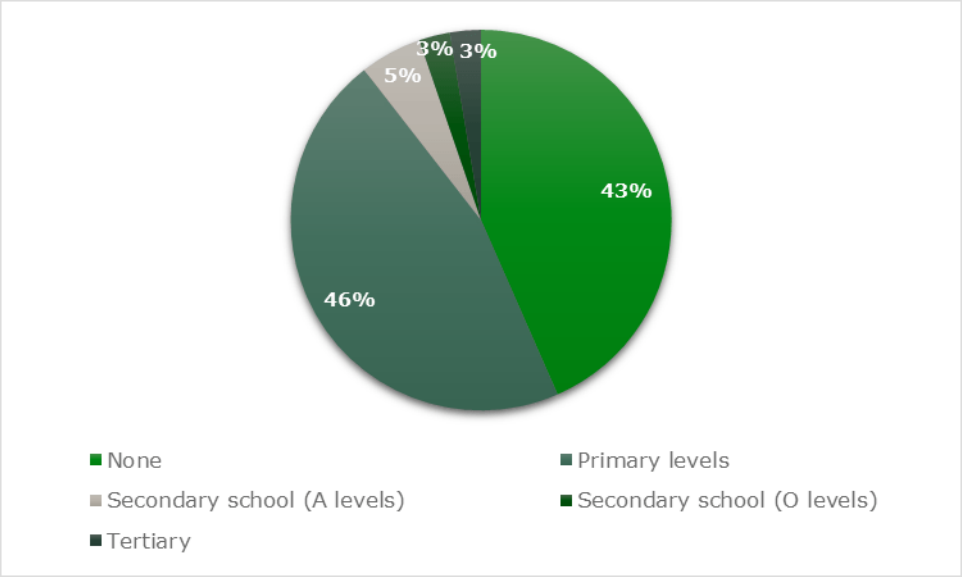


FIGURE 6-28: LEVEL OF EDUCATION IN THE STUDY AREA

6.4.11 LIVELIHOOD ACTIVITIES

Bugesera District is a rural District in the Eastern Province whose economy is principally dominated by Primary, Secondary and Tertiary sectors. These sectors are not yet modernized and hence production and productivity are still very low. Many challenges observed in these sectors constitute barriers to district's development, consequently, contribute to Poverty.

The **primary sector** in Bugesera District is characterized by activities associated with primary economic activities including agriculture subsistence and commercial, forestry, farming & grazing, fishing, and quarrying.

The **secondary sector** includes those economic activities that produce finished, usable products and construction. This sector generally takes the output of the primary sector and manufacturers finished goods or where they are suitable for use by other businesses, for export, or for sale to domestic consumers. This sector is often divided into light industry and heavy industry. Many of these industries consume large quantities of energy and require factories and machinery to convert the raw material. The secondary sector supports both primary and tertiary sectors.

The **tertiary sector** economy is also known as the service industry. It sells goods produced by the secondary sector and provides commercial services to both the general population and to businesses in all three economic sectors. In spite of lack of developed secondary sector, Bugesera District can procure tertiary sector; this sector exists in dependency of products imported within Rwanda and countrywide. However, the tertiary sector recognized a lot of activities associated with retail and wholesale sales, transportation and distribution, restaurants, clerical services (offices services), education services, media, tourism, insurance, banking, healthcare, law, and information technology[70].

[70] https://knowledge-uclga.org/IMG/pdf/bugeseradistrict.pdf

Bugesera District, like other districts, has a young population that is economically active where it has an area favourable for trading due to its border with Burundi that provides potential for improved economic activities. The district has at least seven main trading centres with modern markets at Nyamata, Ruhuha, Gashora, Nyabagendwa, Batima, Kabukuba, and Nemba border. This is an opportunity for small and medium enterprises development. Currently trade is developing, however there is still low private investment in trade and hence, employment opportunities in this sector remain low[71].

The overall employment to population ratio is 87.4 percent, with the employment rate of 1.5 percent. The district's inactivity rate is 11.3 percent while the time related underemployment rate is 26.7 percent[72].

6.4.12 LAND TENURE AND LAND USE

Rwanda is densely populated, and competition for land is ongoing. In addition, land tenure in Rwanda has been unstable over the past 100 years. In the colonial era there was widespread dispossession and reallocation of land for colonial purposes, especially in the Eastern Province. Since independence, political turmoil and cycles of conflict displaced a number of people. And example is the destabilisation of land tenure by the governments push for agricultural revolution, leaving a number of rural households without land.

Based on the household survey that was conducted on in September and October 2023, most of the households use their plots of land for residential and agricultural purposes. Only 1 percent of the landowners use their plots for commercial purposes. Figure 6-29 below shows land use distribution by households.

[71] https://knowledge-uclga.org/IMG/pdf/bugeseradistrict.pdf
[72] https://knowledge-uclga.org/IMG/pdf/bugeseradistrict.pdf

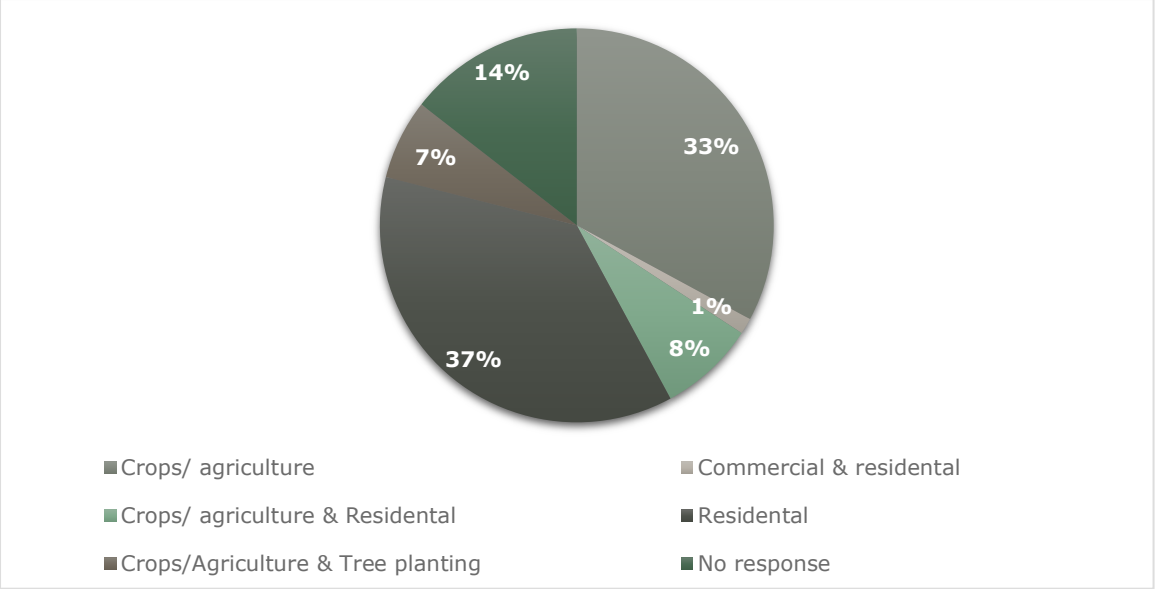


FIGURE 6-29: HOUSEHOLDS PLOTS/LAND USE

6.4.13 BASIC NEEDS

6.4.13.1.1 Water and sanitation

Universal access to safe water, sanitation, and hygiene (WASH) services are priorities in Rwanda. In Rwanda, 57 per cent of the population access safe drinking water that is within 30 minutes of their home, and 64 percent of the population have access to sanitation services. There is a notable disparity between wealthy and poor households[73].

The Eastern Province of Rwanda receives approximately 25 percent less annual rainfall than other areas of the country. This is aggravated by population increases within the province, further reducing access to water for the Eastern Province. Residents who cannot procure safe water must rely on unsanitary surface water and stagnant water for their domestic use. The average access to safe water in the Eastern Province is estimated to be lower than 50 percent. Furthermore, based on climate change projections, most of the Eastern Province is likely to have water deficit by 2023. Moreover, even though the province is experiencing water scarcity, the Eastern Province has the largest concentrations of groundwater exploration activities mainly for domestic and livestock use[74].

Between 2017 and 2019, Rwanda's Ministry of Infrastructure, in collaboration with WaterAid and other water, sanitation and hygiene (WASH) organisations, supported the development of WASH plan for the district of Bugesera as part of the government-endorsed district-wide approach[75]. A district-wide approach focuses on the district – often the lowest administrative and geographical unit responsible for providing WASH services – as the entry point for support from WaterAid. The desired outcome of this

[73] https://www.unicef.org/rwanda/water-sanitation-and-hygiene#:~:text=In%20Rwanda%2C%20only%2057%20per,the%20majority%20of%20household%20tasks.
[74] https://www.ungm.org/Public/Notice/147231
[75] https://washmatters.wateraid.org/publications/water-sanitation-access-district-wide-approach-bugesera-rwanda

approach is for the district to have the necessary plans and processes, finances, human resources, skills and knowledge, coordination and accountability mechanisms in place to achieve and sustain universal access.

The main sources of water supply in Bugesera are Ngenda water treatment plant, Rwakibilizi spring and Kanyonyomba water treatment plant. The total daily production of these three sources is almost 4 000 kilolitres per day. The total current demand is almost 22 000 kilolitres per day, leaving a deficit of almost 18 000 kilolitres. This is compared to standards required for the SDGs by 2030 (requiring 73 percent of the world population to have access to safely managed drinking water), only 18 percent of demand is met through existing schemes. In addition, only 14 percent of the district population is estimated to have access to at least basic services; whereby 8 percent of the population has access to potentially safely managed source (household connection within premises) while 34 percent use unimproved surface water with 44 percent having limited access to water supply service[76].

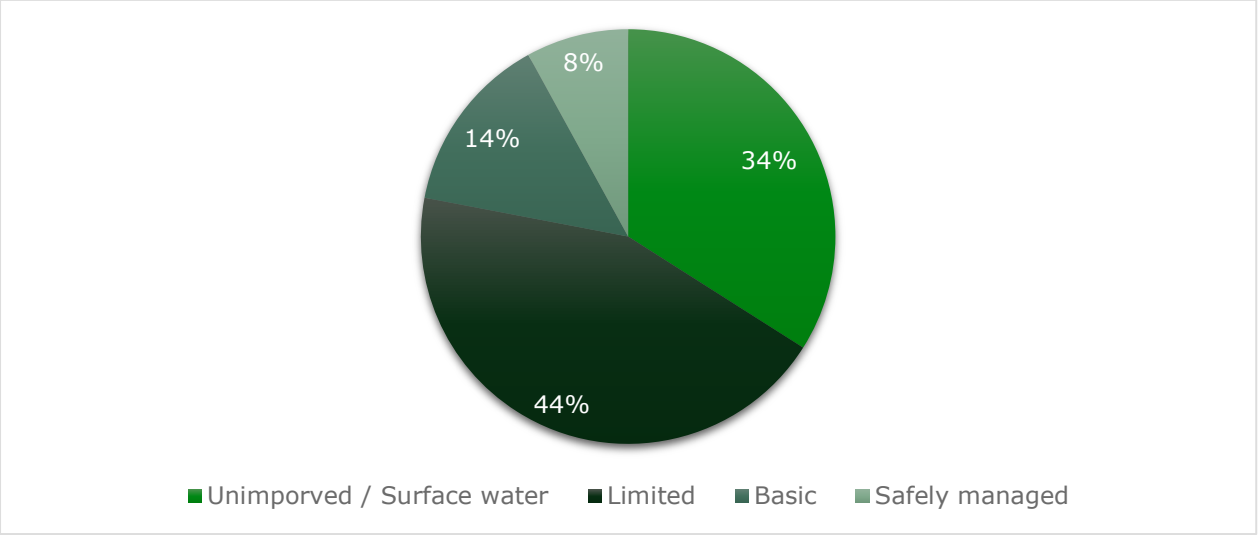


FIGURE 6-30: CURRENT STATUS OF WATER SUPPLY IN BUGESERA DISTRICT

Source: MININFRA, WASAC Ltd, Bugesera District and WaterAid

The household surveys within the AoI indicate that the majority (86 percent) of households source their water from government (Water and Sanitation Corporation Limited) pump stations within the communities. Others source of water are private boreholes, rivers and local dams or lakes.

Of the households surveyed, the majority (96 percent) used open pit latrines. This could pose a significant health and safety risk for the population, and high groundwater concentrations in the region could lead to long-term ground water contamination if the population continues to increase.

The drinking water unit price, supplied through WASAC pipes, could not be determined during this socio-economic baseline study. Of the four boreholes identified during the baseline water quality field campaign that was conducted by Earth Systems in August

[76] https://www.ircwash.org/sites/default/files/2019_bugesera_district_wash_investment_plan.pdf

2023, only one (1) was found to be operational while the remaining three (3) were found to be dried up during the dry season water and hydrology baseline study conducted by the Earth Systems specialist team in August 2023. The Gaharwa and Kilimbi lakes are located within 3 – 4 km from the Project area and are known to be used for livestock and agricultural purposes by the local population.

Access to good quality water was not mentioned as a development area, however some of the respondents reported not being able to afford water supplied through WASAC pipes and therefore resulting in the use of lake water for daily use. Drought is reported to have been experienced frequently over the past three years by respondents.

Project resettled households surveyed across all four surveyed villages reported facing significant challenges in securing and transporting water to households that do not have a nearby water supply. This difficulty is primarily attributed to the geographical terrain and location of settlements in relation to water bodies in the region. The majority of water sources are situated in valleys or low-lying areas, while many villages are located in higher elevations, often just below ridgelines or on plateau areas. Consequently, the transportation of water often involves uphill journeys, frequently accomplished with the use of bicycles.

Source: Earth Systems, 2023

FIGURE 6-31 A WATER TANK BY WORLD VISION IN KAGASA I

6.4.13.1.2 Food security

According to the 2021 comprehensive food security and vulnerability analysis (CFSVA), 20.6 per cent of the Rwandan population is food insecure, with 18.8 per cent moderately food insecure and 1.8 per cent severely food insecure. The 2021 CFSVA also indicated that 32.4 per cent of under five years children had chronic malnutrition (stunting)[77].

Furthermore, the CFSVA report indicated that two-thirds of the food consumed by households is acquired from the market, while the remaining share comes from their own farm produce and other sources. Market dependency is higher in urban areas compared to rural areas where most households are involved in agriculture. This high market dependency is an indication that most households are vulnerable to ongoing

[77] https://docs.wfp.org/api/documents/WFP-0000141510/download/

price increases in both rural and urban households. Moreover, 25 per cent of households spend more than 65 per cent of their budget on food, which classifies them as having high economic vulnerability to access food[78]. Since both food and non-food items prices are on the rise, the purchasing power of households is therefore heavily affected[79].

Food insecurity within the *Eastern Province is at 16.2 per cent*[80]. Water scarcity in some parts of Rwanda especially Eastern Province has been an issue, exposing farmers to hunger crisis due to drought that has been causing crop failure.

Food security is deteriorating in some eastern and southern districts (Kayonza, Kirehe, Ngoma, and Bugesera), where households are facing food insecurity levels as stocks have been depleted earlier than usual following the below-average 2017 production and households rely more on markets to meet their food requirements[81].

The household survey within the AoI indicates that only a small portion of households (3 percent) experienced hunger or food shortages in the last 12 months. It should be noted that most respondents gave no formal reply to this question, and so the actual food shortages are unknown. There could also be other social processes in place, such as communal sharing of food, household-level crop farming (which most households take part in in the AoI). Access to irrigation water is low, and so dryland farming is the main form of food production. It is assumed this would include crops such as beans, maize, and cassava, but no information is available for the local area.

6.4.13.1.3 Housing

Bugesera district shows a clear move from the traditional isolated habitat towards Imidugudu (villages) or other clustered forms of habitat. Considerable improvements are also observed in construction materials used for dwellings, for example the increase in households with cement floors, the growing trend of using bricks for walls rather than tree trunks, households using bricks or switching from thatched roofs to metal sheets Households that live in modern or planned settlements tend to be provided with better management of waste and sewage[82].

Within the AoI the main building materials are mud bricks and steel sheeting. These bricks are likely to be made by a member of the household or local tradesperson and are unfired. Very few are made of improved bricks (heated clay bricks) and clay roof tiles. This is assumed to be a factor of two aspects, firstly the high cost of building materials in Rwanda and secondly the low-income status of households within the AoI.

6.4.13.1.4 Energy use

Rwanda generates electricity through various means comprising 51% is from thermal sources, followed by hydro sources (43.9%) and solar sources with 4.2%.). The cost of electricity is high, and the distribution centered primarily in urban areas, and specifically

[78] based on the CARI (Consolidated Approach for Reporting Indicators of Food Security) methodology
[79] https://docs.wfp.org/api/documents/WFP-0000141510/download/
[80] https://www.globalfinancingfacility.org/sites/gff_new/files/documents/Rwanda-Investment-Case.pdf
[81] https://www.fao.org/giews/countrybrief/country/RWA/pdf_archive/RWA_Archive.pdf
[82] https://knowledge-uclga.org/IMG/pdf/bugeseradistrict.pdf

Kigali[83]. The key means of energy generation within Rwanda is, therefore, biomass – i.e. firewood harvested from forests and scrubland and agricultural waste used for cooking. It is noted that approximately 74 percent of households have access to electricity (54 percent on grid and 20 percent off grid) [84].

About 13 percent of the Bugesera District population use electricity for lighting, 3.4 percent use Oil Lamp, 1.7 percent use Firewood, 12.8 percent use Candle, 9.4 percent use Lantern, 1.1 percent use Solar Panel, 53.4 percent use Batteries while 4.4 percent use other sources. The lack of enough budget to acquire electrical infrastructures by GoR required to install high voltage line and medium voltage line for connecting remote areas with electricity remains a key challenge to the desired grid and off-grid connection to all households[85].

At a local level, the surveyed households indicated that 61 per cent use grid connections for electrical supply for lighting, 4 percent use off grid solar, and 5 percent have no lighting. The majority are likely to use firewood for cooking, however most respondents did not answer this part of the survey.

6.4.14 INFRASTRUCTURE AND PUBLIC SERVICES

6.4.14.1.1 Healthcare

The Ministry of Health, and its affiliated agency, the Rwanda Biomedical Centre (RBC) provide policy leadership in the health sector. Health care services are, in turn, delivered through twelve national referral hospitals and thirty-six District Hospitals. Since 2011, the government has established District Hospitals at the core of health service delivery through the District Health System (DHS) which comprises the district hospital and a network of health centres either public, government assisted, not for profit or private[86].

The Bugesera District has 15 health centres (one per Sector) and one hospital at Nyamata. Across surveyed villages, the September 2023 socio-economic surveys identified one health infrastructure in the village of Kagasa I. Despite the low number of health centres, the mean walking distance to a health post in Study Area is approximately 2.7 km according to survey respondents. The nearest health centres in the Study Area were reported to be located in Kagasa I, Gashora, Ramiro, Nyagatare, Kagumasi and Bidudu.

6.4.14.1.2 Schools

The government of Rwanda continues to prioritize the education sector in national budgeting, reflected by a budget increase for the sector of nearly 20 percent. The latest statistics provided by the Ministry of Education indicate that in 2020/21, a total of 4,033,046 children and young people accessed education at different levels. By gender, 1,977,323 were male learners representing 49 per cent while 2,055,723 were female representing 51 per cent[87].

[83] https://www.usaid.gov/powerafrica/rwanda
[84] https://www.reg.rw/what-we-do/access/
[85] https://knowledge-uclga.org/IMG/pdf/bugeseradistrict.pdf
[86] https://www.mineduc.gov.rw/index.php?eID=dumpFile&t=f&f=10885&token=6a58578987ea9d46d1d37eaafcfda7d675d69a85
[87] https://www.unicef.org/esa/media/11916/file/UNICEF_Rwanda_Education_Brief_2022-2023.pdf

The Gashora Sector has two primary schools and two secondary schools constructed by the Government. Most children in the Sector of Gashora travel approximately 1.2 km to the nearest primary school and 1.5 km to secondary school according to the survey respondents. There is one primary and ordinary level secondary school in Kagasa I and one primary and two secondary schools in Biryogo Village.

6.4.14.1.3 Transport

Rwanda has one of the densest road networks on the continent, though less than one-fourth of it is paved. Publicly supported mass transit is concentrated in Kigali, but since the 1990s there has been a large influx of privately operated networks of minibus routes that connect Kigali with towns in all directions. Domestic transportation of farm commodities and other goods occurs largely by small-scale traders with individually owned pickup trucks. Rwanda relies heavily on its road network, as it has no railway system and its waterway ports are largely limited to the minor facilities at Gisenyi, Cyangugu, and Kibuye on Lake Kivu. There are several airports located in the country, including international airports at Kigali and Kamembe[88].

The transportation infrastructure within the Study Area comprises a combination of well-maintained tarmac roads and unpaved dirt roads that are accessible to both cars and trucks. Survey respondents indicated that this is generally deemed adequate. Car ownership is very limited across all the villages included in the survey. Bicycles and motorcycles predominantly serve as the primary means of transportation in these communities.

FIGURE 6-32 MAIN BUS STOP IN KAGASA I

6.4.14.1.4 Telecommunications

Rwanda's landline telephone system is insufficient, and its use is generally limited to government and businesses. Mobile phone usage is much more prevalent and expanding rapidly. Internet use is growing as well, with Internet centres opening throughout the country[89].

[88] https://www.britannica.com/place/Rwanda/Demographic-trends
[89] https://www.britannica.com/place/Rwanda/Demographic-trends

Local community access to mobile telephones and services varies. However, there is mobile telephone coverage for every village in the Study Area. In all the households surveyed, at least one person has access to a mobile telephone.

6.5 CULTURAL HERITAGE BASELINE

6.5.1 INTRODUCTION

This chapter presents the baseline for cultural heritage and assesses the nature, distribution and value (significance) of identified cultural heritage resources for the Bugesera SEZ Project.

The Project comprises the design, construction, and operation of a commercial zone on 335.68 hectares (ha) of land situated in Kagasa II Village, Ramiro Cell, Gashora Sector, Bugesera District in the Eastern Province of Rwanda (hereinafter referred to as the "Project"). The parcel of land on which the Project is situated is also referred to as the "Site" (Figure 6-33).

The information presented in this baseline chapter draws on desk-based research, remote sensing and field survey of the Project Area of Influence (AoI) by ERM-appointed subcontractor, Earth Systems, carried out in December 2023.

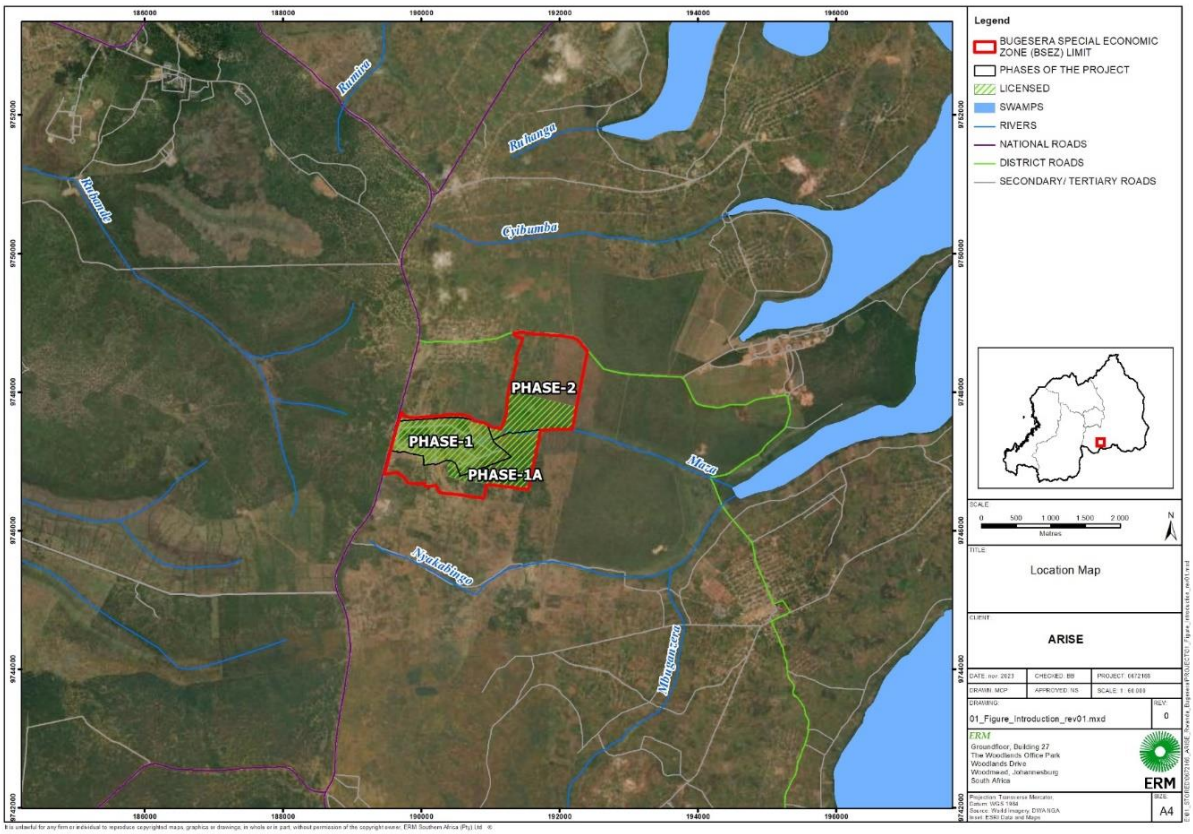


FIGURE 6-33: PROJECT LOCATION

6.5.2 LEGISLATIVE FRAMEWORK

This baseline has been prepared taking into consideration:

- National legislation and regulations for Rwanda for the protection of cultural heritage;
- International treaties ratified by the Government of Rwanda for the protection of cultural heritage;
- International environmental standards for cultural heritage, including:
    - International Finance Corporation's Performance Standard for cultural heritage (IFC PS8); and
- Good International Industry Practice (GIIP).

6.5.2.1 NATIONAL LEGISLATION

National legislation relating to the protection of cultural heritage in Rwanda is summarised in Table 6-26.[90]

TABLE 6-26 NATIONAL LEGISLATION IN RELATION TO THE PROTECTION OF CULTURAL HERITAGE IN RWANDA

Law	Description of law
1989 Declaration of African, Caribbean and Pacific (ACP) States on the return or restitution of cultural property.[91]	This declaration encourages the return or restitution of cultural property from ACP states that are held in Member states. ACP states ask for help with training in the area of preservation and protection of cultural property.
1989 Ministerial Order N. 01/12.04/00 determining the composition and operating methods of the Management Committee of the Management Board of the National Museum of Rwanda.[92]	This order discusses how the national museum will operate. As well as concerning internal museum business, Article 2e states that the museum will engage and advise on "the coordination of collection, research and cultural and educational action".
1989 Presidential Order N. 240/14 of April 20, 1989 establishing and organizing the	This presidential order outlines the establishment of the National Museum of Rwanda. Notable aspects include: Article 4, which notes that the purpose of the museum conserve and promote national heritage on the

[90] UNESCO, 'Rwanda National Cultural Heritage Laws', https://ncc.unesco.org/en/statesparties/rw/laws/ [Accessed 10/01/2024].
[91] Declaration des Etats d'Afrique, des Caraibes et du Pacifique (ACP) sur le retour ou la restitution des biens culturels: https://en.unesco.org/sites/default/files/afr_declaration_acp_retour_restitution_freorof.pdf [Accessed 10/01/2024].
[92] Arrêté ministériel N. 01/12.04/00 déterminant la composition et les modalités de fonctionnement du Comité de Gestion de la Régue du Musée national de Rwanda: https://en.unesco.org/sites/default/files/rwanda_arreteminis_01140400_freorof.pdf [Accessed 10/01/2024].

Law	Description of law
Authority of the National Museum of Rwanda.[93]	historical, cultural and artistic levels for future generations; Article 5, which states the collection powers the museum has for both physical and intangible heritage. Both articles stress the importance of making heritage information found public.
2002 Law and Heritage in Africa 4: from Rwanda to Zimbabwe.[94]	This law outlines the process of classifying sites in order to place them under the protection of the state. If the classified site is private property then there are restrictions placed on the rights of owners or occupants, and they are required to preserve the site. Any order classifying a site is notified to the owner, which defines the specific measures required to ensure the care and conservation of the classified site. Details compensation to the owner in the event of damage, as well as punishment measures if the law is violated.
2003 African constitutional standards relating to culture and the preservation of heritage.[95]	These standards relate to the rights that citizens of the state of Rwanda have regarding their cultural heritage. Article 50 states that every citizen has the right to activities promoting national culture, including language. Article 51 outlines the duty of the State in safeguarding and promoting national values and heritage and makes special note of conserving memorials and sites of the 1994 genocide against the Tutsis.

6.5.2.2 INTERNATIONAL TREATIES

International treaties relating to the protection of cultural heritage in Rwanda are summarised in Table 6-27.[96]

[93] Arrêté présidentiel N. 240/14 du 20 avril 1989 portant création et organisation de la Régie du Musée National du Rwanda: https://en.unesco.org/sites/default/files/rwanda_arretepres_24014_freorof.pdf [Accessed 10/01/2024].
[94] Droit et Patrimoine en Afrique 4: du Rwanda au Zimbabwe: https://en.unesco.org/sites/default/files/senghor4_droit%26patr2002_freorof_engorof.pdf [Accessed 10/01/2024].
[95] Normes constitutionelles africaines relatives à la culture et à la sauvegarde du patrimone: https://en.unesco.org/sites/default/files/afr_normes_constitutionnelles_patrimoine_culture_24.pdf [Accessed 10/01/2024].
[96] UNESCO, 'Rwanda National Cultural Heritage Laws', https://whc.unesco.org/en/statesparties/rw/laws/ [Accessed 10/01/2024]; UNESCO, 'Rwanda: Conventions', https://www.unesco.org/en/countries/rw/conventions [Accessed 10/01/2024].

TABLE 6-27 INTERNATIONAL TREATIES FOR THE PROTECTION OF CULTURAL HERITAGE IN RWANDA

Title	Ratification/acceptance date
Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention	28th December 2000
Convention concerning the Protection of World Cultural and Natural Heritage	28th December 2000
Convention for the Safeguarding of the Intangible Cultural Heritage	21st January 2013
Convention on the Protection and Promotion of the Diversity of Cultural Expressions	16th July 2012

6.5.2.3 INTERNATIONAL LENDERS' ENVIRONMENTAL AND SOCIAL STANDARDS

There are several international lender banks and financial institutions who insist on a minimum level of environmental and social standards from the projects that they finance. The IFC's Performance Standards (PS) (2012) and its accompanying guidance notes apply to this Project.[97]

IFC PS 8 recognises the importance of cultural heritage for current and future generations.[98] Consistent with the *Convention Concerning the Protection of the World's Cultural and Natural Heritage*, this PS sets out minimum requirements for the protection of cultural heritage resources in development projects financially supported by the IFC.

The objectives of PS8 are to:

- protect cultural heritage from the adverse impacts of project activities and support its preservation; and
- promote the equitable sharing of benefits from the use of cultural heritage.

Key sections within PS8 include the following:

- Paragraph 6 calls for the implementation of international treaties and national laws relating to heritage protection, stating that clients:

  'Will identify and protect Cultural Heritage by ensuring that internationally recognized practices for the protection, field-based study, and documentation of Cultural Heritage are implemented'.

- Paragraph 7 adds that:

[97] IFC, *IFC's Performance Standards on Environmental and Social Sustainability* <https://www.ifc.org/en/insights-reports/2012/ifc-performance-standards

[98] IFC, *Performance Standard 8* <https://www.ifc.org/en/insights-reports/2012/ifc-performance-standard-8> [Accessed 16/01/2024].

> *'Where the risk and identification process determines that there is a chance of impacts to Cultural Heritage, the client will retain competent professionals to assist in the identification and protection of Cultural Heritage'.*

- Paragraph 9 states that:

> *'The client is responsible for siting and designing a project to avoid significant adverse impacts to Cultural Heritage. The environmental and social risks and impacts identification process should determine whether the proposed location of a project is in areas where Cultural Heritage is expected to be found, either during construction or operations.'*

PS8 goes on to specify that affected communities and relevant national regulatory agencies should be consulted. It favours the retention of cultural heritage *in situ* (paragraph 12), permitting exceptions only where there is no feasible alternative, and the removal of the resource is carried out 'using the best available technique'.

In paragraphs 13-15, PS8 addresses impact on 'critical cultural heritage' defined as:

> *'Recognized heritage of communities who use or have used within living memory the Cultural Heritage for long-standing cultural purposes; or (ii) legally protected Cultural Heritage areas, including those proposed by host governments for such designation.'*

The standard states that critical heritage should not be removed unless in exceptional circumstances where impacts are unavoidable, in which case, suitably qualified experts should be retained to assist in its protection and assessment. Where there are legally protected sites, the client is required to comply with legal requirements related to their protection, consult stakeholders, and implement additional programmes to promote and enhance their conservation.

6.5.2.4 GOOD INTERNATIONAL INDUSTRY PRACTICE

Safeguarding and protecting cultural heritage with the use of innovative approaches, in cooperation with stakeholders, is key to appropriately manage and promote cultural heritage to the benefit of the country and communities for social cohesion, wellbeing and environmental sustainability.[99]

This baseline for the Project has considered the following approaches in line with good international industry practice.

6.5.2.4.1 Precautionary Approach

Good international industry practice requires developers to take a precautionary approach to cultural heritage identification, protection, and safeguarding. Where there is uncertainty about the impact of a development on cultural heritage (such as through an insufficient level of information) good international practice requires an assumption that a significant adverse impact will occur and require appropriate mitigation for the assumed impact until such a time as further information is available to allow a robust

[99] UNESCO, 'Cultural heritage: 7 successes of UNESCO's preservation work', https://www.unesco.org/en/cultural-heritage-7-successes-unescos-preservation-work [Accessed 10/01/2024].

assessment of potential impacts. This precautionary approach is relevant to managing risks and impacts to cultural heritage and has been applied to this Project.

6.5.2.4.2Mitigation Hierarchy

The implementation of the mitigation hierarchy is one of the fundamental objectives of PS 8 and is recognised as good international industry practice. The project developer should, as a departure point, avoid impacts on cultural heritage through project redesign. Where avoidance is not feasible, the developer shall apply a mitigation hierarchy that minimises adverse impacts on cultural heritage, as far as practically possible. This concept has been applied to the selection of mitigation measures for this Project.

6.5.3 SCOPE

The Project's area of influence (AoI) includes areas of direct, indirect, and cumulative impacts potentially occurring during the construction, operation, and decommissioning stages of the proposed Project.[100] This baseline study considers the extent and value (significance) of all identified tangible and intangible cultural heritage resources within the defined Project AoI and the potential for these resources to be directly or indirectly impacted.

Project-related activities and associated infrastructure inside the following perimeter are considered to potentially have impacts to cultural heritage resources:

- The proposed Project footprint and associated infrastructure footprint (red line construction boundary or Site boundary); and
- A 500 m study area around the proposed Project footprint and associated infrastructure.

The red line Site boundary and the 500 m study area, which together make up the Project AoI are both shown on Figure 6-34.

6.5.4 METHODOLOGY

6.5.4.1 BASELINE METHODOLOGY AND APPROACH

This baseline report is prepared using the draft guidance on heritage impact assessments for cultural world heritage sites (International Council on Monuments and Sites (ICOMOS)[101] and international guidance (ICOMOS and IFC PS8).[102] No national guidance currently exists on methodology for assessment of impacts on cultural heritage within Rwanda.

Cultural heritage resources were identified through the following:

- Desk-based research, including remote sensing; and
- Field survey for tangible and intangible cultural heritage.

[100] According to the definition given in the IFC PS1, the Project Area of Influence includes Area of Direct Impacts (e.g., Project Area), Area of Indirect Impacts, and Area of Cumulative Impact.
[101] ICOMOS (2011) 'Guidance on Heritage Impact Assessments for Cultural Heritage Properties: A publication of the International Council on Monuments and Sites'. Available at iccrom.org.
[102] International Finance Corporation (IFC) (2012) 'Performance Standard 8: Cultural Heritage'. Available at www.ifc.org

The field survey was conducted by ERM-appointed subcontractor Earth Systems and carried out in December 2023. The survey results identified several new resources within the Project AoI, including medicinal plants and locations associated with Rwandan royal history. These have been verified by remote sensing, as detailed in section 6.5.7. Whilst no archaeological surface scatters were identified during the field survey, the desk-based research has identified the potential for archaeological sites to be buried under alluvial and lacustrine deposition within the Site and further investigations may be required to adequately assess the potential impact on the archaeological resource.

6.5.5 GEOGRAPHIC AND TOPOGRAPHIC CONTEXT

The Project AoI is located on the slopes of a small valley with the modified Mata stream at its base, which drains directly into Lake Garhawa, 2 km to the southeast. Run off from the northeast part of the Site, similarly, drains into Garhawa's sister lake, Lake Kilimbi (Figure 6-15). Lake Garhawa and Lake Kilimbi are both part of the Nyangabaro River catchment, which itself is connected to the broader lake and river systems of the Western Lake Victoria Basin region.[103]

6.5.6 ARCHAEOLOGICAL AND HISTORIC BACKGROUND

6.5.6.1 INTRODUCTION

Rwanda's prehistory is relatively unexplored compared to other regions of Africa, and much of the available literature has been inferred from sources such as historical linguistics and philology.[104]

The most systematic field survey aimed at assessing the archaeological potential of Rwanda was undertaken in 2006-2007, during which 150 previously published and newly identified archaeological sites were identified within three survey areas, though none were undertaken in the Bugesera region.[105]

The absence of systematic research within the Project AoI makes it difficult to assess its archaeological potential with any degree of certainty. However, by considering sites from other parts Rwanda and even further afield across the Great Lakes region, broad assessments can be made. The chronology and periodization of this baseline assessment is based partly upon guidance from the Turkana Basin Institute.[106]

[103] The Nyangabaro River is a tributary of the Kagera River, which in turn is part of the upper headwaters of the Nile and one of the largest inflow rivers to Lake Victoria in Uganda.
[104] Some archaeological work has been conducted in the immediate vicinity of the Project but was abandoned due to an unstable political climate within the country. In 1961, William Krenning conducted archaeological work at Urwobo rwa Bayanga (approx. 35 km northwest of the Project AoI) and Kibugabuga (approx. 7 km southwest of Project AoI). Within Urwobo rwa Bayanga, a pit dating to the mid-nineteenth century, finds including animal bones, human remains, pottery, and 'weapons' were identified.
[105] John Giblin, Jane Humphris, Maurice Mugabowagahunde, André Ntagwabira (2011) 'Challenges for Pre-Colonial Archaeological Site Management in Rwanda', *Conservation and Management of Archaeological Sites*, 13, pp. 174-188.
[106] Turkana Basin Institute, *Learning the origins of stone tool technology* <https://www.turkanabasin.org/2020/04/learning-origins-of-stone-tool-technology/> [Accessed 02/09/2023]

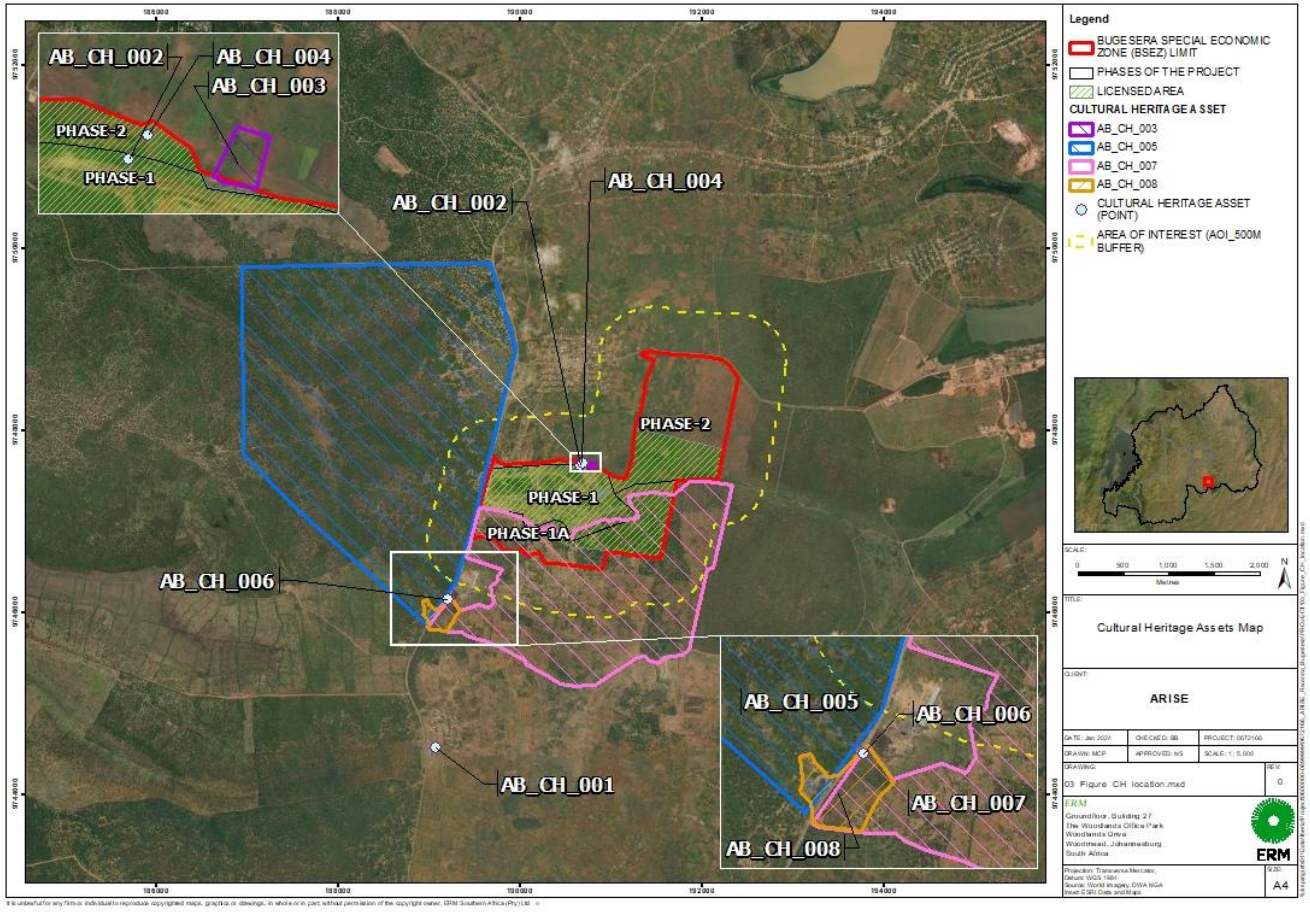
Each identified cultural heritage resource described below has been assigned a unique identifier (for example AB_CH_001) and is shown in Figure 6-34 below[107]. Further information on each resource is provided in the gazetteer (Appendix K). There are no designated heritage assets within or close to the Site.

6.5.6.2 GEOARCHAEOLOGICAL POTENTIAL

Though there has been no detailed chronological, stratigraphic or palaeoenvironmental research on lake systems in this part of Rwanda, research in neighbouring regions has shown that lake levels fluctuated significantly during the Pleistocene period as a result of climate change events and that hunter-gatherer settlement history was linked to these dynamics. [108] Ground investigation works have recorded thick >6m deposits of silt, clay and gravel across the Site[109] and though their age is currently unknown, considering the location of the AoI within an ancient lake drainage system, it is likely that these sediments are associated to past alluvial or lacustrine depositional events. The sediments themselves may thus be of palaeoenvironmental potential and they may also preserve and/or mask former land surfaces and archaeological sites. Though not strictly speaking a cultural heritage asset, these sedimentary deposits which underly the Site are therefore recorded here as a cultural heritage resource (AB_009).

[107] CH_009 is not shown on this figure as its limits are not yet known but it is thought to cover most, if not all, of the Site.
[108] Christian A. Tryon, et al. (2016) 'The Pleistocene prehistory of the Lake Victoria basin', *Quaternary International*, vol. 404, pp. 100-114.
[109] Khemet Ltd (2023)

FIGURE 6-34 LOCATIONS OF IDENTIFIED CULTURAL HERITAGE RESOURCES



6.5.6.3 EARLY STONE AGE (C. 3,000,000 – 300,000 BP)

The earliest cultural phase of the East African Early Stone Age (ESA) is the Oldowan[110] , an industry characterised by pebble chopping tools made by removing a small number of flakes, which was first identified in Olduvai Gorge in neighbouring Tanzania. From around 1.7 million years ago the Oldowan is replaced by the Acheulean,[111] an industry consisting of large bifacial cutting tools such as hand axes, cleavers, picks used for butchering large animals and skinning carcasses. Though ESA assemblages have not yet been positively identified in the Project AoI, Acheulean assemblages have recently been recorded just 50 km away over the border in Tanzania.[112]

Given the long-time depth of the ESA and the presence of known sites in neighbouring regions, there is a **low-moderate** potential for buried archaeological remains from this period to be present within the Project AoI.

6.5.6.4 MIDDLE STONE AGE (C. 300,000 – C. 30,000 BP)

The Middle Stone Age (MSA) is characterised by blade technology and 'toolkits' more refined and diversified than that of the Acheulean. During this period prepared core flakes and bifaces dominated the African record, although poor quality raw materials such as quartzite and quartz were utilised too. The MSA material culture of the western side of the Lake Victoria Basin appears to consist mainly of the less formalised use of quartz stone alongside a specialised bone working technology.[113]

Katanda, a group of sites dated to between 60-70 thousand years ago, is located some 250 km to north on the shore of Lake Edward in the DRC. Here dense multi-phases occupation sites are found within ancient lake sediments. The occupation layers consist of rich stone tool and faunal assemblages and a broader material culture that includes a sophisticated barbed bone harpoon that represents the earliest example of such technology in the world. The sites are thought to evidence a small family sized group occupying the lake shore on a seasonal basis to exploit the abundant fish resources found there.

Though no MSA sites or finds are currently known from within the Project AoI, an undated site is known 35 km away at Rutonde, which, like the Katanda sites, was also found in former lake sediments and contained a very similar suite of material culture. Surface finds of MSA tools have also been reported both at Ndago and Akagera National

[110] A widespread lithic industry characterised by their simplicity, made with one or a few flakes chipped off with another hand-held stone. These are thought to have been used between 2.9 million years ago to 1.7 million years ago.
[111] A type of lithic industry that is characterised by distinctive oval- and pear-shaped hand axes associated with *Homo erectus*, an ancestor to modern humans. The Acheulean period dates from 1.95 million years ago 0.13 million years ago.
[112] F.T. Masao, (2017) 'Eastern equatorial forest variant of Acheulean and subsequent Stone Age Industries: a report of Stone Age Industries discovered in Kabanga, northwestern Tanzania', *Journal of Historical Archaeology & Anthropological Sciences,* 1.3, pp. 1-12.
[113] Tryon, et al. (2016)

Park (c. 65 km northeast of the Project AoI).[114] Lupemban objects were uncovered within Bugesera District,[115] but the location of the supposed finds is uncertain.

As reported in above, the field survey conducted as part of this baseline study did not locate any MSA stone artefacts. However, the complete lack of surface finds may be a result of the deposits of this age being buried under more recent alluvial or lacustrine deposits, rather than an indication of an absence of human occupation at during this time period.

In summary, given the presence of known sites nearby and the possibility that Pleistocene age deposits may be buried under more recent lacustrine and alluvial sediments, there remains a **low**-**moderate** potential for buried archaeology dating to the MSA to be found within the Project AoI.

LATER STONE AGE (C. 30,000 – C. 2500 CAL BP)[116]

The changes that can be observed in archaeological assemblages from the MSA to Later Stone Age (LSA), appearing at c. 40,000-20,000 cal. BP are the most pronounced across the whole of the Pleistocene period, with a shift from prepared core stone tool technology to one characterised by microlithic blade production alongside dramatic increases in the presence of ostrich eggshell beads and evidence for long distance exchange. These material culture changes are often linked to sharp climatic fluctuations with pronounced cold and arid periods at the end of the Pleistocene c. 26,500-19,000 cal. BP and again at c. 17,000-16,000 cal. BP, which appear to have had a push-pull effect on human populations across the Lake Victoria Basin.[117] In contrast to other parts of Africa where human expansion was linked to decreasing aridity, human populations are thought to have expanded into new areas during this period in tandem with the growing populations of large herbivores that would have benefited from the shrinking lakes and increased grassland ranges.

Though again evidence from Rwanda itself is lacking, the next major change in the east African record appears at the very end of the Pleistocene and the onset of the Holocene period (c. 11,500 cal. BP). In Western Kenya in particular a number of sites have been excavated which show the warmer and wetter conditions of the early Holocene afforded hunter-gatherer populations further opportunities to diversify and establish less mobile, higher density forms of settlement and intensify their use of resources.[118] By the time domestic animals had arrived in east Africa from further north at c. 5000 cal. BP, a number of key changes had occurred amongst these seasonally sedentary hunter-gatherer-fisher populations, including the use of elaborately decorated pottery, fish traps

[114] D. Byanafashe, P. Rutayusire (2016) *The History of Rwanda: From the beginning to the end of the twentieth century*.
[115] J. Nenquin (1967) 'Contribution to the study of prehistoric cultures of Rwanda and Burundi', *Annales*
[116] CAL or cal. BP signifies that the raw radiocarbon age has been calibrated.
[117] Tyron et al. (2016)
[118] S.T. Goldstein, et al. (2022) 'Hunter-gatherer technological organization and responses to Holocene climate change in coastal, lakeshore, and grassland ecologies of eastern Africa', *Quaternary Science Reviews,* 280.

and the development of long distance trade networks.[119] Though the appearance of a more sedentary hunter-gatherers, pottery and domestic animals has not yet been demonstrated at early to mid-Holocene sites in Rwanda, this may be a product of the lack of research rather than a genuine absence. The location of the AoI within a river valley and lacustrine environment indicates that sites of this kind may well be uncovered by future research.

As reported in more detail below, the field survey conducted as part of the current baseline study did not locate any LSA stone artefacts. However, the lack of surface finds may be a result of the deposits of this age being buried under more recent alluvial or lacustrine deposits, rather than an indication of an absence of human occupation during this time period. Holocene Later Stone Age stone tools have been identified in Akagera National Park (approximately 65km northeast of the Project AoI) and in the District of Ruhango, immediately west of Bugesera.[120]

In summary, bearing in mind the general lack of previous systematic research, the likelihood that earlier Holocene land-surfaces may be buried under thick alluvium and lacustrine sediments, and the occurrence of stone tools within the region, there can be said to be a **low-moderate potential** for LSA archaeology to be present within the AoI.

6.5.6.5 EARLY IRON AGE (C. 400 BCE – 800 CE)

The appearance of iron and agriculture in the mid-first millennium BC coincides with the arrival of the distinctive Urewe[121] ceramics in the region.[122] The settlement pattern of these early farmers appears to have been one of small, settled communities who practiced shifting cultivation. Millet, cowpea and sorghum were staple crops, though cattle and sheep pastoralism as well as hunting, gathering and fishing remained key parts of the subsistence strategy for EIA farmers at this time.[123] Indeed, this period appears to have been characterised by significant variation in subsistence strategies and Rwanda's population would likely have included hunter-gatherers who practiced herding and farmers and pastoralists who practiced hunting, gathering and fishing.

Metal working technology underwent rapid changes at this time and elaborately decorated iron smelting furnaces have been identified across the Lake Victoria Basin.[124] The widespread distribution of furnace sites and Urewe ceramics suggest a shared

[119] M.B. Jones, R. Tibesasa (2022) 'Kansyore Fisher-Hunter-Gatherers Abandoned the Northeastern Lake Victoria Shoreline during an Arid Period in the Middle Holocene: A Reconsideration of Dates from Western Kenya with New Radiometric and Faunal Evidence from the Namundiri A Shell Midden, Eastern Uganda', *Journal of African Archaeology,* 20, pp. 137-155.
[120] Ibid.
[121] A culture that developed and spread in and around the Lake Victoria region that is recognised through its distinct earthenware and highly technical iron working techniques. Sites date from the fifth century BCE to the sixth century CE, although some sites retain significance to local people in the modern day.
[122] John D. Giblin, Dorian Q. Fuller (2011) 'First and second millennium A.D. agriculture in Rwanda: archaeobotanical finds and radiocarbon dates from seven sites', *Vegetation History and Archaeobotany 20.*
[123] Rebecca Watts, Maurice Mugabowagahunde, André Ntagwabira, John Giblin (2020) 'Deposition of modified human remains as evidence for complex mortuary treatment in East Africa during the first millennium AD', *International Journal of Osteoarchaeology*, 30.6.
[124] Ibid.

material culture over much of modern-day Rwanda, Burundi, southern Uganda, western Kenya, northern Tanzania, and eastern Democratic Republic of Congo, with trade links that may have extended to the Indian Ocean.[125]

A number of Early Iron Age (EIA) furnace sites have been excavated in the southwestern portion of Rwanda, the closest of which are only c. 60 km from the Project AoI, including those found at the EIA site at Nyaruhengeri[126] and those near Gahondo Hill[127]. The research by Giblin and Humphris in the Gahondo Hill area in the Butare district also involved the excavation of a high-status burial that included iron jewellery grave goods.

Although there are no EIA sites in the Project AoI, this may reflect a lack of research rather than an absence of evidence. The field survey undertaken as part of the current baseline did not yield any EIA archaeological material. However, the lack of surface finds may be a result of the deposits of this age being buried under more recent alluvial or lacustrine deposits, rather than an indication of an absence of human occupation during this time period. The existence of known EIA archaeological sites in nearby regions suggests there is some, albeit **low potential** for remains from this period to be found within the Project AoI.

6.5.6.6 THE MIDDLE IRON AGE (C. 800 – 1600 AD)

Diverse technological, social, economic and political transitions were occurring across the Great Lakes landscape during the Middle Iron Age (MIA), from c. AD 800–1600.[128] The archaeology of this period can be characterised as a shift away from Urewe ceramics towards roulette-decorated ceramics, which can be found alongside remains of both domestic livestock and hunted game.[129] The elaborately decorated furnaces of the EAI were also replaced by undecorated but larger furnaces at this time.[130] A more centralised form of social structure emerged during the MIA, with linguistic evidence indicating that contact between mobile pastoralists and sedentary farmers also became more common.[131]

Archaeological research in the broader Great Lakes region suggests that agricultural expansion at this time led to widespread soil erosion and fuelled population movements, diversification and specialisation, which in turn laid the foundations for differential access to resources, and the formation of elites.

Archaeological evidence of MIA occupation within Rwanda itself is very slim but this likely reflects a lack of research rather than a demographic pattern. Major settlement sites indicating diverse social and ritual structures are, however, known from across the broader Great Lakes region between the seventh and tenth centuries CE.

[125] Watts, Mugabowagahunde, Ntagwabira, Giblin (2020)
[126] Paul Craddock, et al. (2007) 'Early Iron Age iron-smelting debris from Rwanda and Burundi, East Africa', *Historical Metallurgy*, 41.1
[127] Humphris, J. (2010) *An Archaeometallurgical Investigation of Iron Smelting Traditions in Southern Rwanda,* DPhil Thesis, University College London.
[128] Humphris (2010).
[129] Ibid.
[130] Giblin, Humphris, Mugabowagahunde, Ntagwabira (2011).
[131] Humphris (2010).

Although there are no MIA sites in the Project AoI, this may reflect a lack of research rather than an absence of evidence. The field survey undertaken as part of the current baseline did not yield any MIA archaeological material. However, the lack of surface finds may be a result of the deposits of this age being buried under more recent alluvial or lacustrine deposits, rather than an indication of an absence of human occupation during this time period. The existence of known Iron Age archaeological sites in nearby regions suggests there is some, albeit **low potential** for remains from this period to be found within the Project AoI.

6.5.6.7 THE LATE IRON AGE (C. 1600 – 1897 AD)

The Late Iron Age (LIA), otherwise known as the 'Kingdom period', saw further socio-political centralisation and economic specialisation. Kingdoms were established throughout the Great Lakes region at this time, including the Nyiginya Kingdom which later became the Kingdom of Rwanda.[132] The ruling dynasty of this kingdom was founded by Ruganzu Ndori in the seventeenth century,[133] whose power base was in Nduga, a region south of the Nyabarongo bend and just 30km north of the Project AoI.[134] However, from at least the mid-eighteenth century onwards the Kingdom of Rwanda expanded far beyond this original core, annexing the Kingdom of Bugesera where the Project AoI is located.[135] This event is remembered through two well-known dynastic poems that were composed after the death of the King of Bugesera.[136]

According to further oral tradition, one of the kings of Bugesera resided near Kayovu Hill, although there is no surviving physical evidence of the royal palace.[137] When interviewed during the field survey (Appendix B), elders noted that the palace was marked by a collection of ficus trees.[138] These trees were however thought to have been felled during the reconstruction of residences to house refugees from the 1994 genocide against the Tutsis.[139]

The LIA period was characterised by ongoing militarisation, expansion of the realm, and a dense population within the Kingdom.[140] The state became increasingly centralised [141] with the king controlling all men within the army, a development that led to a military aristocracy and quasi-feudal structure by the eighteenth century.[142] By the nineteenth century, the Kingdom of Rwanda became one of the most powerful kingdoms in the area, alongside Burundi and Buganda.[143]

[132] Paul (2020).
[133] Ibid.
[134] Ibid.
[135] Paul (2020); Andre Ntagwabira (2023) *The Cultural Heritage Field Survey in Bugesera Special Economic Zone.*
[136] Ntagwabira (2023).
[137] Ibid.
[138] Ibid.
[139] Ibid.
[140] Paul (2020); Giblin, Humphris, Mugabowagahunde, Ntagwabira (2011)
[141] Ibid.
[142] Paul (2020)
[143] Ibid.

Interviews conducted as part of the current baseline survey suggest that during the second half of the nineteenth century, King Kigeli IV Rwabugiri[144] established a defensive royal palace in the grassland within the Project AoI.[145] The traditional location for this palace is bisected by the NR5 national road and is bordered by the current location of the Imana Steel factory.[146] The only known remaining physical feature of the palace are the above mentioned ficus trees which the local communities identify as being part of the royal palace fence (AB_CH_006).[147] These trees are 3 metres from the boundary of the Imana Steel Factory, as seen in Figure 6-35, and approximately 700 metres from the Site. Though these trees are too young to be the originals recorded by oral tradition they may be their descendants and it is clear they are important cultural heritage receptors for the community.

However, land access at the time of the survey was limited. Additional survey and more in-depth interviews are required in order to take place to assess the possible location of King Rwabugiri's palace.

[144] Monarch of the Kingdom of Rwanda (1853-1895) and was the first Rwandan king to encounter Europeans. Defence of the kingdom's borders through the establishment of a rapidly modernising army was a key characteristic of his reign.
[145] Ntagwabira (2023)
[146] Ibid.
[147] Ibid.

FIGURE 6-35 PROXIMITY OF AB_CH_006 TO IMANA STEEL, WITH PROJECT FOOTPRINT TO THE NORTHEAST[148]

[148] Google Earth (2022) *Imana Steel -2.2906, 30.2076, elevation 0m* <https://earth.google.com/web/search/Imana+Steel,+Colline+Gako,+Rwanda/@-2.2923508,30.2085927,1468.32764936a,850.8528131d,35y,0h,0t,0r/data=CigiJgokCZdubURCPwLAEf5TpNllbwLAGUzIbBMzOD5AIXxX7qI3Mj5A> [Accessed 17/01/2024].

FIGURE 6-36: AB_CH_006 - NTAGWABIRA (2023) TWO FICUS TREES ASSOCIATED WITH THE PALACE OF KING RWABUGIRI[149]

Also associated with the palace of King Rwabugiri is a small pool thought by the local community to be a watering trough for the King's cattle (AB_CH_001).[150] Although located approximately 1.5 km from the Site, the oral history of this pool suggests it is part of a wider dynastic landscape that includes the Project AoI. This trough is clearly significant to the local community as it has been maintained and conserved.[151] As noted above, further survey of the surrounding area, including that between AB_CH006 and AB_CH_001, and more in-depth interviews, are required to better define the extent of the royal settlement.

[149] Andre Ntagwabira (2023) *The Cultural Heritage Field Survey in Bugesera Special Economic Zone.*
[150] Ibid.
[151] Ibid.

FIGURE 6-37: AB_CH_001 - NTAGWABIRA (2023) CATTLE WATERING TROUGH OF KING RWABUGIRI[152]

The close proximity of LIA sites to the Project suggests that there is a **high potential** for archaeological evidence from the LIA to be found within the Project AoI.

6.5.6.8 COLONIAL PERIOD (1897-1959)

From the beginning of the 1890s, the Kingdom of Rwanda was shaken by famine, plague and political instability after the death of King Rwabugiri and the incursion by Belgian colonial forces.[153] In 1897 the Rwandan court accepted German imperial rule in exchange for protection of the Rwandan king, and later that year Rwanda became an official district as part of the German colony of Ruandi-Urundi.[154]

During the German occupation of Rwanda there were few Europeans, apart from missionaries, living in the colony.[155] The focus of German political influence was on bolstering the power of local elites, thus ensuring both that they were materially invested in the colonial situation and that Rwandan king was undermined.[156] However, after the First World War, Germany was forced through League of Nations mandate to relinquish Ruanda-Urundi to Belgium as part of a wider annexation of territory.[157]

As well as creating division between colonised populations to curb the effectiveness of anti-colonial resistance, the creation of official ethnic castes was intended to create a more well-ordered and efficient society.[158] With the increased numbers of Europeans and their greater political influence, the architecture changed. Indeed, whilst traditional settlement styles continued throughout the colonial period, new European-style brick

[152] Andre Ntagwabira (2023) *The Cultural Heritage Field Survey in Bugesera Special Economic Zone.*
[153] Paul (2020)
[154] Ibid.
[155] Ibid.
[156] Ibid.
[157] Carina Yervasi (2008) 'Anti-Colonial Resistance in the Former Belgian Colonies', *A Historical Companion to Postcolonial Literatures: Continental Europe and its Empires*
[158] Ibid.

buildings were constructed.[159] Some of these survive today in colonial centres.[160] Whist there are no such buildings known within the Project AoI, other forms of archaeological evidence, including former rural settlements, trackways and field boundaries from the colonial period may be found within the Project AoI. There is therefore a **high potential** for heritage resources from this period to survive within the Project AoI.

6.5.6.9 INDEPENDENCE (1959-PRESENT)

Resistance by the local populations in Rwanda began with the first wave of European colonisation in 1897. However, Rwanda did not formally begin the political process of independence from Belgium until 1959, and total independence was only achieved in 1962, when Ruanda-Urundi split into Rwanda and Burundi after failing to agree on a common future.[161]

After independence, the majority Hutu community replaced the Tutsi minority political elites in governing positions. Inter-ethnic violence increased among the populace at this time, and over the next thirty years led to a series of pogroms which displaced thousands of people, most of who were Tutsi.[162] By 1990, the displaced Tutsi had formed a militarised refugee organisation called Rwanda Patriotic Front (RPF).[163] The RPF re-entered Rwanda in 1990, triggering the 1994 genocide against the Tutsis where 800,000 Rwandans were killed.[164]

In the aftermath of the 1994 genocide against the Tutsis, the Rwandan government relocated refugees to a section of land within the Project AoI that was previously owned by the Rwanda Agricultural Research Institute.[165] In 1995, a settlement for these refugees was constructed on Kagasa Hill, which more recently has been used for both farming and residential purposes.[166]

There are four sites memorialising the 1994 genocide against the Tutsis recognised by UNESCO as World Heritage Sites of cultural significance.[167] The closest site is Nyamata Memorial Site of the 1994 genocide against the Tutsis, located only 11km northwest of the Project AoI.[168] Historical memory of the post-Independence period and the 1994 genocide against the Tutsis is therefore likely to be a prominent element of cultural understanding amongst the population within the Project AoI. This heritage is likely to take the form of intangible cultural practices and memories including visiting nearby memorials at certain times of the year. There is a **high potential** for intangible heritage associated with this period to exist within the Project AoI. This intangible heritage may also have tangible or archaeological associations in the contemporary landscape.

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[159] Giblin, Humphris, Mugabowagahunde, Ntagwabira (2011)
[160] Ibid.
[161] Giblin, Humphris, Mugabowagahunde, Ntagwabira (2011); Yervasi (2008)
[162] Giblin, Humphris, Mugabowagahunde, Ntagwabira (2011)
[163] Ibid.
[164] Ibid.
[165] Ntagwabira (2023)
[166] Ibid.
[167] UNESCO, 'Memorial sites of the Genocide: Nyamata, Murambi, Gisozi and Bisesero' < https://whc.unesco.org/en/list/1586/> [accessed 20th November 2023].
[168] Ibid.

6.5.7 REMOTE SENSING

A systematic study of satellite imagery covering the Project AoI dating from November 2001 – March 2023 was undertaken as part the current baseline research. Although there were no clear surviving historic structures identified, changing land use and planned rural development patterns were clearly visible.

The implementation of planned rural development can be traced on historic satellite imagery surrounding the Site with the location of Rwinazi to the south, Kagasa to the north, and Batima, 3 km to the southeast. These planned rural settlements were established as part of a wider governmental plan to "villagize" scattered rural landscapes to increase agricultural productivity and access to infrastructure.[169] The Human Settlement Policy (HSP) was implemented in 1996 through the introduction of 'blocked' settlements consisting of 100-200 houses arranged in a grid layout.[170] The HSP was intensified in 2008 with the adoption of the Rural Settlement Program that intended to actively encourage rural populations to move into planned villages.[171]

From 2001-2008 the historic satellite imagery from the Project AoI and its vicinity shows that traditional shifting agricultural and grazing was still the main landuse during this period. The field systems are irregular in form though the clearings and fields are orientated with their long axes following the contour lines or arranged radially along a drainage channel. Smaller clusters of circular shaped enclosures with clearly defined tree and shrub perimeters, likely to be for containing and securing livestock, are also visible at this time. Together with the patchwork of field systems, these clusters of enclosures are an important part of the traditional agro-pastoral landscape and the suite of traditional subsistence practices that are likely to have been practiced here for centuries (AB_CH_007).

Between 2008 and 2014 large rectangular fields begin to appear, which is in line with the land use consolidation program that was introduced by the government in 2008, though it is interesting to note that irregular grazing and clearance patterns can still be discerned within the overarching field boundary pattern.[172]

Heritage assets such as the Royal cattle drinking pool (AB_CH_001) also appear to have survived the intensive restructuring of the rural landscape between 2001 and 2022, with a planned village settlement built around it and preserving the feature in its centre (Figure 6-39).

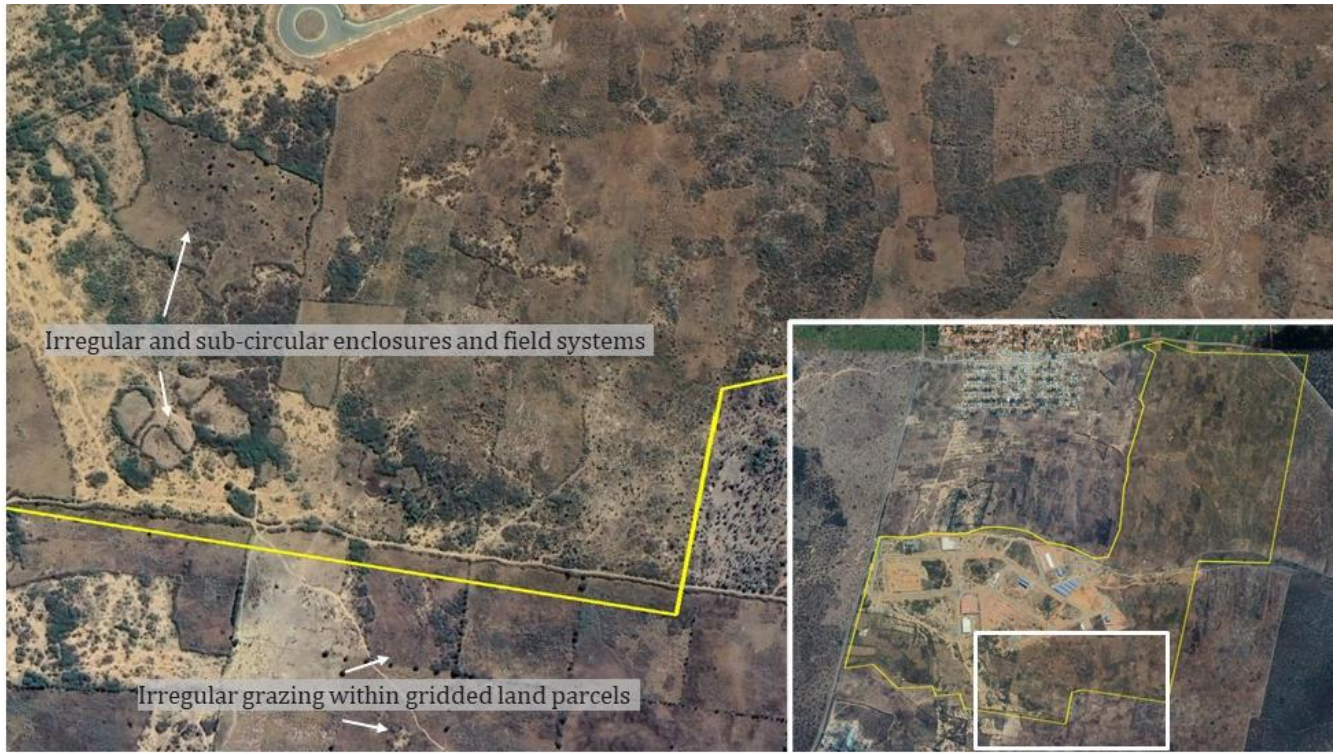
The preliminary development of the Site is also visible on the satellite imagery from 2016. It consists of roads and services, followed by a number of industrial facilities in subsequent years. The industrial development of the region can be seen more widely during this period.

From the 2022 satellite imagery it can be inferred that despite the implementation of governmental land consolidation programs, traditional agro-pastoral practices remain. In

[169] Lisa Dale (2023) 'Resettlement and Climate Change Adaptation in Rwanda: The Case of Rweru Model Green Village', working paper no. 35, *Researching Internal Displacement*
[170] Ibid.
[171] Ibid.
[172] Ibid.

the southern part of the Site and to its south, the patchwork of irregular field systems and clusters of circular and sub-circular livestock enclosures are still visible (Figure 6-38).

FIGURE 6-38: AB_CH_007 - THE PROPOSED DEVELOPMENT IN 2022 SHOWING TRADITIONAL AGRO-PASTORAL PRACTICES[173]



[173] Google Earth (2022) *Area south of Afroturk Sanitary Industry -2.2907, 30.212 elevation 0m* < https://earth.google.com/web/search/Afroturk+Sanitary+Industry+Ltd,+Rwanda/@-2.28851387,30.21747491,1438.53726704a,856.69311614d,35y,0h,0t,0r/data=CigiJgokCW1tpl74_AHAETY0F7K7dQLAGVGsWkYBPj5AIfQIFnP_Lj5A> [Accessed 17/01/2024]

FIGURE 6-39: AB_CH_001 – THE CATTTLE DRINKING POOL ASSOCIATED WITH KING RWABUGIRI IN 2001[174] AND 2022

[174] Google Earth (2001) *Cattle Trough -2.3087, 30.2046 elevation 0m* < https://earth.google.com/web/@-2.30655809,30.20980434,1451.75572041a,8942.24565696d,35y,360h,0t,0r> [Accessed 17/01/2024]

6.5.8 INTANGIBLE TRADITIONS

In recent years, the Rwandan Government has begun to recognise the importance of protecting intangible traditions. In 2013, Rwanda ratified the 2003 UNESCO Convention for the Safeguarding of the Intangible Heritage.[175]

The archaeological field survey identified a significant amount of intangible heritage associated with locations within the Project AoI. As discussed above, the community has a clear sense of the royal history of both the Kingdom of Bugasera and the Kingdom of Rwanda in association with the Project AoI.[176] These histories are communicated through oral traditions, such as poems, but are also associated with physical sites (AB_CH_001 and AB_CH_006). The means of communicating this history is vulnerable to change as the transmission of oral culture relies on the cohesiveness of the community. Further, if the sites themselves are destroyed then the intangible traditions associated with them may be lost too.

Intangible cultural practices associated with the use of indigenous plants such as umukunde, umukoni, umuravumba, umubirizi, and umuko were also identified through the field study carried out as part of this baseline.[177] Most of the plants are used for traditional medicinal purposes. However, umuko is thought to have sacred significance in addition to its use in healing, and umukunde is used ritually to attract lovers.[178] A number of the plants associated with the intangible cultural practices are location within, or within a few meters of, the Site.

As noted above, there remains a traditional agro-pastoral landscape that reflects and is an integral part of intangible traditional practices (AB_CH_007) despite the implementation of governmental land consolidation programs. This is part of a wider historic agro-pastoral landscape that extends beyond the Project AoI.

6.5.9 KEY BASELINE FINDINGS

The baseline study identified a total of 9 cultural heritage resources within the AoI. Of these 9 identified resources, none are designated (listed or otherwise legally protected).

Further details on each cultural heritage resource can be found in Appendix and related maps.

It is important to note, however, that in addition to the known cultural heritage resources presented below, potential remains for further currently unknown archaeological sites and buried remains to exist below the surface within the Project AoI.

6.5.9.1 LISTED, LEGALLY PROTECTED CULTURAL HERITAGE RESOURCES

No designated cultural heritage resources were identified within the Project AoI.

[175] UNESCO, 'Rwanda: Conventions Ratified' https://www.unesco.org/en/countries/rw/conventions [Accessed 10/01/2024].
[176] Ntagwabira (2023)
[177] Ibid.
[178] Ibid.

6.5.9.2 NON-LISTED OR NON-PROTECTED CULTURAL HERITAGE RESOURCES

A total of seven non-designated cultural heritage resources were identified within the Project AoI and are presented by 'type' below.

6.5.9.2.1Indigenous Plants

- AB_CH_002 and AB_CH_003: A group of indigenous plants that were identified as having intangible cultural value in the field survey. These plants have medicinal uses for a variety of ailments. They are umibirizi (AB_CH_002) and a plot of umukoni (AB_CH_003). The group of plants straddles the Project boundary (Figure 6-40 and Figure 6-41).
- AB_CH_004: An indigenous tree known as umuko that was identified as having intangible cultural value in the field study. The tree is considered sacred. It sits within the Project footprint.
- AB_CH_005: A zone of indigenous trees that were identified as having intangible cultural value in the field survey.

FIGURE 6-40 AB_CH_002 - NTAGWABIRI (2023) AN UMUBIRIZI TREE USED FOR TRADITIONAL MEDICINE WITHIN THE PROJECT FOOTPRINT[179]

[179] Andre Ntagwabira (2023) *The Cultural Heritage Field Survey in Bugesera Special Economic Zone.*

FIGURE 6-41 AB_CH_004 - NTAGWABIRI (2023) SURVEY TEAM NEXT TO INDIGENOUS MEDICINAL PLANTS, INCLUDING AN UMUKONI[180]

6.5.9.2.2Palace of King Rwabugiri

- AB_CH_001: An historic cattle watering trough associated with the local palace of King Rwabugiri. The field survey identified local oral history surrounding the trough, of which the community are proud and endeavour to maintain (Figure 6-37).
- AB_CH_006: Trees marking the traditional location for the local palace of King Rwabugiri. The two ficus trees here are thought to have been a part of the boundary fence. Like the trough, the community place importance upon these trees and they form part of their intangible heritage (Figure 6-36).
- AB_CH_008: A possible location for the palace of King Rwabugiri identified in the archaeological field survey. The receptor is divided by the national road, with the western half thought to be contained within the Gako military domain, which it was not possible to access during the field survey.

6.5.9.2.3Historical agro-pastoral landscape

- AB_CH_007: Traditional agro-pastoral practices, which are evidenced by the physical presence of field systems, enclosures and irregular clearances on the landscape. This heritage landscape includes the intangible practices and cultural knowledge associated with these farming and herding traditions that have survived despite the pressures to modernise food production in Rwanda despite governmental intervention (Figure 6-38).

[180] Andre Ntagwabira (2023) *The Cultural Heritage Field Survey in Bugesera Special Economic Zone.*

6.5.9.2.4Geoarchaeological potential

AB_CH_009: Ground investigation works have shown thick >6m deposits of silt, clay and gravel are present across the Site[181] and therefore archaeological remains may still survive within and under them. Though there has been no geoarchaeological assessment of the area and we do not know the age of the sedimentary deposits that underly the Site, it is likely that these deposits have their origins in prehistoric drainage dynamics associated to shifting palaeo-lake formations.

Much of the low lying floodplain within the Site has, however, already undergone soil stripping and development as part of the Phase 1 works and many of the river sides and terraces would have been removed through the modification works. The northern side of the river valley at the eastern end of the Site has, however, not yet been developed and lies within the area set aside for a Conservation Green[182].

6.5.10 SENSITIVITY/VALUE OF RECEPTOR

Each identified tangible and intangible cultural heritage resource has been assigned a sensitivity/value. There are many factors to consider when assigning value to cultural heritage resources and key baseline findings are presented a sensitivity as a tangible or intangible cultural heritage resource as presented section 6.5.10.1.

Values are typically expressed as low, medium, high (and sometimes very high) and these can be equated to local, national, and international values.

The sensitivity/value of receptor for the cultural heritage resources identified in the baseline has been assigned based on ERM's internal impact assessment standard criteria for cultural heritage impact significance, professional judgement, desk-based research, and the field survey on tangible and intangible cultural heritage.

ERM's internal impact assessment standard criteria for cultural heritage impact significance are aligned with PS8's guidance, and assign a 'Low', 'Medium' and 'High' value to cultural heritage resources as set out in Table 6-28.[183]

TABLE 6-28 CRITERIA FOR CULTURAL HERITAGE SENSITIVITY/VALUE (A GUIDE)

Cultural Heritage Resource sensitivity/value		
Low	**Medium**	**High**
Defining Characteristics: • Site is not specifically protected under local, national or international laws or treaties; • Site can be moved to another location or replaced by a similar site,	**Defining Characteristics:** • Site is specifically or generally protected by local or national laws, but laws allow for mitigated impacts; • Site can be moved or replaced, or data and	**Defining Characteristics:** • Site is protected by local, national and international laws or treaties; • Site cannot be moved or replaced without a major loss of cultural value;

[181] Khemet (2023)
[182] BSEZ (2022). 'Masterplan and Preliminary Engineering: Bugesera SEZ'. Unpublished report, dated December 2022.
[183] Source: Annex to The ERM Impact Assessment Standard)

Cultural Heritage Resource sensitivity/value		
Low	**Medium**	**High**
or is a type of site that is common in the surrounding region; • Site has limited or no cultural value to local, national or international stakeholders; and/or • Site has limited scientific value or similar information can be obtained at numerous sites (Replicable Cultural Heritage)	artefacts recovered in consultation with stakeholders; • Site has considerable cultural value for the local and/or national stakeholders; and/or • Site has substantial scientific value, but similar information can be obtained at a limited number of other sites. (Non-replicable Cultural Heritage)	• Legal status specifically prohibits direct impacts or encroachment on site and/or protection zone; • Site has substantial value to local, national and international stakeholders; and/or • Site has exceptional scientific value and similar site types are rare or non-existent (Critical Cultural Heritage)

6.5.10.1TANGIBLE CULTURAL HERITAGE

Tangible cultural heritage refers to physical artefacts, objects or places produced, maintained, and transmitted inter-generationally in a society.

Tangible cultural heritage resources were assigned the following sensitivities. All sites are described further in the table in Appendix K.

6.5.10.1.1 High Sensitivity

The following 1 cultural heritage resource can be attributed a High sensitivity:

- AB_CH_001 (Historic cattle watering trough)

6.5.10.1.2 Medium Sensitivity

The following 3 cultural heritage resources can be attributed a Medium sensitivity:

- AB_CH_004 (Sacred tree)
- AB_CH_006 (Trees marking the former location of the palace of King Rwabugiri)
- AB_CH_008 (Possible location for the palace of King Rwabugiri)

6.5.10.1.3 Low Sensitivity

The following 5 cultural heritage resources can be attributed a Low sensitivity:

- AB_CH_002 (Indigenous medicinal plant)
- AB_CH_003 (Indigenous medicinal plant)
- AB_CH_005 (Indigenous tree zone)
- AB_CH_007 (Historic agro-pastoral landscape)
- AB_CH_009 (Deposits of geoarchaeological potential within alluvial and lacustrine sediments)

6.5.10.2INTANGIBLE CULTURAL HERITAGE

It is common for cultural heritage to have both tangible and intangible value.[184] Intangible cultural heritage features may be impacted by restricted access to, and use of these sites during construction and operational phases. Intangible cultural heritage resources were assigned the following sensitivity:

6.5.10.2.1 High Sensitivity

There are no intangible cultural heritage resources which can be attributed a High sensitivity.

6.5.10.2.2 Medium Sensitivity

There is one intangible cultural heritage resources which can be attributed a Medium sensitivity.

- AB_CH_001, AB_CH_006, and AB_CH_008 (Intangible traditions associated to the palace of King Rwabugiri)

6.5.10.2.3 Low Sensitivity

There are 7 intangible cultural heritage resources which can be attributed a Low sensitivity:

- AB_CH_002 and AB_CH_003 (Indigenous medicinal plants)
- AB_CH_004 (Sacred tree)
- AB_CH_005 (Indigenous tree zone)
- AB_CH_007 (Historic agro-pastoral landscape)

184 Intangible Cultural Heritage indicates 'the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their Cultural Heritage' (UNESCO, 2003).

7 STAKEHOLDER ENGAGEMENT

This Chapter presents a summary of the stakeholder engagement undertaken as part of the ESIA process for the Proposed Project. It also serves as a summary of a more detailed Stakeholder Engagement Plan (SEP), which presents the engagement approach and identifies stakeholders and the mechanisms through which stakeholders have been engaged. The complete SEP is included in Appendix D.

Stakeholder engagement took place throughout the ESIA process, by Earth Systems, and specifically over September and October 2023 during the primary data collection phase.

Since the project is a Category A Project, the engagement process has been scaled to ensure all affected parties are consulted and adequately engaged. This includes establishing an external communication and maintaining an open line of communication throughout the project cycle. Additionally, the engagement process has been designed to meet both Rwandan legal requirements for public participation in relation to an ESIA Report, and international requirements for engagement as outlined in the IFC Performance Standards.

7.1 OBJECTIVES OF STAKEHOLDER ENGAGEMENT

The objectives of engaging stakeholders and the community during the ESIA process and beyond include:

- **Ensuring understanding:** An open, inclusive and transparent process of culturally appropriate engagement and communication is undertaken to ensure that stakeholders are well informed about the proposed Project as it develops. Information is disclosed as early and as comprehensive as possible and appropriate.
- **Involving stakeholders in the assessment**: Stakeholders are included in the scoping of issues, the assessment of impacts, the generation of mitigation and management measures and the finalisation of the ESIA Report. They also play an important role in providing local knowledge and information for the baseline to inform the impact assessment.
- **Building relationships**: Through supporting open dialogue, engagements help establish and maintain a productive relationship between the Project and stakeholders. This supports not only an effective ESIA, but also strengthens the existing relationships and build new relationships between the Proponent and stakeholders.
- **Engaging vulnerable peoples**: An open and inclusive approach to consultation increases the opportunity of stakeholders to provide comment on the Project and to voice their concerns. Some stakeholders, however, need special attention in such a process due to their vulnerability. Special measures are to be considered to ensure that the perspectives of vulnerable stakeholders are heard and considered.
- **Managing expectations**: It is important to ensure that the Project does not create or allow unrealistic expectations to develop amongst stakeholders about Project benefits. The engagement process serves as one of the mechanisms for

understanding and then managing stakeholder and community expectations, where the latter is achieved by disseminating accurate information in an accessible way.

- **Ensuring compliance**: The process is designed to ensure compliance with both local regulatory requirements and international best practice.

7.2 PROJECT STAKEHOLDERS

To undertake effective engagement, it is necessary to identify Project stakeholders and understand their interest, priorities, and objectives in relation to the Project. For the purposes of this report, a stakeholder is defined as any individual or group which is potentially affected by the Project or who has an interest in the Project and its potential impacts. Different issues are likely to concern different stakeholders, as such stakeholders have been grouped based on their connections to the Project.

Table 7-1 presents the stakeholders currently identified for the Project. Key stakeholder groups for the Project include Project Affected Communities, natural resource users, local businesses, non-government institutions, and the Government of Rwanda at local and central levels.

TABLE 7-1: PROJECT STAKEHOLDERS

Category	Stakeholder Groups	Stakeholder Interests
Communities/Project affected people[185]	• Women Forum • Youth Forum • Association of People living with Disabilities • Faith Based Organization	• Livelihood restoration and compensation • Grievance resolution • Community development initiatives • Economic development • Employment opportunities and skills development • Community health and safety. • Protection of vulnerable and disadvantaged members of the community
Government/ traditional authorities	• Local Administration • Ministry of Trade and industries (MINICOM) • Ministry of Infrastructure (MININFRA) • Rwanda Development Board (RDB) • Rwanda Environment Management Authority (REMA) • National Land Authority (NLA) • Ministry of Local Government (MINALOC) • Rwanda Housing Authority (RHA) • Water and Sanitation Corporation	• Economic development • Livelihood restoration and compensation • Grievance Resolution • Employment and skills development • Social infrastructure (potable water, health centres, etc) • Community health and safety • Cultural heritage • Access routes and accessibility; and • Agro-pastoral activities.

[185] Project affected people refers to the portions of the local communities who were relocated during Phase 1 of the BSEZ development in 2012

	• Rwanda Transport Development Agency (RTDA) • Rwanda Energy Group/Energy Utility Corporate Limited (EUCL)	
Public and commercial interests	• Private Sector Federation, Bugesera District • Federation of Farmers Cooperatives	• Economic development • Community health and safety • Cumulative impacts.
Non-government / Civil Society Organisations	• Rwanda Environmental NGOs Forum (RENGOF) • Centre of Excellence in Biodiversity and Natural Resources Management •	• Conservation and protection of rare and threatened flora and fauna species • Biodiversity values • Protection of threatened species and habitats • Protected area management.
Other	Media	• Information on the project
Institutions	Rwanda Institute for Conservation Agriculture	• Knowledge transfer

7.3 APPROACH TO STAKEHOLDER ENGAGEMENT

Stakeholder engagement for the proposed Project will be and was undertaken using a staged approach in line with the various phases of the Project, which will include engagements during:

- The ESIA process (i.e. pre-project implementation);
- Project implementation (construction phase); and
- Post project implementation (operations and decommissioning phases)

Stakeholder engagement for the proposed Project will be and was undertaken using a staged approach in line with the various phases of its development as follows:

- ESIA process engagement; and
- Post ESIA engagement.

7.3.1 ESIA PROCESS ENGAGEMENT

The Objectives of the ESIA process engagement were to:

- To understand the interests, influence, and concerns of various Project stakeholders.
- To ensure effective, transparent, and timely communication between the Project and its stakeholders, to engender an environment of trust and mutual respect.
- To engage stakeholders on their concerns regarding the Project, and appropriately address these through dialogue and corrective actions.
- To establish effective means of communication to disseminate information from the Project to stakeholders.
- To design stakeholder engagement mechanisms and standards that respect local traditions and cultural norms.

- To effectively manage the expectations of stakeholders regarding socio-economic benefits derived from the Project.
- Establish the appropriate management mechanisms and identify necessary capacity building and training requirements for the effective implementation.

Stakeholder consultations began with the identification of the different stakeholders and the evaluation of stakeholder's needs, expectations, interests, and objectives in relation to the Project. This information was used to tailor engagement activities to each type of stakeholder. The broader stakeholder categories which were identified included:

- Project affected people;
- Primary stakeholders;
- Secondary stakeholders; and
- Vulnerable people.

Furthermore, individuals or groups that found it more difficult to participate and those who were differentially or disproportionately affected by the project due to their marginalized or vulnerable status were identified.

During consultations, stakeholders expressed their views and grievances for the Phase 1 operations, and they also presented suggestions and recommendations for the implementation and operation of the upcoming Phase 1A and 2. Focus group discussions with representatives at the village, cell and sector level were conducted with the youth, women, and people living with disabilities. Each group discussion comprised of:

- Three representatives from the village;
- One from the cell; and
- One from the sector.

Additionally key informant interviews were conducted with government stakeholders including:

- Ministry of Trade and industries (MINICOM);
- Ministry of Public Service and Labour (MIFOTRA);
- Rwanda Development Board (RDB); and
- Rwanda Environment Management Authority (REMA) and National Land Authority (NLA).

The stakeholder engagement activities undertaken during the ESIA phase are presented in Table 7-2 below.

TABLE 7-2 *EIA BASELINE SURVEYS AND CONSULTATIONS (SEPTEMBER & NOVEMBER 2023)*

Method of Engagement	Location	Date
• Focus Group Discussion with the Youth Forum in Gashora Sector	Kagasa Cell office Gashora Sector	September 2023 November 2023
• Focus Group Discussion with people living with disabilities	Kagasa market	November 2023

Method of Engagement	Location	Date
• Focus Group Discussion with young women in Gashora Sector	Kagasa Cell office Gashora Sector	September 2023 November 2023
• Key Informant Interview with Private Sector Federation, Bugesera	Bugesera District in Nyamata town	September 2023
• Community meetings with Project affected people.	Kagasa Centre in Gashora Sector	September 2023
• Key Informant Interview with the Federation of Maize Cooperatives Farmers in Bugesera	Gashora Sector, Lake Cyohoha	September 2023
• Key Informant Interview with Rwanda Environment Management Authority	REMA office Kigali	September 2023
• Key Informant Interview with Ministry of Trade and industries (MINICOM)	MINICOM office Kigali	November 2023
• Key Informant Interview with Rwanda Development Board (RDB)	RDB office Kigali	November 2023
• Key Informant Interview with Ministry of Public Service and Labour (MIFOTRA)	MIFOTRA office Kigali	November 2023
• Key Informant Interview with National Land Authority (NLA)	NLA office Kigali	November 2023

7.3.2 OUTCOMES OF ENGAGEMENT CONDUCTED TO DATE

As indicated in Table 7-2 stakeholder engagement meetings were held during the ESIA process of the Project. During the stakeholder consultation process, several anticipated project benefits and key community concerns were raised. Anticipated Project benefits identified from consulted communities include:

- Employment and skills development opportunities;
- Land compensation;
- Health infrastructure opportunities; and
- Further water infrastructure development.

Employment opportunities, particularly for the youth, were identified by the villages as a key anticipated benefit, which is a common expectation for rural communities located near major project developments. It was reported that factories in the BSEZ Phase 1 gave women and youth priority in employment. Additionally, during the stakeholder engagements, the representatives from the maize farmers Cooperatives Federation confirmed receiving farming inputs, tools, and materials from maize flour processing company in the economic zone. Compensated landowners were also given enough time to harvest their farms.

Moreover, the management of BSEZ Ltd collaborates with district and local authorities at Sector and Cell level. The collaboration includes information exchange especially reporting of community grievances. Furthermore, the Private Sector Federation in

Bugesera is pleased to have good relationship with a number of factories within the BSEZ. The *Project affected people* recognised the successes registered over Phase 1 activities and the important contribution of different stakeholders however, they highlighted significant challenges resulting from the operation of Phase 1.

The key issues of concern were raised in relation to the Phase 1 of BSEZ development. Some of the *Project affected people*, who were relocated during Phase 1, raised grievances related to the resettlement process and compensation that was allocated to them. Some of these *Project affected people* are anticipating to be fully compensated as Phase 1A and 2 of the development commences. The following grievances were reported by stakeholders and *Project affected people*:

Limited stakeholder engagement activities: the project implementers held various meetings and interviews during Phase 1. Nonetheless, there are many people affected by Phase 1 whose complaints are unaddressed.

- Civil society might have felt excluded.
- Limited compliance with environmental standards.
- Reported cases of corruption by youth.
- Reported cases of sex extortion from female employees.
- Reported cases of gender-based violence.
- The use of media and radio was very limited.
- Land compensation was delayed in some communities which generated many claims.
- Safety of factory workers is not guaranteed.

The detailed minutes of the stakeholder engagement meetings conducted during the ESIA process, attendance registers, and the developed stakeholder engagement records are presented in Appendix D and Appendix E.

7.3.3 POST ESIA ENGAGEMENT

The Project is committed to continuous engagement with stakeholders throughout the life of the Project, from the current stages of planning and design, through construction into operation, and eventually to closure and decommissioning.

Plans and activities implemented during the next stages of Project planning and development will therefore feed into and inform on-going stakeholder engagement as the Project moves into these stages, ensuring that two-way dialogue with those affected, both positively and negatively by the proposed Project is maintained.

The aim will be to ensure that the Project remains in contact with all interested parties and cognisant of their concerns, and that these are addressed in an effective and timely manner. At each stage, a detailed schedule of activities and events will be developed and widely disseminated so that people know how to interact with and participate in the Project.

A summary of all engagement activities is presented in Table 7-3 below: Detailed description of the engagements post-ESIA are detailed in the SEP (Appendix D).

TABLE 7-3:SUMMARY OF ENGAGEMENT

Phase	Activities	Description
ESIA Phase	EIA Disclosure/Public Hearings	Following the completion of the EIA, findings should be disclosed to all stakeholders. In compliance with the Law no 001/2019 of 15/04/2019, once the EIA is under review by the Rwanda Development Board (RDB) the EIA documents may be requested by RDB to be disclosed publicly for 21 days. To align with the IFC's best practice, the EIA must be disclosed publicly through online and in hard copy. In addition, a non-technical summary provided to local communities, translated into the appropriate local language, and key information should be shared verbally (and preferably with relevant visual aids and in the local language/s) in a public forum (e.g. a public meeting or town hall meeting)
	EIA Comment and Objection	RDB will make reasonable opportunity available to stakeholders to comment or object to the EIA findings. This will be conducted in compliance with Law no 001/2019 of 15/04/2019 to incorporate Public Consultation.
Pre-Construction Phase	Grievance Management Procedure (GMP)	BSEZ Ltd must implement a robust grievance mechanism and management process that is aligned with IFC PS1, to receive and facilitate resolution of Affected Communities' concerns and grievances about the Project.
	Quarterly engagement with project affected people	At least quarterly engagement during pre-construction is required to ensure the project affected people are aware the progress of the project, to address historical issues, and any new grievances raised
	Ongoing engagements	At least biannual engagement with communities, employers, and employee representatives, including trade unions and business forums, of the BSEZ Ltd.
	Quarterly Engagement with Local Leadership	During the pre-construction phase, the local leadership will receive updates on the progression of planning for construction commencement.
Construction Phase	Quarterly Engagement with Local Leadership	Throughout the construction phase, BSEZ Ltd will meet with the local leadership quarterly. The local leadership

Phase	Activities	Description
		will serve as the main vehicle of communication between the Project and host communities.
	Quarterly engagement with youth, women, vulnerable groups	Quarterly updates regarding the progression of construction, as well as any other pertinent information to be disclosed, will be provided through engagements with traditional and community leaders, as well as youth structures, and any other stakeholders deemed necessary as determined by the proposed outcomes of the engagement
	Monitoring of Grievances	At the commencement of construction and during construction of Phase 1 - currently ongoing, the Project will actively monitor grievances raised against BSEZ Ltd or sub-contractor staff, as per the process outlined in the SEP (Appendix D)
Operational Phase	Annual Engagement with Local Leadership	The Project will continue to engage with local leadership on an annual basis, and more often if communities or other stakeholder groups require
	Provide Broader Project Updates as Required	BSEZ Ltd will continue to provide broader feedback and updates to stakeholders beyond the local leaders regarding the operation of the Project, as well as any other pertinent information to be disclosed such as environmental exceedances and corrective measures to be implemented.
	Monitoring of Grievances	The Project will actively monitor grievances raised against BSEZ Ltd or sub-contractor staff throughout the operational life of the Project
Decommissioning Phase	Announcement of Intended Decommissioning	Stakeholders will be informed of the intended decommissioning as soon as reasonably and practically possible, but no less than three months prior to the commencement of decommissioning activities.
	Quarterly Engagement with Local Leadership	During the decommissioning process, BSEZ Ltd will meet with the local leadership quarterly to discuss the potential impacts of the decommissioning on host communities, as well as how these may be mitigated.
	Provide Broader Decommissioning Updates as Required	BSEZ Ltd will continue to provide broader feedback and updates to stakeholders beyond the local leadership regarding the decommissioning of the Project, as well

Phase	Activities	Description
		as any other pertinent information such as anticipated impacts on host communities.
	Monitoring of Grievances	At the commencement of decommissioning, the Project will actively monitor grievances raised against BSEZ Ltd or sub-contractor staff

7.4 PROJECT GRIEVANCE MECHANISM

In accordance with international good practice, the Project has established a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation who judges that they have been adversely affected by a project during any stage of its development.

Further detail on the grievance mechanism process is outlined in the SEP in Appendix D.

8 IDENTIFICATION AND ASSESSMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS

8.1 METHODS AND TECHNIQUES USED

The ESIA consultant's approach in conducting this ESIA study is to work closely with the teams of the Project Developer and Owner (i.e., BSEZ Ltd) so that the environmental and social assessment is an iterative process. In this way, E&S considerations, mitigation and enhancement measures are embedded into the design, where possible, to maximise efficiencies.

For this ESIA Report, ERM's standard Impact Assessment Methodology (Figure 6 1) has been employed for assessment of impacts. The overall approach is that the significance of an impact is assessed as a result of the impact magnitude (which depends on extent, duration and other impact factors) and the sensitivity characteristics of resources and receptors. The resulting impact significance is then defined in terms of Minor, Moderate or Major – or positive, as based on the Fecteau Impact Significance Determination Grid[186].

For potential impacts that are found to be Major (and in some cases Moderate), one or more mitigation measures are recommended in line with the so-called "Mitigation Hierarchy" to either: avoid, minimise, mitigate, or compensate for the impact so that the resulting residual impact significance is acceptable.

The ESIA consultant has interacted with BSEZ Ltd design team to ensure the technical measures incorporated to avoid/minimise impacts, (e.g. International Best Practices) are captured/noted. Such "embedded measures" are considered as part of the existing Project design and not specified again as mitigation measures - they are anyhow already planned/obligatory (refer to sections 8.2 to Section 8.4). Additional mitigation measures to be implemented are addressed in Chapter 9 of this ESIA Report.

8.1.1 PREDICTION OF MAGNITUDE

The magnitude of each impact was predicted as falling into one of the following designations: negligible, small, medium or large. The 'magnitude' encompasses various possible dimensions of the predicted impact, such as:

- extent (i.e., local, regional or international);
- duration (i.e., temporary, short-term, long-term or permanent);
- scale or size (no fixed designations);
- frequency (no fixed designations); and
- likelihood, for unplanned events only (i.e., unlikely, possible, likely).

Each ESIA topic area (e.g., noise, biodiversity, social, etc.) adopted a different methodology for defining the magnitude of change as appropriate to the discipline, but the designations used were consistent. For example, for readily quantifiable impacts,

[186] Absolute Significance Grid (Fecteau, 1997)

such as noise, numerical values were used to define its size, whilst for other topics, e.g., social impacts, a more qualitative classification was necessary.

In the case of positive impacts, no magnitude was assigned.

8.1.2 SENSITIVITY OF RESOURCES AND RECEPTORS

The sensitivity (or vulnerability / importance) of the impacted resource or receptor was also defined using one of the followings designations: low, medium or high. As per the magnitude rating, the definition for each designation varied on a resource/receptor basis. Where the resource is physical (for example, a water body) its quality, sensitivity to change and importance (on a local, national and international scale) are considered.

Where the resource/receptor is biological or cultural, its importance (for example, its local, regional, national or international importance) and its sensitivity to the specific type of impact are considered.

Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered. The sensitivity definition for each resource / receptor is defined in more detail in the individual topic assessment sections.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity/vulnerability/importance designations are:

- Low;
- Medium; and
- High

8.1.3 EVALUATION OF SIGNIFICANCE

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance of the impact is assigned using the impact significance matrix shown in TABLE 8-1.

TABLE 8-1 IMPACT SIGNIFICANCE MATRIX

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	**Negative Impacts**			
	Negligible	Negligible	Negligible	Minor
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Critical
	Positive Impacts			
	Positive	Minor	Moderate	High

For positive impacts (which are mostly socio-economic impacts) magnitude is generally categorised as 'Positive' unless sufficient information is available to support a more robust characterisation and to assign the degree of magnitude as Small, Medium or Large.

For impacts resulting from unplanned events (typically accidents, such as a major fuel spill or other event that cannot be reasonably foreseen), the above methodology is applied but likelihood is also considered when assigning the magnitude designation, as classified in TABLE 8-2.

TABLE 8-2 DEFINITIONS FOR LIKELIHOOD DESIGNATION FOR UNPLANNED EVENTS

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

Table 8-3 provides context for the various ratings of impact significance used for this ESIA Report in ERM style. For the purpose of this ESIA, the colouring methodology from ERM was applied.

TABLE 8-3 CONTEXT OF IMPACT SIGNIFICANCE

Significance Designation & colour code	Significance Context
Negligible	A resource/receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
Minor	A resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
Moderate	Has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit.
Major	An accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors.
Positive	There will be a beneficial impact to a resource/receptor. (*note: no magnitude is assigned for positive impacts).*

8.1.4 IDENTIFICATION AND MITIGATION OF MEASURES

Where impacts of Moderate or Major significance were identified, mitigation measures have been developed to find practical ways of addressing negative impacts and enhancing positive impacts. Where feasible, mitigation was also evaluated for impacts of Minor significance. The key objective was to mitigate impacts to a level that is 'as low as reasonably possible'.

A hierarchy of mitigation options is considered, with avoidance at the source of the impact as a priority, and compensatory measures or offsets to reduce the impact significance as a last resort for residual impacts that cannot be further reasonably avoided. The mitigation hierarchy is presented in Figure 8-1.

Embedded controls (i.e., physical or procedural controls that are planned as part of the Project design and are not added in response to an impact significance assignment), were considered as part of the Project (i.e., prior to the impact assessment stage of the ESIA Process). Accordingly, they are not described as mitigation measures in the individual topic assessment sections. Embedded measures (if available) are listed under the respective topics in Section 8.2 to Section 8.4 of this report.

THE MITIGATION HIERARCHY FOR PLANNED PROJECT ACTIVITIES
Avoid at Source; Reduce at Source Avoiding or reducing at source is designing the project so that a feature causing an impact is designed out (eg, a waste stream is eliminated) or altered (eg, reduced waste volume).
Abate on Site This involves adding something to the design to abate the impact (eg, pollution controls).
Abate at Receptor If an impact cannot be avoided, reduced or abated on-site then measures can be implemented off-site (eg, noise or visual screening at properties).
Repair or Remedy Some impacts involve unavoidable damage to a resource. Repair essentially involves restoration and reinstatement type measures.
Compensate/Offset in Kind Where other mitigation approaches are not possible or fully effective, then compensation, in some measure, for loss or damage might be appropriate.

Source: ERM 2020

FIGURE 8-1 HIERARCHY OF OPTIONS FOR MITIGATION

8.1.5 UNPLANNED EVENTS

This ESIA considers the impacts that are expected to result from planned activities on the physical, biological and the socioeconomic environment. It also considers cumulative impacts and impacts from unplanned events such as accidents.

These are different to impacts that would reasonably be predicted to occur in the normal course of activities (including the application of in-built control measures) during construction and operations.

8.1.6 EVALUATION OF LIKELIHOOD

Unplanned and accidental events have the potential to occur during Project activities and therefore the evaluation of impacts for unplanned and accidental event takes into account the likelihood of the event occurring into the impact magnitude.

For unplanned events (e.g., accidental release of hazardous materials) the likelihood of the impact occurring is taken into consideration in deriving the magnitude rating. The likelihood of an impact occurring as a result of an unplanned event is expressed as a probability and is designated using a qualitative scale (or semi-quantitative, where appropriate data is available), according to the attributes described in TABLE 8-2.

8.1.7 ASSESSMENT OF RESIDUAL IMPACT

Following the identification of mitigation measures, impacts are re-assessed to determine their residual impact. This is essentially a repeat of the impact assessment steps discussed above, albeit with a consideration of the assumed implementation of the mitigation measures.

8.2 PHYSICAL RESOURCES AND RECEPTORS

8.2.1 AIR QUALITY

The baseline study has shown the airshed in the Project area is not degraded for both NO_2 and for particulate matter (PM_{10} and $PM_{2.5}$). The potential human receptors are of **medium** sensitivity.

8.2.1.1 POTENTIAL IMPACTS

8.2.1.1.1 Construction phase

The potential impacts associated with the construction phase of the Project are listed below:

- Construction dust: the construction activities can lead to emissions of dust;
- Construction traffic: Project construction can generate traffic on nearby roads and thereby associated combustion emissions and dust level raising; and
- Mobile plant and on-site power generation: Project construction associated combustion emissions potentially might occur due to diesel generators used.

The potential dust impacts due to construction are assessed and recommendations are made for appropriate mitigation as necessary. As per the traffic screening conducted by the BSEZ Ltd, the number of vehicles on the road is anticipated to be <17 000 in the years 2023 – 2026, which will render the impacts "negligible" as per the traffic screening methodology (Figure 8-3). The predicted traffic between the years 2030 to 2033 is anticipated to be <55 000, which render the impacts to be small, with the correct implementation of mitigation measures these residual impacts can be mitigated to negligible levels.

The nearest sensitive human and environmental receptors which may be impacted by construction activities are:

- The closest dwellings, including schools and churches, are located within 0.5 km northwest, 2.5 km northeast and 4 km southeast from the Project; and

8.2.1.1.2 Operational Phase

The potential impacts associated with the operational phase of the Project are:

- Operational traffic: the Project will attract increased traffic and generate vehicular related emissions; and
- Process emissions: the Project might use diesel generators occasionally for power production in cases of emergency or power shortcuts in the grid, which will generate air emission. Further emissions from the industries that are going to be settled in the BSEZ are not known at this stage, thus their potential impacts are not assessed in this report. Each new tenant in the BSEZ will be obliged to obtain their own environmental permits, including limits on air pollutants, as appropriate per the Rwandan environmental regulations and standards.

8.2.1.2 EMBEDDED MITIGATION MEASURES

The following embedded mitigation measures are included in the Project design:

- Construction phase: The Project will require measures to be adopted for the control of dust during the construction phase, as set out in Section 9.1.1. Construction projects are always undertaken with some mitigation, and these measures are therefore considered to be embedded.
- Operational Phase: Combustion sources will meet the relevant IFC and Rwandan emission limits.

8.2.1.3 IMPACT ASSESSMENT

8.2.1.3.1 Determination of Significance

The significance of impacts is determined based upon guidelines set out by the IFC. The IFC Environmental, Health, and Safety (EHS) Guidelines are relevant in terms of understanding the Project impacts. The guideline states:

> *"Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimise impacts by ensuring that:*
>
> *Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines;*
>
> *Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general rule, this Guideline suggests 25 percent of the applicable air quality standards to allow additional, future sustainable development in the same airshed."*

An airshed is an area that shares a common flow of air and that is exposed to the same conditions which may become uniformly polluted or stagnant.

The baseline data analyse showed that the dust AQS in the Project AoI are within the required standards for the PM_{10} and $PM_{2.5}$ parameters. Thus, considering this contextual environment the impact assessment was conducted in the sections below.

8.2.1.3.2 Construction Phase Assessment

The construction phase assessment of development considers the following aspects:

- Construction dust; and
- Construction traffic.

The impacts from these activities are assessed on a semi-quantitative basis as impacts are typically not significant or can be mitigated to the point at which residual impacts are negligible.

8.2.1.3.3 Construction Dust

The process for the air quality assessment for construction dust impacts is based on the methodology shown in Figure 8-2. The method indicates the key steps in determining the significance of dust generation. Construction phase data was provided by BSEZ Ltd (where possible). It should be noted that the Project is within an existing 335.68ha Bugesera SEZ and the construction of phase I, 91.64ha is at 54% of construction and 67 ha already occupied. It is understood that the access roads in Phase 1 are constructed

and already paved, however the internal roads within Phase 1A and Phase 2 of the Project limit (during construction) are unpaved or still not available. Access roads at Phase 1A and Phase 2 are not yet constructed. The magnitude of dust generation was determined by the following:

- Earthworks, which will primarily involve excavating material, haulage, tipping, and stockpiling. This may also involve levelling the site and landscaping, the magnitude of dust generated is thus expected to be > 50 ha (estimated)[187];
- Estimated number of vehicles on the internal unpaved roads is more than 10 per day;
- Material volume handling likely to be more than 50 000m^3 (estimated); and
- The airshed is considered not degraded for PM_{10} and $PM_{2.5}$ both in the dry seasons.

On the basis of the above parameters the construction phase dust and PM_{10} and $PM_{2.5}$ generation is determined to be of **large** magnitude (having the potential to exceed dust and PM_{10} and $PM_{2.5}$ AQS). Therefore, this impact is considered to be of **major** significance. The receptor profile can be described as being of **medium** sensitivity (general population).

Mitigation measures are outlined in Section **9.1.1**. An Air Quality Management Procedure will also be required within the construction Occupational Health, Safety Plan which should include construction phase dust management commitments.

With correct implementation of the required dust mitigation, the residual impacts could be **negligible**.

[187] The estimated values are based on the size of the Project area (i.e., 330 ha), and guidance from IAQM (2014) Assessment of dust from demolition and construction, Institute of Air Quality Management.

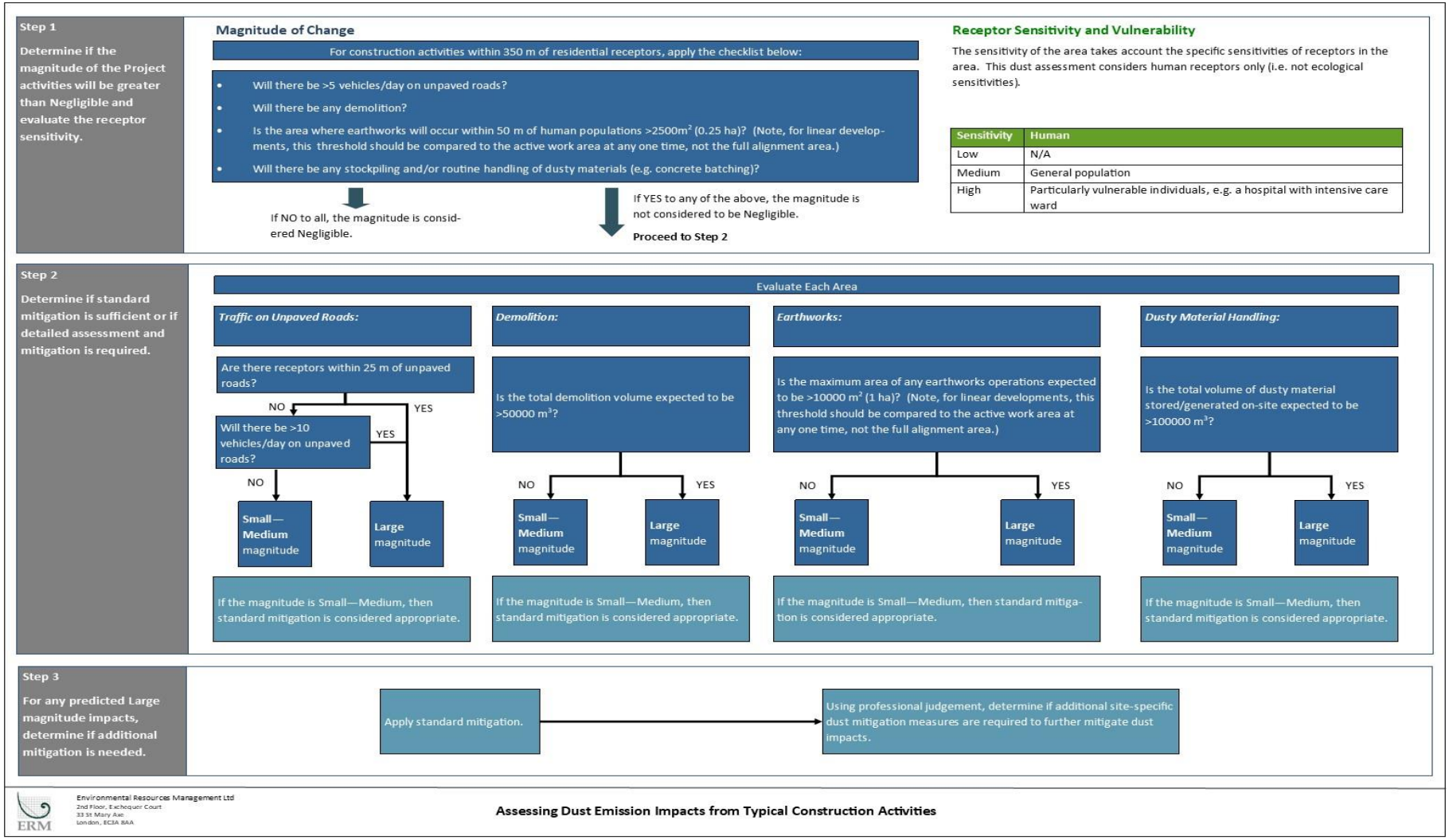


Figure 8-2 Infographic for Air Quality Assessment of Dust

8.2.1.3.4Construction Traffic

The process for the air quality assessment for traffic-related impacts is based on the methodology as shown in the infographic Figure 8-3.

The screening method is based upon the UK Highways Agency Design Manual for Roads and Bridges (DMRB) and IFC guidelines adapted for the traffic fleet likely to be in place in Rwanda. DMRB is a semi-quantitative method that utilises traffic emission factors, and a dispersion factor derived from ADMS-Roads model for a typical road to estimate roadside concentrations at increments away from the roadside. This approach provided a set of traffic screening criteria corresponding to thresholds for Minor, Moderate and Major Impacts. These screening thresholds can be used in the future to identify the potential for significant impacts to arise. This approach is proposed as it does not rely upon traffic flow data, or detailed modelling which will be highly uncertain. As per the traffic screening conducted by the BSEZ Ltd, the number of vehicles on the road is anticipated to be <17 000 in the years 2023 – 2026, which will render the impacts "negligible" as per the traffic screening methodology (Figure 8 3).

When the amount of traffic is known, this needs to be compared to these thresholds and in the case of moderate or major impacts, mitigation needs to be considered.

It should be noted that this method applies to road traffic exhaust emissions. Dust emissions from vehicle operation on unpaved roads is covered in the section above on construction dust.

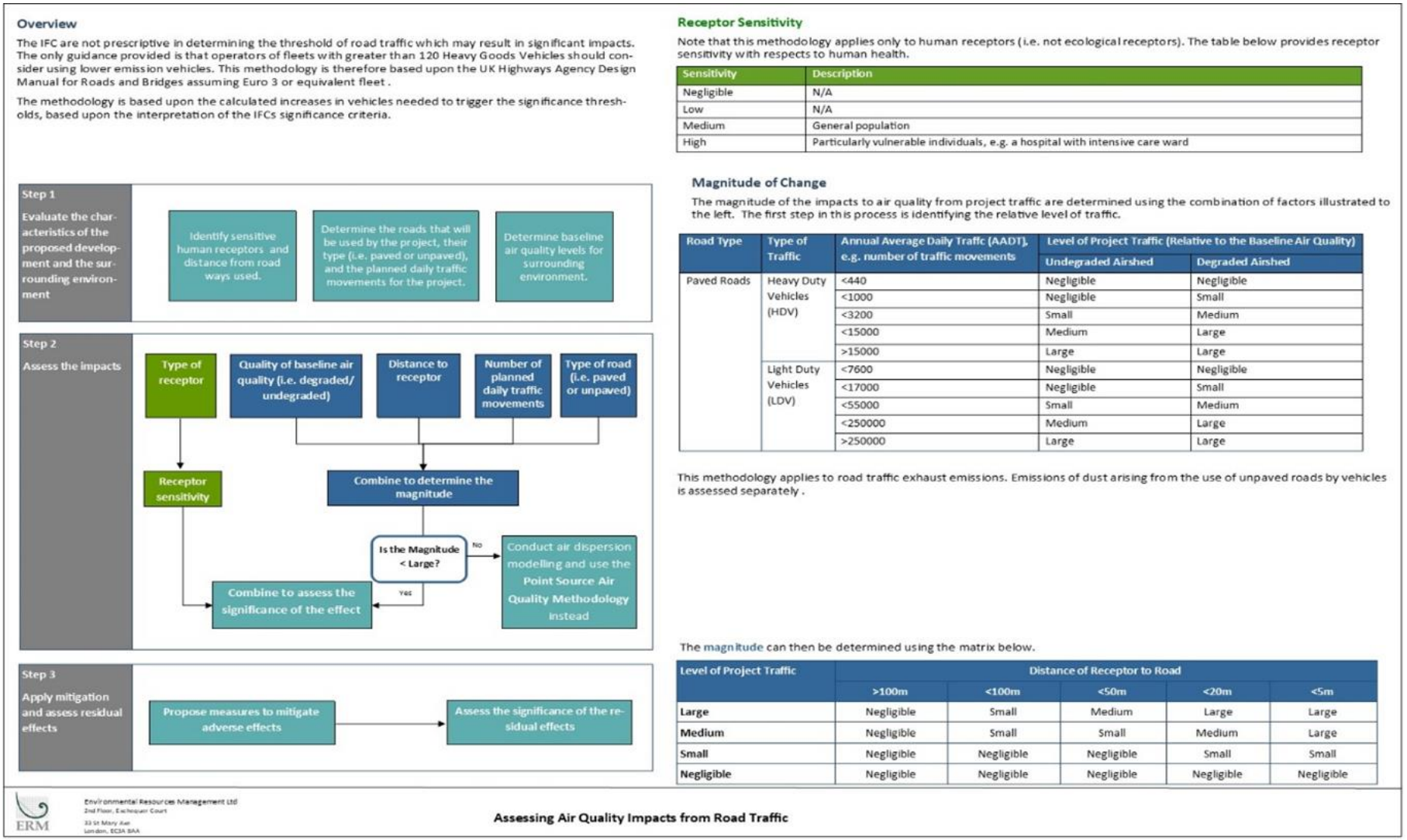


Figure 8-3 Traffic infographic for Air Quality Assessment

Operational Phase

Operating basic infrastructure

As noted, the diesel generator emissions were excluded from further consideration as the generator(s) will operate solely as standby energy supply for lighting and during emergency or power cuts and for other basic infrastructure within this Project.

The operational phase impact of the Project is deemed to be negligible for the operation of the basic infrastructure of the BSEZ itself, considering the embedded mitigation. This result is not necessarily indicative of the entire BSEZ. During the permitting process for the industries that will settle in the Project 335.7 ha, it is understood that a cumulative assessment of the potential impacts will be untaken to ensure AQS are not exceeded. Each tenant/industrial facility within the BSEZ will be responsible for their own permitting procedures/approvals – BSEZ Ltd will have no responsibility for this.

Traffic during Operation

The predicted traffic between the years 2030 to 2033 is anticipated to be <55 000, which render the impacts to be small, with the correct implementation of mitigation measures these residual impacts can be mitigated to negligible levels.

The screening method used for the operation phase assessment is similar to the one discussed for the construction phase (refer to the section above for more information). It should be noted that this method applies to road traffic exhaust emissions. Dust emissions from vehicle operation on unpaved roads is covered in the section above on operational dust. When the amount of traffic is known, this needs to be compared to these thresholds and in the case of moderate or major impacts, mitigation needs to be considered.

As traffic flows associated with the Project are unknown, at this stage the significance of traffic related impacts cannot be determined precisely. However, based on the projected Project activities during the operation phase, it is estimated that the impact from the Project traffic (e.g., servicing basic infrastructure of the Project) is **minor.**

8.2.1.4 SUMMARY OF IMPACT ASSESSMENT

A summary of the predicted Air Quality impacts is set out in Table 8-4. Additional mitigation measures for identified potential impacts, as deemed necessary, are outlined in Section 9.1.1 of the mitigation Chapter 9. Measures should be implemented during both the construction and operational stages to effectively address the potential impacts.

TABLE 8-4 AIR QUALITY IMPACT ASSESSMENT

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
Development & construction phase.	Dust generation from construction activities	See Figure 8-2	Air Quality	Direct	Negative	Medium	Regional	Medium	Moderate	If unmitigated, dust emissions will be polluting the area and add to already dusty air.
	Road vehicles and on unpaved roads and surfaces	See Figure 8-3	Air Quality	Direct	Negative	Small	Local	Medium	Moderate	Due to absence of traffic data, detailed assessment cannot be undertaken. However, it is estimated a higher traffic within the Project area
Operation phase	Operation of facilities	See Figure 8-2	Air Quality	Direct	Negative	Small	Regional	Long	Moderate	It is expected limited air emissions from basic infrastructure of the BSEZ.
	Road vehicles	See Figure 8-3	Air Quality	Direct	Negative	Small	Occasional	Long	Minor	Due to absence of traffic data, detailed assessment cannot be undertaken. However, estimated small number of vehicles for limited time.
Closure or rehabilita	Dust from demolition activities and traffic accessing the site. Mitigation measures are similar to the construction phase for dust.									

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
tion phase										

8.2.2 NOISE

Baseline noise measurements were conducted during October 2023 at 4 monitoring locations, carefully selected to provide a comprehensive representation of the noise baseline in the vicinity of the Project. There are nearby receptors where national noise criteria are not exceeded during day time.

8.2.2.1 POTENTIAL IMPACTS

During construction, noise levels can be increased due to the operation of the construction equipment. There are receptors at short distances from the boundaries of the project area that may be impacted during construction noise.

For operation, each future industrial facility will need a detailed Noise Impact Assessment, taking into account the type of activity and its proximity to the nearest NSR.

8.2.2.2 EMBEDDED MEASURES

The following embedded mitigation measures are included in the Project design:

- Construction phase: Construction works will be undertaken only during day time period.
- Construction activities such as Site Preparation and Roadworks will progress in stages throughout the construction period. As a result, simultaneous occurrences of these activities at any specific location are not anticipated.
- The Project's Road network will connect to existing roads. No new roads are planned outside the project site.
- Speed controls will be undertaken during Construction and Operation stage.

8.2.2.3 IMPACTS ASSESSMENT

8.2.2.3.1Construction Phase

Predicted distances at which noise criteria will be met for different Construction scenarios is shown in Table 8-5

Table 8-5 Distance at Which Criteria Will be Met.

Scenario	Rwandan Criteria (day-time), dB(A)	Distance (m)
S1	55	235
S2		300

ERM 2023.

The criteria for this Project will be met at a minimum distance of 235 meters from the Construction activity. However, given the extension of the proposed Project area (335.7 ha), it is expected that major nuisances will arise when construction activities were in the northeast area of the Project due to the proximity of the nearest NSR (N1).

Noise levels due to S1 and S2 activity are predicted to comply with Rwandan noise criteria for residential areas (high sensitivity) during daytime period at N2, N3, N4 and N5 locations. Therefore, **Negligible** significance impacts are predicted.

However, the noise levels at N1, when each individual activity will be at the nearest distance from the receptors, are predicted to be 62 dB(A) and 63 dB(A) for scenarios S1 and S2 respectively. These levels indicate **Moderate** significance impacts. Even though, the duration of these impacts is anticipated to last a short period of time, ERM recommends implementing mitigation measures and develop regular noise monitoring when construction activities are carried out in the northeast area.

8.2.2.3.2Operation Phase

Adequate noise emission for the operation of any industrial facility operating in proximity to existing NSRs are shown in Table 8-6. The criteria presented below are based on the greatest criteria, as defined either by the existing baseline or by the absolute criteria, focusing on the two, to the project area, nearest receptors.

Table 8-6 Operation Noise Emission at which Criterial will be met.

NSR	Distance to nearest Project Site Boundary (m)	Background +3dB(A) Criteria		Criteria, dB(A)		Total Allowed Sound Power Level, dB(A)	
		Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
N1	45	53	49	55	45	103	93
N2	300	49	45			112	102

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Any future development near N1 and N2 operating below the estimated maximum noise emission, is expected to have **Negligible** significance impacts. However, each future industrial facility will need a detailed Noise Impact Assessment, taking into account the type of activity and its proximity to the nearest NSR.

8.2.2.4 SUMMARY OF IMPACT ASSESSMENT

The noise assessment indicates that the average noise levels during the construction period will result in **Negligible** significance impacts. However, during the period that construction activities will be located at the shortest distance to the NSRs (e.g. N1) **Moderate** significance impacts have been predicted.

To mitigate these impacts, it is recommended the implementation of mitigation measures and noise monitoring, both detailed in Section 9.1.2. These measures will help minimize the impacts and ensure compliance with noise regulations and standards.

Furthermore, the successful implementation of noise control mitigation and management measures can lead to a significant reduction in overall noise levels, resulting in a transition from a classification of **Moderate** to **Minor-Negligible** significance impacts.

Moreover, **Negligible** impacts are expected for the operational scenario of any Industrial facility located near N1 and N2 (the closest receptor to the Project site) that operate below the noise emission levels calculated in **Table 8-6**.

A summary of the predicted Noise impacts is set out in **Table 8-7**.

To ensure ongoing compliance and effective management of noise emissions, ERM recommends regular monitoring through direct measurements at critical NSRs. If any exceedances of criteria occur, the implementation of an Noise Management Plan (NMP) is necessary to identify noise sources and implement corrective actions.

Table 8-7 Noise Impact Assessment

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct / Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
Construction phase	Earthworks and Roadworks	See Section 8.2.1.3	Noise	Direct	Negative	Small	Local	Short	Moderate	All receptors, apart from N1, are located at distances at which noise levels from construction will be Negligible. However, it is expected that major nuisances will arise when construction activities were in the northeast area of the Project due to the proximity of N1.

Operation phase	This assessment has been undertaken in the absence of operational details (types of activities, equipment, and quantities)	See Section 8.2.1.3	Noise	Direct	Negative	Negligible	Local	Duration of the activity	Negligible	It is estimated that any industrial activity operating with noise emission below the values mentioned in Table 8-6 will result in a Negligible at the nearest NSRs.
Closure or rehabilitation phase	The closure of the Project will have an impact on noise level due to emissions from demolishing equipment and works. It is anticipated that impact significance will be similar to construction phase.									

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8.2.3 HYDROGEOLOGY AND SURFACE WATER HYDROLOGY

8.2.3.1 POTENTIAL IMPACTS ON GROUNDWATER AND SURFACE WATER RESOURCES AND RECEPTORS

8.2.3.1.1 Pre-construction and construction phases

The impacts on the groundwater resource quality and quantity during the pre-construction and construction phases are discussed below.

- Surface infrastructure: The construction of the above infrastructure can involve shallow excavation to establish foundations or basement areas. The depth to groundwater level in the weathered material aquifer can range from 1.5 metres below ground level (mbgl) and deeper. The groundwater level in the deeper fractured rock aquifer is expected to be in the order of 50 mbgl. The groundwater level in the weathered material aquifer can potentially be impacted:
    - In the case that there is some excavation for basement areas, or deeper foundations for industrial facilities the groundwater level can be breached, leading to a localised, temporary, lowering of the groundwater level, or re-direction of groundwater flow patterns. The impacts on the groundwater levels and flow patterns are expected to be a "Minor Negative Impact" pre-mitigation (please refer to Table 8-8).
    - Construction of residential and utility (energy) infrastructure is not expected to breach the groundwater level and no direct impact on the groundwater levels is expected.
    - Increased paved and roofed areas will increase surface runoff, thereby reducing groundwater recharge into the underlying aquifers, leading to a minor, localised, drawdown in the groundwater levels underlying the BSEZ. The lowering of the groundwater levels could lead to a minor change in groundwater flow velocities. This is classified as a "Minor Negative Impact" pre-mitigation (please refer to Table 8-8).
    - Heavy machinery will be operational on site, which can impact the groundwater quality through accidental spills of fuels and oils, as well as other contaminants related to the transportation of equipment and materials during the construction phase. The weathered material aquifer is at risk of accidental chemical and hydrocarbon spills. The extent and severity of these impacts are expected to be relatively low, but it is likely to remain in the soil and groundwater for a prolonged period of time. Remediation will be difficult. Impacts from chemical and hydrocarbon spills will be a "Moderate Negative Impact" pre-mitigation (please refer to Table 8-8).
- Water supply: Pipelines are installed to transport the water from the Kanyonyomba treatment plant, which is located 11 km from site. On site, the water will be distributed using buried pipelines. Excavation for installation of the pipelines and distribution network at the new plots in Phase 1 and at the proposed Phase 1A and Phase 2 can cause a localised, temporary, impact on the groundwater level in the

shallow weathered material aquifer. The impacts on the groundwater levels and flow patterns are expected to be a "Minor Negative Impact" pre-mitigation (please refer to TABLE 8-8).

- Wastewater:
    - A sewage network will be installed on site at Phase 1A and Phase 2. Excavation for installation of the pipelines can cause a localised, temporary, impact on the groundwater level in the shallow weathered material aquifer. The impacts on the groundwater levels and flow patterns are expected to be a "Minor Negative Impact" pre-mitigation (please refer to Table 8-8).
    - Excavation for installation of the pipelines and the foundation of the CETP can cause a localised, temporary, impact on the groundwater level in the shallow weathered material aquifer. The impacts on the groundwater levels and flow patterns are expected to be a "Minor Negative Impact" pre-mitigation (please refer to Table 8-8).
- Drainage:
    - It is not expected that grading of the site, or construction of the channel will intercept the groundwater table. Therefore, no impact on the groundwater flow patterns is expected from the grading of the site.
    - During the grading of the site, as well as construction of the channel, heavy machinery will be operational on site. There is a risk of impacts to the groundwater quality through accidental spills of fuels and oils, as well as other contaminants related to the transportation of equipment and materials during the construction phase. Due to the groundwater level in the weathered material aquifer being around 1.5 mogul, the aquifer is at risk of accidental chemical and hydrocarbon spills. The impact on the groundwater qualities is expected to be a "Minor Negative Impact" pre-mitigation (please refer to Table 8-8).
    - Increased runoff due to the improved site runoff management can reduce groundwater recharge into the underlying aquifers. This could lead to a minor, localised, drawdown in the groundwater levels underlying the BSEZ. The lowering of the groundwater levels could lead to a minor change in groundwater flow velocities. The impacts on the groundwater levels and flow patterns are expected to be a "Negligible Negative Impact" pre-mitigation (please refer to TABLE 8-8.
- Energy: A total of 19,660 m of underground cables will be laid down while 4 sub-stations will be built on site.
    - The depth of excavation during laying of the underground cables is not specified in the project description. It is expected that the cables will be laid at a depth of around 0.7 to 0.8 m, with a maximum excavation depth of 1.5 m. Excavations for foundations are expected to be shallow. There is a slight possibility that these activities could breach the groundwater level but is not expected to have any notable impact on the groundwater levels or flow patterns.

- During the excavation for the underground cables, as well as construction of the sub-station pads and foundations heavy machinery will be operational on site. There is a risk of impacts to the groundwater quality through accidental spills of fuels and oils, as well as other contaminants related to the transportation of equipment and materials during the construction phase. Due to the groundwater level in the weathered material aquifer being around 1.5 mbgl, the aquifer is at risk of accidental chemical and hydrocarbon spills. The impacts on the groundwater qualities are expected to be a "Minor Negative Impact" pre-mitigation (please refer to TABLE 8-8).

- Waste: Waste will be either recycled or stored in dedicated transfer areas before disposal offsite in appropriate disposal sites.
    - With waste managed in a responsible manner, stored in dedicated transfer areas in the SEZ, and disposed of in appropriate off-site facilities, it is expected that waste will have minimal impact on the groundwater quality in the SEZ property boundary.

8.2.3.1.2Operational phase

The impacts on the groundwater resource quality and quantity during the operational phase are discussed below.

- Surface infrastructure:
    - Increased paved and roofed areas will increase surface runoff, thereby reducing groundwater recharge into the underlying aquifers, leading to a minor, localised, drawdown in the groundwater levels underlying the BSEZ. The lowering of the groundwater levels could lead to a minor change in groundwater flow velocities. This is classified as a "Minor Negative Impact" pre-mitigation (please refer to Table 8-9).
    - Vehicular use on site in the execution of tasks can impact the groundwater quality through accidental spills of fuels and oils, as well as other contaminants related to the transportation of equipment and materials during the operation phase. The weathered material aquifer is at risk of accidental chemical and hydrocarbon spills. The extent and severity of these impacts are expected to be relatively low, but it is likely to remain in the soil and groundwater for a prolonged period of time. Remediation will be difficult. Impacts from chemical and hydrocarbon spills will be a "Moderate Negative Impact" pre-mitigation (please refer to TABLE 8-9).
- Wastewater:
    - Discharged water concentrations can still be higher than the element concentrations in natural groundwater and therefore impact the groundwater quality negatively should the discharge recharge into the soils and eventually the shallow weathered material aquifer. However, with the element concentrations in the discharge complying with IFC guidelines, it is not expected that the discharged wastewater will have an impact that cause the groundwater quality to exceed World Health Organization (WHO) drinking water quality

standards, or IFC effluent guidelines. Impacts from discharge water on the groundwater resource will be a "Moderate Negative Impact" pre-mitigation (please refer to Table 8-9).

  - The main source of wastewater of the Project will be industries, which may have pre-treatment facilities. The effluents discharged into the BSEZ Ltd network will have to comply with the prescribed standards. The water in the BSEZ Ltd network will be treated at a common effluent treatment plant (CETP). After treatment the water is expected to meet the IFC standards and will be discharged into the existing natural drain at the bottom of the valley.

- Drainage:
  - Increased runoff due to the improved site runoff management can reduce groundwater recharge into the underlying aquifers. This could lead to a minor, localised, drawdown in the groundwater levels underlying the BSEZ. The lowering of the groundwater levels could lead to a negligible change in groundwater flow velocities. This is classified as a "Negligible Negative Impact" pre-mitigation (please refer to TABLE 8-9).
- Energy:
  - Groundwater contamination could potentially result from accidental spill or leakage of mineral oil at the substation transformers during facility operation (please refer to TABLE 8-9).

8.2.3.2 EMBEDDED MITIGATION MEASURES

There are a number of embedded impact mitigation measures in place as described below.

- Surface infrastructure:
  - Depth of excavations will be limited to reduce impacts on groundwater levels.
  - Areas where the groundwater level is near surface, thereby increasing the risk of breaching the groundwater level during excavation and/or contamination from accidental hydrocarbon spills will be avoided where possible.
  - The extent of paved and roofed areas will be limited, thereby reducing the impact on recharge.
  - Movement of machinery will be monitored and limited to that needed for operational progress.
- Water supply:
  - Depth and extent of excavation for the water supply pipelines will be restricted.
  - Areas of shallow groundwater will be avoided where possible.
- Wastewater:
  - Depth and extent of excavation for the wastewater pipelines will be restricted.
  - Areas of shallow groundwater will be avoided where possible.

  - The water in the BSEZ LTD network will be treated at a common effluent treatment plant (CETP). After treatment the water is expected to meet the IFC standards and will be discharged into the existing natural drain at the bottom of the valley.
- Drainage:
  - During grading of the area and construction of the drainage vehicular movement will be monitored and limited.
  - Green zones are proposed, which will preserve and protect natural drainage.
- Energy:
  - Depth and extent of excavation for the underground cables will be restricted.
  - Areas of shallow groundwater will be avoided where possible.
  - Movement of machinery will be monitored and limited to that needed for operational progress.
- Waste:
  - Waste will be either recycled or stored in dedicated transfer areas before disposal offsite in appropriate disposal sites.

8.2.3.3 SUMMARY OF IMPACT ASSESSMENT

8.2.3.3.1 Determination of significance

The significance of each of the impacts is determined at the hand of:

- IFC Environmental, Health, and Safety Guidelines (General EHS Guidelines: Introduction), with specific focus on:
  - Wastewater and ambient water quality
  - Water conservation
- The impact assessment methodology as described in Section 6.1 of this report.
- The expected extent and severity of the impacts as derived from:
  - The project description.
  - The groundwater environment in an around the project site.

A summary of the expected groundwater and surface water impacts during the pre-construction and construction phases is resented in TABLE 8-8, while impacts expected during the operational phase are summarised in Table 8-9.

8.2.3.3.2 Sensitive receptors

Sensitive receptors in and around the proposed project site include:

- The natural environment, including the aquifers present in the study area. The aquifers are relatively shallow, and therefore are sensitive to:
  - Changes in recharge to the aquifers which could reduce the volume of water available in the aquifer.

  - Accidental spills on surface (e.g. hydrocarbons), which could infiltrate the soil and reach the saturated sone, thereby impacting the aquifer water qualities.
- The closest surface water bodies are Lake Gaharwa and Lake Kilimbi which lie approximately 5 km to the east of the site. Please refer to **Figure 6-11** to view the lake positions; and
- Human receptors, who are users of the groundwater and surface water resources. These users will be sensitive to changes in groundwater volumes and qualities as it could impact their drinking water supply, agricultural activities, and livelihood. Satellite imagery shows the presence of a village approximately 750 m to the north of the northern boundary of the SEZ, and directly to the east of the NR5 highway. Two buildings, which are assumed to be occupied, and the occupants might be dependent on the groundwater resource for water supply, lie between 500 and 1,000 m south of the site on either side of the NR5 highway. The source of water used at the two buildings is not currently known with certainty.

TABLE 8-8: SUMMARY OF GROUNDWATER AND SURFACE WATER IMPACT ASSESSMENT DURING PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
Construction phase	Construction of Surface Infrastructure	Expert Judgement	Groundwater Volumes	Direct	Negative	Small	Local	Long	Minor	The impact on the groundwater levels will be limited to the immediate vicinity of the excavations and the new paved / roof areas. The zone of influence is expected to be less than 50 m radius from each source of impact. The groundwater levels will recover once the construction is completed.
	Construction of Surface Infrastructure	Expert Judgement	Groundwater Quality	Direct	Negative	Small	Local	Long	Moderate	The impact on the groundwater quality will be limited to the immediate vicinity of the spill or contaminant source. Once contamination has occurred it will be difficult to remove completely and it is likely that some

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
										contamination will remain.
	Construction of water supply infrastructure	Expert Judgement	Groundwater levels	Direct	Negative	Negligible	Local	Long	Minor	The impact on the groundwater levels will be limited to the immediate vicinity of the pipeline excavations. The zone of influence is expected to be less than 50 m radius The groundwater levels will recover once the construction is completed. The impact will be continuous until construction is completed, and the water level has recovered
	Construction of wastewater infrastructure	Expert Judgement	Groundwater levels	Direct	Negative	Negligible	Local	Short	Minor	The impacts can occur any place where water distribution pipelines are laid, as well as where the CETP will be located.

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
										The impact on the groundwater levels will be limited to the immediate vicinity of the pipeline excavations and excavations for the foundation of the CETP.
	Construction of wastewater infrastructure	Expert Judgement	Groundwater Quality	Direct	Negative	Small	Local	Long	Minor	The impact on the groundwater quality will be limited to the immediate vicinity of the spill or contaminant source. Once contamination has occurred it will be difficult to remove completely and it is likely that some contamination will remain. The impacts can occur any place where wastewater pipelines and the CETP are constructed.

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
	Construction of drainage systems	Expert Judgement	Groundwater Quality	Direct	Negative	Small	Local	Long	Minor	The impact on the groundwater quality will be limited to the immediate vicinity of the spill or contaminant source Once contamination has occurred it will be difficult to remove completely, and it is likely that some contamination will remain The impacts can occur any place where grading of the site takes place, or where the drainage channel is installed
	Drainage systems increasing surface runoff and reducing recharge	Expert Judgement	The groundwater levels	Direct	Negative	Small	Local	Long	Negligible	It is understood that the entire site will be graded. The increased runoff can occur on the entire site once grading is done. Therefore, the decreased recharge and lowered groundwater level can occur across the site.

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
										The groundwater levels will not recover as long as the surface drainage is maintained, which is foreseen to be the life of the SEZ. The impacts can occur across the entire site.
	Laying of underground power cables	Expert Judgement	Groundwater quality	Direct	Negative	Small	Local	Long	Minor	The impacts can occur any place where the cables will be laid Once contamination has occurred it will be difficult to remove completely, and it is likely that some contamination will remain.

TABLE 8-9: SUMMARY OF GROUNDWATER AND SURFACE WATER IMPACT ASSESSMENT DURING OPERATION PHASE

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
Operation phase	Constructed of Surface Infrastructure	Expert Judgement	Groundwater Recharge	Direct	Negative	Small	Local	Long	Minor	The impact on the groundwater levels will be limited to the immediate vicinity of the paved / roof areas. The zone of influence is expected to be less than 50 m radius from each source of impact. The impact will be permanent as the surface infrastructure is planned to be permanent. The impacts can occur any place where surface infrastructure is constructed
	Vehicular use	Expert Judgement	Groundwater Quality	Direct	Negative	Small	Local	Long	Moderate	The impact on the groundwater quality will be limited to the immediate vicinity of the spill or contaminant source. Once contamination has occurred it will be difficult to remove

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
										completely and it is likely that some contamination will remain. The impacts can occur any place where surface infrastructure is constructed.
	Constructed wastewater infrastructure	Expert Judgement	Groundwater Quality	Direct	Negative	Small	Local	Long	Moderate	The impact on the groundwater quality will be limited to the immediate vicinity of the spill or contaminant source. Once contamination has occurred it will be difficult to remove completely and it is likely that some contamination will remain. The impacts can occur any place where wastewater pipelines and the CETP are.

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
	Drainage systems increasing surface runoff and reducing recharge	Expert Judgement	The groundwater levels	Direct	Negative	Small	Local	Long	Negligible	It is understood that the entire site will be graded. The increased runoff can occur on the entire site once grading is done. Therefore, the decreased recharge and lowered groundwater level can occur across the site. The groundwater levels will not recover as long as the surface drainage is maintained, which is foreseen to be the life of the SEZ. The impacts can occur across the entire site.
	Energy infrastructure	Expert Judgement	Groundwater quality	Direct	Negative	Small	Local	Long	Minor	The impact on the groundwater quality will be limited to the immediate vicinity of the sub-station where the spill occurred. Once contamination has occurred it will be difficult to remove completely, and it is likely that some

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
										contamination will remain. The impacts can occur around the sub-stations.

8.2.4 CLIMATE CHANGE AND GREENHOUSE (GHG) GAS EMISSIONS

The Physical Climate Change Risk Assessment (CCRA) and Greenhouse Gas (GHG) Inventory assessment, as per IFC standard[188] and EP4 requirements[189], developed by BSEZ Ltd. (November, 2023) are presented in Appendix H and Appendix I respectively.

The CCRA includes:

- An identification and evaluation of the physical climate risks affecting the Project under current baseline and future climatic conditions.

The GHG Inventory includes:

- A description of the Project GHG generating sources;
- A calculation of the Project carbon footprint; and
- Key recommendations of GHG mitigation measures.

For the GHG inventory Scope 1 (Direct GHG emissions), Scope 2 (indirect GHG emissions from the use of purchased electricity) emissions and Scope 3 (waste generation during construction phase) were assessed, as this represents industry best practice.

8.2.4.1 POTENTIAL IMPACTS

The Project activities include the construction of the infrastructure on approximately 250 ha of the BSEZ (i.e., for the extension of Phase 1, the construction of Phase 1A and Phase 2). The GHG assessment covers a projection of expected GHG emission during the construction phase and a projection of the expected emissions during the operational phase, when third party industries will be building and occupying industrial plots.

Activities forecasted during the construction phase are:

- Land clearing on approximately 62ha;
- Construction of 10,5 km of roads; and
- Construction of utilities and facilities like office buildings, a single-window clearance, a fire station, a sewage treatment plant, water connection, and fences.

Activities expected during the operational phase are industrial activities in the fields of glass manufacturing, paper production, oxygen bottling, fertilizer production, plastic recycling, etc.

8.2.4.1.1 List of Greenhouse Gases Generated by the Project and their Sources

The Table 8-10describes the main GHGs emitted by the Project and their different sources of emissions with focus on energy, land use and waste which consider construction phase (2023-2026) and operation phase (beyond the year 2026). The information was drawn from GHG assessment undertaken by BSEZ Ltd in November 2023 (Appendix I).

[188] IFC, 2007
[189] Equator Principles, 2020. EP4

TABLE 8-10: EMISSION CATEGORIES GENERATED BY THE PROJECT AND THEIR SOURCES

Emission Categories	Emission Sources	Included in the assessment?
Energy		
Electricity	Diesel generators for offices Electricity consumption after grid connection during construction Electricity consumption of industries during operations	Through diesel consumption Yes Yes
Fuel	Diesel generator Staff transportation Contractors' vehicles used for construction	Yes Yes Yes
Lubricants	None – no use of lubricants witnessed	No
Air Conditioning	The site is not using any refrigerant system	No
Land Use		
Change in land use	Land clearing from crop to concrete	Yes
Waste		
Industrial Waste	Construction activities	Yes
Domestic Waste	Office spaces	No, very minimal
Wastewater	Domestic use Public utilities Industrial wastewater	No, very minimal
Dangerous waste	Industrial activities	No, not constated
Purchases		
All purchases	Common procurement	Conservatively excluded
Freight and transportation		
Imports	Imports of purchased goods	Conservatively excluded
Commuting	Transport of BSEZ staff and contractors	Conservatively excluded
Business trips	Admin trips during construction International visits Site promotion	Conservatively excluded

8.2.4.1.2Carbon footprint of the Project

The calculations for the carbon footprint of the Project are presented in Appendix I. To summarise, on basis of the estimated data, it can be assumed that about 14,500 tonnes

of carbon dioxide Equivalent (t CO_2e) will be produced in Scope 1, 2 and 3 [190]during the whole 18 months construction phase (TABLE 8-11).

TABLE 8-11: SUMMARY OF ALL EMISSIONS FOR CONSTRUCTION PHASE FOR SCOPE 1, 2 & 3

Phase	**Total Emissions [t CO_2 e]**
Construction	**~ 14,500**
Scope 1	~ 11 149
Scope 2	~ 2 843
Scope 3 (Waste only)	~ 790

During the operation phase, about 78,640 t CO_2e will be released in Scope 1, 2 & 3 each year (TABLE 8-12).

TABLE 8-12 SUMMARY OF ALL EMISSIONS FOR OPERATIONS PHASE FOR SCOPE 1, 2 & 3

Phase	**Total Emissions [t CO_2 e]**
Operation	**~87 679**
Scope 1	~ 80 350
Scope 2	~ 186
Scope 3 (Waste only)	~ 7 178

8.2.4.2 EMBEDDED MEASURES

- Optimised design & construction to ensure minimal clearing of vegetation.
- Water management strategies have been employed such as used of gravity system to minimise energy and water resource consumption.
- Renewable energy generation: the Project envisages the use of solar technology and smart lighting to minimise energy use.
- The Project aims to create a sustainable and green zone with inclusive & safe residential and commercial developments for the working community.

8.2.4.3 IMPACT ASSESSMENT

Based on the GHG assessment, Table 8-13 below shows the ranking of the most significant GHG emissions from the Project.

[190] In accordance with GHG protocol: Scope 1: Direct GHG emissions; Scope 2: Indirect GHG emissions from the use of purchased electricity, heat or steam, Scope 3: Indirect emissions from waste generation, employees commuting, use of products; Available online at : https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

TABLE 8-13: RANKING OF MOST SIGNIFICANT GHG EMISSIONS OF ACTIVITIES

Ranking of Most Polluting Activities in Decreasing Order
Electricity used during the operational phase
Change in land use during construction phase
Electricity used during the construction phase
Fuel used during construction phase
Fuel used during operations
Waste generation during construction phase
Wastewater treatment during operations

The most CO_2 emissions can be mitigated through general fuel saving methods or energy saving methods and technologies during construction and operation.

TABLE 8-14 the results of the GHG inventory developed by BSEZ Ltd which are assessed according to their Magnitude, Likelihood and Significance. It should be noted that the methodology for assessment is presented in Appendix I. The impact assessment shows that:

- Project-related direct emissions during construction (Scope 1), are considered **Negligible.**
- Project-related indirect emissions during construction (Scope 2), are considered **Minor**.
- Project-related indirect emissions during construction (Scope 3), are considered **Negligible**.
- Project-related direct emissions during operation (Scope 1), are considered **Major**.
- The waste generation (Scope 3) during operation of the Project is deemed as **Negligible**.

TABLE 8-14 IMPACT ASSESSMENT USING GHG INVENTORY DATA

Phase	**Source**	**GHG emissions**	**Magnitude**	**Likelihood**	**Resulting Significance**
Construction	Fuel and electricity consumption	3,300 t CO_2e	Negligible	Likely	Negligible
	Change in land use	11,110 t CO_2e	Small	Likely	Minor
	Waste Generation	60 t CO_2e	Negligible	Likely	Negligible
Operation	Electricity consumption	78,638 t CO_2e	Medium	Likely	Major

	Fuel consumption	186 t CO_2e	Medium	Likely	Major
	Waste Generation	1 t CO_2e	Negligible	Likely	Negligible

8.3 BIOLOGICAL RESOURCES AND RECEPTORS

8.3.1 BIODIVERSITY BASELINE OVERVIEW

The Impact Assessment for Biological Resources and Receptors covers the licenced Phase 1 (Area: 94.71 ha), the Phase 1A expansion (Area: 99.37 ha) and the Phase 2 expansion (Area 141.6 ha). The reason for this is although parts of Phase 1 are developed already, the overall proportion is small and impacts on and from this area have the potential to continue to manifest on biodiversity on and beyond the site. For this reason, from a biodiversity perspective the potential area of influence (AoI) was regarded as starting from the NR5 Road (which is along the watershed) and extending eastward up to the Lake Gaharwa inlet. Key considerations on selecting the AoI were the potential impact of noxious emissions (should such occur), spread of alien invasive species, presence of remnant natural vegetation as well as risks due to erosion and runoff.

The BSEZ is located on a plateau bordering the fluvial systems of the Nyabarongo River system within the western periphery of the Lake Victoria Basin. The site is in close proximity to the Lake Rweru-Mugesera complex (also referred to as the Nyabarongo wetlands), of which the upper lakes Kilimbi (also referred to as Kirimbi) and Gaharwa are in close proximity to the eastern periphery of the BSEZ – with runoff from the site collecting in the relatively steep stormwater collection system throughout the BSEZ having the potential to drain into Lake Gaharwa during periods of high rainfall. The Lake Rweru-Mugesera complex, which also crosses the border to Burundi, is considered a Key Biodiversity Area, whilst in Burundi these wetlands are formally protected.

Historically, the entire BSEZ would have been covered by evergreen and semi-evergreen bushland and thicket, gradually merging into riverine wooded vegetation at the lowest points. Much of this historic vegetation had been modified to make way for small-scale settlements and cultivation before Phase 1 of the BSEZ was initiated. However, about 63 ha of natural thicket was still present within the Phase 2 area up to 2020, when it was cleared. In an effort to reduce erosion from cleared land, small-scale cultivation of areas not yet under development in the expansion areas 1A and 2 was established but is understood to be abandoned within the current year.

A summary of the type and extents of habitats encountered in the AoI and BSEZ is listed in Table 8-15, whilst relevant maps are presented in Section 4.3as well as the Biodiversity Baseline(Section 6.3). Of note is that historical Google-Earth imagery was used to extrapolate the extent of relevant habitats present *prior* to additional clearing during 2020 (as this was on ground not licenced for the BSEZ at the time. Impacts will thus relate back to the time just prior to that clearing event.

Key concerns regarding natural and near-natural habitats include the ever-increasing extent of loss and fragmentation of these through clearing as well as degradation of such by alien plant invasion, firewood collection and occasional charcoal production. Despite this, diversity of natural habitats was still relatively high >100 indigenous species recorded in the AoI, they are in their current state still able to significantly reduce erosion and soil loss by facilitating direct water infiltration into the ground and are thus considered of high ecological importance.

Key concerns regarding modified habitats are the high to extreme levels of invasion with alien plants (which are distributed by wind, water and fauna to surrounding areas) as well as accelerated erosion.

TABLE 8-15 EXTENT OF HABITATS IDENTIFIED

Habitat	Type	Site Ecological Importance (sensitivity)	Extent of Habitat by 2020 (ha)		Extent of Habitat post 2020 (ha)	
			Project Site	AoI (incl.)	Project Site	AoI (incl.)
Broad-Leaved Thicket	Natural but disturbed	High	58	692	0	514
Riparian Thicket *(also extending across Modified Wetland in the AoI)*	Modified *(regenerated after past clearing, but appearing near-natural*[191]*)*	High	5	118	-	93
Modified Wetland	Modified	Medium	8	78	8	78
Fallow and Cultivated Land	Modified	Low	171	618	231	810
Timber Plantations	Modified	Insignificant	-	3	1	4
Quarries	Transformed[192]	Insignificant	-	5	-	5
Townships	Transformed	Insignificant	-	71	-	71
Industrial Areas	Transformed	Insignificant	95	116	95	116
Totals			335	1627	335	1627

8.3.2 ANTICIPATED IMPACTS ON BIOLOGICAL RESOURCES AND RECEPTORS DURING CONSTRUCTION

Impacts on the biodiversity of the Project site and potentially downstream or within the AoI during site establishment and construction can be summarised as follows:

- Clearing of vegetation, including natural habitat, and loss of associated natural and modified habitats currently occupied by generalist fauna, combined with displacement of fauna

[191] Despite this habitat giving the visual appearance of natural habitat and providing at least some ecosystem functionality similar to the historic vegetation, has not attained the structure nor even 20% of the species diversity of comparable natural habitat, with a high level of alien invasive and indigenous pioneer species present. As per interpretation of the IFC definition, this is thus modified habitat.
[192] Although not an 'IFC category', a transformed habitat is considered an area modified to the extent that natural establishment of any vegetation will not occur unless the area is decommissioned and actively rehabilitated, and in its current configuration has no value to indigenous biodiversity

  - Faunal composition is likely to change and diversity to decrease, as fauna dependent on core natural habitat will be lost from the area, and replaced by more generalist/adaptive fauna; and
  - Although this cannot be quantified at this stage, additional natural habitat in the AoI may potentially be cleared to replace the extent of cultivation fields currently established within the Project Site;
- Ground disturbance and clearing of vegetation, as well as the movement of large machinery may contribute to the further distribution and/or establishment of alien invasive flora, leading to further degradation of natural and modified habitats.
  - Note that clearing of modified habitat for development may reduce the stands of alien invasive species. However, this positive impact is limited and short-lived and as long as regenerative material is present in topsoils and industrial stands are not fully developed, re-establishment of such species is very rapid, as observed on current undeveloped areas of Phase 1. For this reason, the potential positive impact of clearing alien species is considered insignificant without further mitigation.
- Potential accidental injury or mortality of indigenous fauna

  Fauna could be killed or injured due to vehicle collisions, entrapment on site (e.g. in excavations or fenced areas), uncontrolled spills of toxic substances (see below), uncontrolled snaring/ hunting or by collision with overhead electrical infrastructure.
- Loss of arable land and/or soils due to a combination of factors such as inadequate removal and storage, compaction, contamination, establishment of alien invasive plants with increased soil seed banks of such species, and erosion.
- Accelerated erosion after clearing, with increased and/or continued sedimentation and associated loss of functionality of downstream wetland and riparian habitats.
- Chemical and/or hydrocarbon spills may arise from heavy machinery and vehicles operational as well as materials used/stored on site.
  - Unforeseen significant spillages of either hydrocarbons or other pollutant(s) coming from construction may lead to a decline in indigenous species and/or varying levels of damage to habitats depending on the extent and nature of pollutants spilled.
  - Unchecked pollution and uncontained spillages will significantly damage the ecosystems they are spilled into. Pollutants may rapidly be distributed by leaching or runoff, contaminating water resources, most notably Lake Gaharwa and associated swamps and aquatic habitats, with associated added loss of biodiversity:
  - Diesel and hazardous chemicals are extremely toxic to biodiversity – terrestrial and aquatic – and damage by spills may be extensive and spread beyond the AoI if not contained promptly.
  - Even small quantities of hydrocarbons and chemicals are able to pollute very large quantities of soils and water and even if not spilled directly into water, will rapidly be transported to such by runoff concentrated and accelerated by the stormwater management system or leaching though soils.
- Altered noise and night-light levels may lead to local disturbances and potentially more displacement of fauna:

  - For fauna, high noise levels, mainly from operating machinery and vehicles, can compromise predator/ prey detection and mating signals, may alter temporal or movement patterns and increase physiological stress. Combined, these impacts may lead to lower regeneration and loss of population viability.
  - Increased light levels at night can disturb natural bio-rhythms of fauna, whilst it can also lead to a change in nocturnal faunal behaviour
- Some degree of dust and potentially damaging gas emissions (mostly from vehicles and machinery) can be anticipated.
  - Air pollutants can create severe respiratory irritations and challenges to a host of fauna, of which birds and amphibians are likely the most sensitive.
- In the case of lack of adequate waste disposal and/or washrooms facilities, this will increase the risk of spreading pathogens (and pollutants) to the wider environment and facilitate the spread of undesirable insect capable of spreading pathogens further:
  - Plastic and packaging waste as typically created by construction (e.g. water-bottles, material packaging, etc) – although generally well-controlled in Rwanda – can be a high risk to fauna that may pick at such, try to eat it or collect it for nesting, eventually dying because of becoming entrapped, choking on it or due to ingestion.

1.1.1.1 PRE-MITIGATION IMPACT SIGNIFICANCE ON BIOLOGICAL RESOURCES AND RECEPTORS DURING SITE PREPARATION AND CONSTRUCTION

Based on the analysis provided above and considering the 2020 ecological state of the site, the impact significance from site preparation and construction has been set out below for:

- Flora and terrestrial habitats;
- Fauna; and
- Wetlands and aquatic habitats (latter downstream of the AoI)

A summary of impact assessment during construction phase is presented in TABLE 8-16 below.

TABLE 8-16: SUMMARY OF IMPACT ASSESSMENT DURING CONSTRUCTION PRE-MITIGATION

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
Pre-Construction and Construction Phase	Site preparation and Construction	Specialist Studies Development plan shared by BSEZ Ltd	Flora and terrestrial habitats Habitats and flora of the Project site is mostly modified, but still contained some indigenous flora and during 2020 natural habitat (of high sensitivity). Natural, near-natural habitats and open areas covered by at least a dense indigenous grass layer is important for ecosystem services and ecosystem function, which are under immense threat of alien	Direct	Negative	Medium	Local	Medium	Moderate to Major	Clearing and landscaping will be limited to the Project site Construction of service-delivery infrastructure will be short-term, but development of individual industrial stands may continue ad-hoc for several years. Up to ± 290 ha will be developed, including the ±63 ha that was natural habitat in 2020, the remainder is modified habitat. Additional natural and modified habitat that may be impacted indirectly by e.g. replacement of agricultural fields, continued spread of alien invasive plants and erosion/ sedimentation may amount to >1000 ha

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
			invasive species infestation, erosion and progressive clearing.							
	Site preparation and Construction	Specialist Studies Development plan shared by BSEZ Ltd Scientific literature	Fauna Terrestrial habitats of the Project site are modified but are still frequented by a variable diversity of fauna. Limited to no suitable breeding or roosting habitat exists on the Project site for any *threatened* faunal species, although threatened faunal species could occasionally frequent the	Direct	Negative	Medium	Local	Medium	Moderate	Clearing and landscaping will be limited to the Project site, hence displacement will be from the project site and surrounding resulting edge habitats. Construction of service-delivery infrastructure will be short-term, but development of individual industrial stands may continue ad-hoc for several years. This includes the site of which ±63 ha was natural habitat in 2020, modified habitat and the immediate surroundings of the Project site

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
			Project site or AoI.							
	Site preparation and Construction	Specialist Studies Development plan shared by BSEZ Ltd Scientific literature	Wetlands and Aquatic habitats Wetland habitats of the Project site are modified with almost no wetland functionality, but downstream of the Project site within the AoI do show some typical wetland functionality such as flood attenuation, even if already compromised. Waste-water treatment plant is planned,	Direct	Negative	Medium	Regional	Long	Major	Clearing and landscaping will be limited to the Project site, but the impacts of erosion and associated sedimentation of downstream wetlands are already evident and are likely to continue if not adequately mitigated. Construction will be short-term, but the sedimentation impacts may remain indefinitely, and will likely increase with continued development across the project site. This includes all riparian vegetation, modified habitats within the AoI and potential extent of Lake Gaharwa that may be impacted during extreme flooding events.

Project phase	Source of impact		Environmen-tal component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
			with treated water to be discharged into the natural drainage system downstream of the site. It is anticipated that this will be in Q3 2024.							

8.3.3 ANTICIPATED IMPACTS ON BIOLOGICAL RESOURCES AND RECEPTORS DURING OPERATION

Note the exact nature of the industries to be established on the BSEZ is not known and cannot be predicted at this stage and impacts by specific industries may vary. Considering impacts for all types of industries that maybe become established will be highly speculative and may be misleading, hence the operational impacts considered here are strictly based on the provision and maintenance of the BSEZ facility and services such as roads, stormwater control, water- and waste-management, as elaborated in the current BSEZ masterplan.

Prior to any mitigation, operational impacts on biodiversity anticipated are as follows:

- Continued potential for further spread and/or re-establishment of alien invasive species on disturbed vegetated and/or bare soils, with a key concern being increased alien invasive plant establishment on areas within and surrounding the Project site, including currently stockpiled soils (also containing topsoils), open land areas and along stormwater infrastructure.
    - Should on-site landscaping include non-indigenous plant species, such could 'escape' to the environment, contributing to increasing the pressure of alien invasive species on surrounding habitats.
    - The above could potentially be exacerbated by a higher volume of large trucks moving in and out of the BSEZ, potentially carrying regenerative material of invasive plants into or out of the AoI (usually with mud adhering to trucks from infested areas)
- Sealed and bare surfaces produce much higher volumes of runoff, which typically flows much faster, loads more pollutants and bare soil, increases flooding risk and the risk of rapidly spreading any surface pollutants (and regenerative material of alien invasive plants) into surrounding areas and downstream wetland and aquatic environments. Despite the presence of a well-established stormwater drainage system in Phase 1, the steepness and sealed nature of this drainage system accelerates the flows of stormwater and the latter is discharged to wetlands downstream of the Project site, and this with an increased scouring force immediately below the constructed stormwater system and potentially high sediment loads (from accelerated surface erosion). This potentially results in pollution and sedimentation of such habitats beyond the Project site, which could potentially lead to loss of biodiversity, water quality and associated ecosystem services that people depend on.
- Loss of and degradation of habitat around the Project site will reduce the ability of ecosystems to filter, absorb floods and provide clean water.
- Chemical and/or hydrocarbon spills may arise from heavy machinery and vehicles in operation or materials handled/stored/produced on site.
- Unforeseen significant spillages of either hydrocarbons or other pollutant (e.g. sewage) coming from operations may lead to a decline in indigenous species and/or varying levels of damage to downstream habitats depending on the size and nature of pollutants spilled.
    - Unchecked pollution and uncontained spillages will significantly damage the ecosystems they end up in. Pollutants may rapidly be distributed by leaching or runoff, contaminating water resources, most notably Lake Gaharwa and associated swamps and aquatic habitats, with associated added loss of biodiversity.

  - Diesel and hazardous chemicals are extremely toxic to biodiversity – terrestrial and aquatic – and damage by spills may be extensive and spread beyond the AoI if not contained promptly.
  - Even small quantities of hydrocarbons and chemicals are able to pollute very large quantities of soils and water and even if not spilled directly into water, will rapidly be transported to such by runoff concentrated and accelerated by the stormwater management system or leaching though soils.
  - Inadequate disposal of organic waste may attract undesirable vermin fauna.
- Altered noise and night-light levels may lead to local disturbances and potentially more displacement of fauna.
  - For fauna high noise levels, mainly from operating machinery and vehicles, can compromise predator/ prey detection and mating signals, may alter temporal or movement patterns and increase physiological stress. Combined, these impacts may lead to lower regeneration and loss of population viability.
  - Increased light levels at night can disturb natural bio-rhythms of fauna, whilst it can also lead to a change in nocturnal faunal behaviour
- Loss of or injury of fauna may continue to occur due to collision with vehicles (especially at night), entrapment in stormwater infrastructure or electrocution by overhead electrical infrastructure.

8.3.3.1 PRE-MITIGATION IMPACT SIGNIFICANCE ON BIOLOGICAL RESOURCES AND RECEPTORS DURING OPERATION

Based on the analysis provided above and considering the post-construction ecological state of the Project site and current ecological state of the remainder of the AoI, the impact significance from site operation and maintenance has been set out below for:

- Flora and terrestrial habitats;
- Fauna; and
- Wetlands and aquatic habitats (latter downstream of the AoI)

A summary of operational impacts is presented in TABLE 8-17 below.

TABLE 8-17: SUMMARY OF IMPACT ASSESSMENT DURING OPERATION PRE-MITIGATION

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
Operation Phase	Site operation and maintenance	Specialist Studies Develop-ment plan shared by BSEZ Ltd Scientific literature	Flora and terrestrial habitats Habitats and flora of the Project site will be modified (low sensitivity) when construction ends, but outside the Project site still contains indigenous flora and natural habitat (of high sensitivity). Natural, near-natural habitats and open areas covered by at least a dense indigenous grass layer is important for ecosystem services and ecosystem function, which are under immense threat of alien invasive species	Direct	Negative	Medium	Local	Long	Moderate to Major	Operation will be limited to the Project site, but level of maintenance may impact surrounding habitats, but still to a local extent. Operation at this stage is envisaged to be as long-term as possible. Additional natural and modified habitat that may be impacted indirectly inside and outside the Project site, by e.g. replacement of agricultural fields, continued spread of alien invasive plants and erosion/sedimentation may amount to >1000 ha; but the confidence of potential extent is currently low.

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
			infestation, erosion and progressive clearing.							
	Site operation and maintenance	Specialist Studies Develop-ment plan shared by BSEZ Ltd Scientific literature	Fauna Habitats and flora of the Project site will be modified (low sensitivity) when construction ends, but outside the Project site still contains modified and natural habitat (latter of high sensitivity). Envisaged conservation areas within the project site will likely encourage the return of some faunal species, whilst the presence of	Direct	Negative	Medium	Local	Long	Moderate	Operation will be limited to the Project site, but level of maintenance may impact surrounding habitats, but still to a local extent. Operation at this stage is envisaged to be as long-term as possible. Fauna may re-establish on or frequent the operational area and will likely still be present in natural and modified habitat that may be impacted indirectly inside (until full industrial establishment) and outside the Project site and may amount to >500 ha; but the confidence of potential extent is currently low.

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
			organic wastes or high insect populations (pre-mitigation) may attract fauna that may not usually have been on the Project site.							
	Site operation and maintenance	Specialist Studies Develop-ment plan shared by BSEZ Ltd Scientific literature	Wetlands and downstream aquatic habitats Habitats and flora of the Project site will be modified (low sensitivity) when construction ends, but outside the Project site still contains somewhat functional wetlands and natural aquatic habitat (of high sensitivity – Lake Gaharwa). Waste-water treatment plant is planned, with treated water to be discharged	Direct	Negative	Medium	Regional	Long	Major	Operation will be limited to the Project site, but level of maintenance may impact downstream wetland and aquatic habitats but may affect regional wetlands under 'normal' operation. Operation at this stage is envisaged to be as long-term as possible. On-site and downstream off-site wetland and potentially downstream aquatic habitat may be impacted by continued/ sporadic erosion and stormwater drainage, the extent of which will be difficult to estimate once the full stormwater drainage system has been installed.

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
			into the natural drainage system downstream of the site. It is anticipated this will be in place Q3-Q4 2024.							

8.4 SOCIAL RESOURCES AND RECEPTORS

8.4.1 ECONOMY AND EMPLOYMENT

8.4.1.1 POTENTIAL IMPACTS

The Project is intended to increase and improve access to employment, which is expected to have positive impacts on the local economy. The development of the Bugesera SEZ, with numerous tenant companies involved in different manufacturing sectors, will create a wide range of direct and indirect employment opportunities and satellite businesses that will support the activities within and associated with the BSEZ. The creation of jobs and increased budget revenues will be contributing to the development of the local villages and meet the GoR development plan.

TABLE 8-18 summarizes the potentially significant impacts on economy and employment during the construction and operation phases of the Project.

TABLE 8-18 POTENTIAL IMPACTS ON ECONOMY AND EMPLOYMENT

Construction Phase	Operation Phase
• Temporary direct and indirect employment opportunities (mainly wage-labour); • Temporary economic impacts from taxes and fees, procurement, and worker spending; • Long-term benefits from capacity enhancement of local labour through on-the-job and formal training opportunities; • Indirect opportunities through the procurement of goods and services, such as food supplies and construction materials	• Long-term direct and indirect employment opportunities. • National economic development and strengthening of local production, transforming local commodities and logistics services into exportable goods and products.

Primary impacts are expected to take place during the construction phase through the creation of temporary employment opportunities and the creation of long-term benefits associated with capacity enhancement of local labour through on-the-job training.

Opportunities for economic development and diversification may also result from the use of local goods and services during the construction phase, through sourcing of significant quantities of construction materials and expenditures associated with the running costs of vehicles and equipment (i.e., fuel, lubricants, and additives). It is anticipated that skilled and wage labour roles will be available to local communities during construction. These will be temporary posts and will be advertised in local communities.

The operation phase will also generate longer-term local employment opportunities mainly for the Project operation, management, and maintenance. A team of security guards will also be employed during the construction and operation.

The operation phase will also generate large longer-term local indirect economic opportunities specifically from the employment of local communities by the industrial activities that will take place within the Bugesera SEZ.

Overall, the Project will promote national economic development and strengthen local production, transforming local commodities and logistics services into exportable goods and products. This will develop the economic basis of the region, improving the socio-economic conditions of the BSEZ, and the well-being of the community.

1.1.1.2 EMBEDDED MEASURES

As it is anticipated that wage labour roles will be available to local communities during construction, BSEZ LTD intends to contribute to the development of local companies and economy. Also, through local sourcing of supplies including construction materials, equipment, water sourcing, medical equipment, fuel, engineering tools as well as services.

In line with BSEZ EHS requirements, all staff, workers and other personnel entering the site shall be provided with site specific induction training to promote competencies and technical content.

Embedded measures supporting benefits to the local economy and local employment include BSEZ Ltd's contractual commitments to meeting specific local employment targets for Rwandan Nationals. In this regard, BSEZ Ltd has committed to creating 1,200 jobs (at the peak) over the 3-year construction period for the second and third phase of Bugesera Industrial Park development. Operation phase employment will constitute direct and indirect employment and is assumed at least 70% will be Rwandan nationals.

One of the key considerations to start the process is the prioritization of the use of local workforce and the implementation of adequate system of communication and shared services throughout the lifecycle.

8.4.1.2 IMPACT ASSESSMENT

8.4.1.2.1 Construction Phase

Temporary Direct and Indirect Employment Opportunities (mainly wage labour)

During the construction phase, the Proposed Project will create approximately 1,200 jobs at peak over the 3-year construction period for the second and third phase of Bugesera Industrial Park development.

The anticipated impacts are **positive** and local in extent due to the high number of primarily wage labour positions available during construction. In addition to direct employment, the Project will result in the indirect employment of workers through procurement of select local goods and services, and the trigger and development of businesses involved in building materials and satellite businesses, creation of jobs, increasing budget revenues and incomes.

These impacts are expected as temporary for the construction phase. Even though the projected workforce of the Project itself will be significantly reduced as the Project moves into operations phase, the establishment of the numerous tenant companies in the SEZ will provide a wide range of permanent employment opportunities with long-term positive impacts.

Considering the nature of the Project, as it is likely attracting a large number of people, both labour and jobseekers, to the area. The magnitude of the impact is to be high; the scope will be occasional and the duration, medium, as the direct workforce will be significantly reduced for the operation phase.

These impacts will be positive affecting both women and men, but with different incidence; In the case of men, the impact will be **medium-term directly and indirectly positive** due to the increase in employment, either during construction or the indirect employment generated by the economic development of the area. In the case of women, they will also benefit from a **medium-term positive direct and indirect** impact of the Project, also due to the increase of employment. In addition, indirect positive impacts arise from the economic development of the Project for women, as mostly women are in charge of local businesses in the villages and involved in selling agricultural products in the markets. Therefore, both the consumption by workers and the consequent economic development that the Project will bring to the area, will have a very significant positive impact on women.

Temporary Economic Impacts from Taxes and Fees, Procurement and Worker Spending

In general, construction activities associated with the Project will likely generate economic benefits from the procurement of goods and services during construction phase, which will generate benefits at local and district level.

Significant quantities of various types of construction materials will be needed and will be locally sourced, such as sand, gravel, cement, asphalt, and fuel (diesel, petrol), as well as basic needs, such as food and other consumer products.

In accordance with international good practice, environmental and social implications need to be considered in the selection, sourcing, and transport of materials from quarries and borrow pits will be assessed during construction. Whereas the location is not defined at this stage for phases which are yet to commence construction (Phase 1A and Phase 2), the information will be provided by each contractor. The main principle is to source the materials locally where possible and feasible and from quarries with requisite government licenses.

The large scale of the Project is likely to attract a high number of labourers and jobseekers, who will spend locally (e.g. food, accommodation). The magnitude of the impact is likely to be high; the scope will be occasional and the duration, medium, as the direct workforce will be significantly reduced for the operation phase.

Therefore, as with Project employment, anticipated impacts of local procurement are **positive.** These impacts are expected as temporary for the construction phase, as this phase is limited in nature.

These impacts will be positive affecting both women and men, but with different incidence; in the case of men, the impact will be **medium-term directly and indirectly positive** due to the increase in employment, either during construction or the indirect employment generated by the economic development of the area. In the case of women, they will benefit directly through their own employment with the Project, and also benefit from a **medium-term positive indirect** impact of the Project, since women are mostly involved in household tasks, which will see household incomes increased through the employment of males in the household .Therefore, both the consumption by workers and the consequent economic

development that the Project will bring to the area, will have a very significant positive impact on women.

Long-term benefits of capacity enhancement (on-the-job and formal training opportunities)

Those who are able to secure employment on the Project during construction will likely have the opportunity to improve their skills, gain experience and thereby improve their opportunities for future employment within the construction and other sectors.

In addition to on-the-job experience at the level of individual workers, the Project will also represent an opportunity for Rwandan companies to tender for work on different Project-related components and basic services such as food supply and maintenance. This will result in capacity enhancement and reputational benefits from working on a major international project to the highest safety and performance standards.

For those companies that meet the eligibility criteria and enter the supply chain, there will be short-term benefits to the businesses and their employees through increased experience, capacity, and training opportunities.

Taking into account the nature of the Project, as it will attract a significant amount of workforce, the magnitude of the impact is to be high; the scope will be occasional and the duration, medium, as the direct workforce will be significantly reduced for the operation phase.

Therefore, impacts to individuals and businesses is anticipated to result in **long-term positive** impacts at the local, commune and district level.

These impacts will be positively affecting both women and men, but with different frequency. In the case of men, the impact will be long-term **directly and indirectly positive** due to the increase in local workforce's capacity enhancement, and the promotion of employment opportunities and professional development. In the case of women, they will also see a **long-term positive indirect** impact from the Project. As most households in the AoI are male headed, the women will benefit from having a more stable income for their households provided by the man in charge. This will have a positive impact on women as they will benefit of a higher household income due to the better skills and training provided to the man.

Impacts to individuals and businesses are anticipated to result in long-term **positive** impacts at the local, regional, and national levels.

8.4.1.2.2Operations Phase

Temporary Direct and Indirect Employment Opportunities

The primary impact associated with the Project during the operation phase is expected to be the long-term employment of the local workforce for operations, maintenance, cleaning, and security workers.

The operations phase employment will constitute direct and indirect employment. The approximate number of labour is expected to be 7,500 directly employed by Bugesera Industrial Park development Special Purpose Vehicle (SPV) and its contractors of which 70% will be Rwandan nationals. Therefore, direct recruitment is not expected to be extensive at this stage.

Considering the above, the impact on direct employment is expected to be **long-term positive**, however of a relatively negligible significance, as the recruitment in this phase is not supposed to be extensive.

Regarding the indirect impact on employment, the Project is expected to create approximately 2500 jobs. The increase in the amount of money circulating in the local economy from direct (in the Proposed Project Area) and indirect (at a local supplier level) job creation, will contribute to induced job creation (for example, a restaurant hiring an additional worker because of increased demand) via the multiplier effect.

Taking into account the nature of the Project, as it will attract industrial units that will be hosted by the Project, the magnitude of the impact is to be high; the scope will be regional and the duration, long, as the direct and indirect workforce will be hired for all the operational phase of the Project.

This is expected to result in significate **major long-term positive** impacts, as economy, employment and development will be promoted and enhanced through the consumption and procurement of local goods and services by workers.

As above, the impact will also be different for women and men; please refer to "Temporary Direct and Indirect Employment Opportunities" Impact Assessment during construction phase to understand how the incidence of this impact is different for women and men.

8.4.2 LAND AND LIVELIHOODS

8.4.2.1 POTENTIAL IMPACTS

This section addresses the likely impacts of land and economic displacement caused by land acquisition inside the 335.68ha including classifying the types and extent of displacement, income and land-based livelihood impacts. The majority of resettled households reported that they previously owned the land within the BSEZ (63%) and approximately 38% reported that they still utilize the land. Results from the Earth Systems survey from September 2023 show that 92.5% of the landowners interviewed in the Project area had registered their land and possessed the appropriate documentation.

The impacts are anticipated to take place during the entire life cycle of the Project (which is likely to be long-term or permanent), and therefore the impacts are described jointly below.

TABLE 8-19 summarizes the potentially significant impacts on land and livelihoods during the construction and operation phases of the Project.

TABLE 8-19 POTENTIAL IMPACTS ON LAND AND LIVELIHOODS

Construction & Operational Phase

• Permanent Loss of Livelihoods and Household Income Due to Permanent loss of access to Land in the Project footprint.
• Impact on Natural Resources and Related Livelihoods.
  ○ Loss of agricultural and grazing land.
  ○ Loss of access to ecosystem services

8.4.2.2 EMBEDDED MEASURES

In addition to the embedded controls stated in Section 4.6, the following measures regarding the land and livelihood topics are considered by BSEZ Ltd as well. In addition, relevant Project design elements and company policies that may potentially influence impacts are summarized as follows:

- BSEZ Ltd has a Grievance Mechanism in place for communities and specifically for this Project, making sure there is a valid, reliable, and consistent process in place for formal complaints or issues that might develop as a direct result of BSEZ Ltd operations to be received, investigated, consulted on, addressed, and resolved. This includes land claims and grievances related to land acquisition.

8.4.2.3 IMPACT ASSESSMENT

8.4.2.3.1 Construction & Operation Phases

Permanent Loss of Livelihoods and/or Household Income due to Permanent Loss of Access to Land in the Project Footprint

Due to the loss of access to land in the Project footprint during construction and operation, there will be restrictions to crop trees plantation, seasonal crops cultivation, resulting in a loss of crops and access to land for agricultural purposes. These restrictions will result in reduced areas available for cultivation and other livelihoods.

GoR/RDB are responsible for all aspects related to compensation of previous landowners/users and transfer of land to BSEZ Ltd. During the stakeholder engagement undertaken as part of this ESIA, grievance records were presented to ESIA team in confidentiality. There is thus an operation grievance mechanism that will continue to be used/implemented at BSEZ. For the next phase of development (Phase 1A and Phase 2), it is understood that there has been an agreement reached between ARISE and the GoR that BSEZ Ltd will monitor grievances lodged by the local communities and resettled households through the formal external grievance mechanism.

The affected agricultural land, crops and trees will be entirely cleared for the construction of the Project. Land users will be affected facing the loss of livelihood source through permanent land take leading to economic displacement. Additionally, the Project will cause severance and fragmentation of agricultural fields and possibly other holdings making them less viable through limited access.

Considering the nature of the Project, as it will cause restrictions to access land, the magnitude of the impact is to be high; the scope will be local (as its limited to the Project footprint), and of long duration as these restrictions will be permanent.

The permanent loss of access to land in the Project footprint is anticipated to have a **major negative** economic impact on local communities, especially for vulnerable groups and households with particularly low incomes and high land dependency for subsistence and income generation. This also applies to disabled and elderly household members or if they are female headed as they might not be able to afford land and might have to move. In addition, these groups may have more difficulties accessing information and less access to employment and other opportunities.

8.4.3 COMMUNITY HEALTH, SAFETY AND SECURITY

8.4.3.1 POTENTIAL IMPACTS

Even though the Project is located in an uninhabited area, workers cross through the Project area on the way between their villages and nearby factories (e.g., industries, plants). The presence of the Project could affect the health and safety and security of the communities in the Project AoI and in the villages as a result of worker-community interactions, the risk of injury associated with construction activities, increased road accidents, and competition for access to health care resources. The presence of workers and jobseekers during construction and operation (influx), could place additional burdens on local communities, and affect their health, safety and security (e.g. through increased crime, spread of communicable diseases and pressure on social service and natural resources). Additional aspects, such as use of private security to manage access to the site, environmental impacts on natural resources (water, soil, air) could negatively affect local communities during all phases.

Therefore, the implementation of the Project could affect the health, safety and security of the communities both during construction and operation phases.

TABLE 8-20 presents the potentially significant community health and safety impacts that may occur during the construction and operation phases.

TABLE 8-20 POTENTIAL IMPACTS ON COMMUNITY HEALTH AND SAFETY

Construction Phase	Operation Phase
• Increased risk of injury or harm due to site trespassing • Increased risk of injuries related to increased road and site traffic. • Reduced environmental health and increased nuisance to communities. • Increased transmission of communicable and non-communicable diseases. • Increased pressure on healthcare • Increased risk to physical and psychological safety due to presence of an outside workforce and use of security personnel.	• Reduced environmental health and increased nuisance to communities. • Increased transmission of communicable and non-communicable diseases. • Increased risk to physical and psychological safety due to presence of an outside workforce and use of security personnel.

8.4.3.2 BASELINE CONDITIONS

Relevant baseline conditions that may potentially influence impacts are summarized as follows:

8.4.3.2.1 Healthcare:

- The Bugesera District has 15 health centres (one per Sector) and one hospital at Nyamata. The nearest health centres in the Study Area were reported to include Kagasa 1, Gashora, Ramiro, Nyagatare, Kagumasi and Bidudu.
- Across surveyed villages, September 2023 socio-economic surveys identified 1 health infrastructure in the village of Kagasa 1. The mean walking distance to a health post in the Study Area is approximately 2.7 km according to survey respondents.
- The key ailment within the AoI is malaria (common in all villages), and influenza (flu), and respiratory ailments (including coughing symptoms) were identified in Kagasa 1&2 (closest to the site).

8.4.3.2.2 Transport safety

- Currently, the majority of local residents within the AoI walk or use public transport or bicycles to move between local areas (e.g. to markets, schools, healthcare). There are few private cars within the local area and, therefore, high pedestrian traffic. Pedestrians who could be affected by the increased activities of contrition and operational vehicles and equipment within the AoI.

8.4.3.2.3 Site safety

- Currently the site is being fenced, however a number of people traverse the site to access work and other communities. It is possible that individuals may attempt to continue to use these pathways or shortcut through the site during construction.

8.4.3.2.4 Environmental services

- According to the household survey, 14% of residents within the AoI rely on surface and ground water resources for domestic use, and more households are likely to rely on these water resources for agriculture. Any contamination of this supplies could result on health impacts on communities.
- Phase 1A and Phase 2 are currently vacant and used for subsistence and market agriculture, and the change of land use may cause physical and psychological impacts on nearby community members, through noise, vibration, dust and visual intrusion. However, the closest community is 1 km from the site which may mitigate some of these impacts.

8.4.3.3 EMBEDDED MEASURES

- In addition, relevant Project design elements that may potentially influence impacts are summarized as follows:
- All the necessary permanent and temporary routes will be adequately signalled and upgraded to secure safety to enable continuous vehicle and pedestrian traffic flow at all times with highest safety standards.
- Establishment of good construction working practices (*e.g.,* routing of construction traffic, dust suppression).

- Maximization of workers originating from the AoI settlements to avoid influx and associated impacts.
- Contractors will be required to operate according to best international practice.
- Note that BSEZ Ltd has already developed an integrated HSE management system presented as part of the ESMMP which will be added to the proposed mitigation measures below.
- The proposed entry is 130 m inside, from the highway, providing more space for trucks to manoeuvre.
- The proposed roundabout is 130 meters inside from the highway. Lining length of 10 trucks provided on both sides.

8.4.3.4 IMPACT ASSESSMENT

8.4.3.4.1 Construction Phase

Increased risk of injury or harm due to site trespassing

There is a potential risk of site trespassing at work fronts for the duration of construction and maintenance and repair operations. As the site will all be fenced, site trespassing should be very limited and the risk for intrusion on site will be from unauthorized people.

Site intrusion could result in accidents leading to injuries or even fatalities especially due to the presence of large vehicles and equipment on site. Young people and children are most likely to trespass onto sites and are most at risk of getting injured.

Considering that the Project site will be fenced off to manage public health and safety risks during construction and operation, this potential impact will be quite limited. Therefore, the magnitude of the impact will be low, the scope will be occasional and short duration related only for the construction phase. This represents a **Minor** negative impact.

Increased risk of injuries related to increased road and site traffic

An increase in traffic, including small and large construction vehicles and equipment, is anticipated during construction, which is likely to affect communities within the AoI. This increase has the potential to increase the risk of accidents and injury to local communities. Traffic accidents involving pedestrians during Project's construction are likely to affect people of all ages, but children and elderly are likely to be most affected.

The construction phase of the Project is likely to have a **Moderate** negative impact on road safety and community health as it involves a high number of vehicles travelling on the unsurfaced or low-quality asphalt road networks adjacent to the construction of the Project.

The impact is a direct result of interaction with the increased traffic associated with construction activities, and the potential risk to community safety related to construction activities. The impact is temporary in nature and limited to the workers of other companies in the AoI and the surrounding road network. However, considering the potential risk posed to communities, the magnitude is considered medium, the scope will be occasional and medium duration, resulting in **Moderate** impact significance***.***

Environmental Health

Impacts on the health of the community as a result of environmental change may arise during construction as a result of noise, dust and other emissions from construction activities. This could result in nuisance to community (dust, vibration, noise, fear) and grazing animals due to construction works.

Noise impacts may occur during construction. The main sources of noise include the construction of the basic infrastructure developed by BSEZ Ltd within the Project area (such as standard factories, warehouses, administrative buildings, logistics and parking centres, commercial buildings, internal road networks, drainage and sewerage, etc.), as well as increased vehicular traffic due to the delivery of construction materials.

These receptors have a direct impact on the well-being of communities. However, any noise impacts will be temporary, are limited to the construction phase and to the workers of other companies in the AoI, as the Project area is distant from residential areas (the nearest communities are Kagasa 1 & 2 (1 km from the Project area). The noise impacts due to construction traffic and activities are unlikely. For more details about noise impacts refer to Section 8.2.2.

The low-quality asphalt road network used across the Project site prior to works completion can be particularly dusty when disturbed by vehicle movements. Increase of dust and reduced air quality levels will also affect environmental community health, due to the potential effect of dust arising from the construction of the Project (site, construction camps and laydown areas), and the use of unpaved roads by vehicles. For more details about air quality impacts refer to Section 8.2.1.

The contamination of ground and surface water from construction and operational activities could potentially result in reduced availability of safe drinking water for local households.

Water-related disease risks could arise from the degradation of surface and groundwater resources and quality impacts of the Project due to construction activities. These are mostly related to construction activities such as clearance of the working strip, earthworks and reinstatement activities, use of/construction of access roads and other associated facilities, and the potential presence of contaminated soils/earths. Water contamination can result in increased risk of transmission of water borne communicable diseases such as hepatitis A and E and typhoid through increased risk of contamination of water and food.

Water-related disease can affect the quality of the water quality of the surface water within the AoI. According to the baseline, the source of domestic water for nearest villages (Kagasa 1 and 2) is 4 boreholes and 10 surface water sites (man-made lake, creeks, wetlands in local lakes).

Therefore, the potential impact that the use of groundwater will have on the community is analyzed in terms of pollution of the groundwater. If mismanaged it can affect water quality, resulting in water-related diseases risks. For further details on groundwater resources and water quality please refer to Section 8.2.3.

Some of the essential infrastructure that will be built as part of the Project may affect positively the health conditions of the communities, like the construction of sewerage and water supply systems (piping, manholes, water storage tanks; the construction of a wastewater treatment plant and a pumping station). Nevertheless, it is unsure how communities will benefit from these.

The impacts on environmental health during construction are directly **negative** and temporary in nature for the duration of the construction phase. Considering the temporary nature of the works and the sequential approach, the magnitude is considered large, as receptors will include children, older people and others that may be susceptible to changes to environmental quality; scope is considered local, and the duration medium, taking into account the nature of the impacts. The impact significance is therefore considered ***Major.***

Increased Transmission of Communicable Diseases

The presence of workforce living in the AoI could lead to the increased transmission of communicable diseases within the workforce and the nearby communities. In addition, if opportunistic workers (those hoping to find employment on the Project or from related activities) migrate to work fronts, this could also impact on the transmission of communicable diseases. Movements outside the camp are expected to be restricted due to security and safety issues. During construction phase no workers camp is planned as workforce is expected to come from the SEZ vicinity.

Communicable diseases of concern are likely to include malaria, tuberculosis (TB), diarrheal diseases and respiratory diseases. Children will be at particular risk of diarrheal diseases due to their poor sanitary behaviours, while the elderly will be at risk of more severe health outcomes as a result of their frailty. Health infrastructure in the AoI is reported to be semi developed, which could worsen the implications of the outburst spread of diseases.

During construction, modifications to the environment and in-migration into the area are likely to increase the risk of transmission of malaria. Modifications to the environment can create small water pools (e.g., wheel ruts and footprints) offering new mosquito breeding grounds and leading to increased vector densities and human-vector interaction. Any influx of people into the area may play an indirect role in increasing the malaria burden. This may result from an increase in pressure on medical facilities, inadequate waste management and establishment of make-shift housing (reducing natural protection from mosquitoes). The highly endemic nature of malaria means that the proposed Project is unlikely to significantly add to the already high disease burden of the community during the wet season. However, modifications to the environment may change the breeding patterns of mosquitoes extending the high-risk malaria season for transmission from its peak.

Poor hygiene, sanitation and waste management can all result in increased risk of transmission of water borne communicable diseases such as hepatitis A and E and typhoid through increased risk of contamination of water and food with fecal matter. In addition, these factors can also result in increased number of pests, such as rats, which can contribute to disease transmission.

The profile of the diseases will be influenced by the existing disease profile of communities along the route and the disease profile of the country's workers are sourced from. Considering approximately 70% of the workforce will be sourced locally, the disease profile of the workforce is expected to be similar, with variations from districts. This results in a **major** impact significance on community health.

The Project could result in increased transmission of STDs including HIV/AIDS during construction due to the following factors:

- Shifts in power dynamics between community members and within households can result in increased Gender-Based Violence (GBV). Male jealousy, a key driver of GBV, can be triggered by labour influx on a project when workers are believed to be interacting with community women.
- Presence of a large workforce including males with higher incomes engaging in high-risk sexual activities with Commercial Sex Workers, within the Project AoI. Prostitution is illegal in Rwanda, but it is a widespread activity that often involves child prostitution and trafficking.
- Women in settlements near project AoI resorting to prostitution for short-term economic gain.
- Workers establishing casual relationships with young girls in communities.
- Engagement in casual high-risk sexual activity by transport drivers along their routes and at their end destination. Transport drivers typically have higher rates of STDs and HIV/AIDS than the general population.
- Increased numbers of CSWs, who may have higher infection rates of STDs and HIV, near construction sites, worker camps and at truck stops.

Commercial Sex Workers may be better placed than other women to negotiate safe sex practices, such as the use of condoms, but may also be willing to waive their use for a fee. Any increase in the prevalence of STDs and/or HIV/AIDS within the Project AoI is a risk to the health of the community including the men who engage in these activities, Commercial Sex Workers, the wives of married men and children through vertical transmission pathways.

While there is access to treatment for STIs including HIV/AIDS in the communities, gaps in coverage is still high. Furthermore, there are significant taboos around STDs, which may influence people's willingness to access treatment. Any lack of access to treatment could affect the long-term health of those who contract STDs other than HIV, including fertility, damage to internal organs and long-term disability or even death.

Increased transmission of STDs including HIV/AIDS has the potential to affect households within the project AoI. However, impacts could spread regionally due to vehicle movements and the presence of Commercial Sex Workers in larger towns.

The increase in risk of STDs including HIV/AIDS will be long-term, as it can take time for prevalence/ incident rates to return to baseline levels. Furthermore, those infected with HIV/AIDS will have health effects, which last beyond the duration of the construction activities. The resulting impact is of **moderate** negative significance.

Increased Pressure on Health Care

Influx of workers for construction of the project may place further strain on health facilities and detrimentally affect health care services and health status for communities. If not properly managed, this can negatively affect the Universal Right to Life and Right to Health of the communities in the AoI. This risk will decrease during the operations phase, as the nature of operational activities involves fewer staff and that will result in less pressure on health care needs.

Any decrease in access to health care facilities including longer waiting times is likely to be associated with worse health outcomes. This is a particular risk in the case of incidents

involving multiple casualties or patients from both the workforce and community where hospital level care is required. Even if the project site is equipped with health centres, the resulting impact is of **moderate** significance to local communities.

Use of Security Personnel

BSEZ Ltd will hire security personnel mainly during construction to prevent unauthorized access to the construction site. They will primarily be responsible for controlling site access and perimeter security.

Security personnel might constitute risks to the community if they are not appropriately trained, as they may misuse their status and be abusive to local persons or apply excessive force in their handling/apprehension of potential trespassers or other unauthorized persons.[193]

Nevertheless, as the workforce will be unarmed and trained in non-violent practices this impact is considered to be of **minor** significance.

8.4.3.4.2Operation Phase

Environmental Health and Nuisance to community (air, noise, and water-based risks) due to the operation of the Project

The operation of the Project has the potential to result in air quality, noise, and physical impacts due to operational traffic and operation activities at nearby receptors and at specific locations.

Some of the essential infrastructure that will be built as part of the Project can lead to an improved access to infrastructure and health conditions, such as internal road networks, drainage and sewerage, and the construction of a first aid centre and fire station. The police and fire station will be available to respond to security or emergency situations. Nevertheless, it is unclear at this stage if local villages will benefit from these new facilities.

In terms of air quality (see section 8.2.1), the impact during operations of the Project will be related to the increase in operational traffic, and the BSEZ Ltd operations, which are assessed as minor significance impact.

Noise impacts could arise during the operation of the Project (see section 8.2.2), The operations can cause noise effects which may result in nuisance and annoyance for workers of nearby companies and other sensitive land uses.

Water-related disease risks could arise from the degradation of surface and groundwater resources and quality impacts of the Project due to operation activities. If mismanaged, it can affect water quality and water pollution, resulting in water-related diseases and water-based risks. Water contamination can result in increased risk of transmission of water borne communicable diseases such as hepatitis A and E and typhoid through increased risk of contamination of water and food.

Therefore, the potential impact that the use of groundwater will have on the community is analysed in terms of pollution of the groundwater. For further details on groundwater resources and water quality during operations please refer to Section 8.2.3.

[193] EBRD. PR4: Community Health, Safety and Security. Available from: https://www.ebrd.com/downloads/about/sustainability/ESP_PR04_Eng.pdf

Thus, this impact is considered direct long-term negative, as it will have an effect on communities' health and will generate nuisance to the community. Considering the distance and type of activities of the Project, the direct impact from the Project operations will be **minor**. Nevertheless, the indirect risks on the environmental health caused by the establishment of the industrial units within the Project area with different activities, are considered of medium magnitude, local scope, and long duration, due to the nature of the Project and the impact. Therefore, the resulting impact on community health is considered of **moderate** significance.

Increased Transmission of Communicable Diseases

The workforce required for the operations, maintenance, cleaning, and security of the Project site will be significantly lower than the workforce expected for construction. Nevertheless, the operations phase work force is estimated to be 7,500 directly employed by BSEZ and its contractors.

The number of staff required for the operation phase can only be defined after elaboration of operation plan. Although the exact size of the workforce needed for operation of the Project is not clear at this stage, recruitment is not expected to be extensive. Therefore, the direct impacts of the Project during operations are expected to be **minor.**

The required workforce for the operators of the industrial units is unsure at this stage, as operators within the zone will manage their own workforce. Thus, it is envisaged that the Project may attract an influx of people looking for work, and if opportunistic workers (those hoping to find employment on the Project or from related activities) migrate to work fronts, could impact on the transmission of communicable diseases. Therefore, the high workforce required for the industrial units can generate an influx of workers that would have the potential to lead to the spread of bacterial disease and infection, as well as the spread of Sexually Transmitted Infections (STIs) and HIV.

Communicable diseases of concern are likely to include malaria, HIV/AIDS, diarrheal, tuberculosis and respiratory diseases. There is the potential for increased transmission between workers living and working in close quarters and then onwards into local workers' families and the communities through interactions. Children will be at particular risk of malaria and diarrheal diseases due to their poor sanitary behaviours, while the elderly will be at risk of more severe health outcomes as a result of their frailty. Health infrastructure in the AoI is reported to be poor, which could worsen the implications of the outburst spread of diseases.

During operations, modifications to the environment and immigration into the area are likely to increase the risk of transmission of malaria. Even though most of modifications to the environment will be done as part of the construction phase, the operational activities and movement of trucks can also create small water pools (e.g., wheel ruts and footprints) offering new mosquito breeding grounds and leading to increased vector densities and human-vector interaction. Any influx of people into the area (which is expected to be high) may play an indirect role in increasing the malaria burden. This may result from an increase in pressure on medical facilities, inadequate waste management and establishment of make-shift housing (reducing natural protection from mosquitoes). The highly endemic nature of malaria means that the proposed Project is unlikely to significantly add to the already high disease burden of the community during the wet season. However, modifications to the environment may change

the breeding patterns of mosquitoes extending the high-risk malaria season for transmission from its peak.

Some of the essential infrastructure that will be built as part of the Project can lead to an improved access to infrastructure and health conditions that can avoid the increased burden of communicable diseases, such as internal road networks, drainage and sewerage, and the construction of a first aid center. Nevertheless, it is unsure how communities will benefit from these improvements.

The profile of the diseases will be influenced by the existing disease profile of communities along the AoI and the disease profile of the countries' workers are sourced from. Considering majority of the workforce will be sourced locally, the disease profile of the workforce is expected to be similar to the current conditions, as very limited influx of people is expected. Although the expatriate workforce will be very limited, any influx will add to the risk of disease spread. Although the direct impacts are considered minor, the indirect risks on the environmental health caused by the establishment of the industrial units within the Project area are considered of medium magnitude, local scope and long duration, due to the nature of the Project and the impact. Therefore, the resulting impact on community health is considered of **Moderate** significance.

The Project could result in increased transmission of STDs including HIV/AIDS during operations due to the following factors:

- Shifts in power dynamics between community members and within households can result in increased Gender-Based Violence (GBV). Male jealousy, a key driver of GBV, can be triggered by labour influx on a project when workers are believed to be interacting with community women.
- Presence of a large workforce including males with higher incomes engaging in high-risk sexual activities with Commercial Sex Workers (CSWs), in particular in larger urban centres. Also, there is a possibility that women in settlements near the sites will resort to prostitution for short-term economic gain.
- Workers establishing casual relationships with young girls in communities near the construction sites.
- Increased numbers of CSWs, who may have higher infection rates of STDs and HIV, near the Project area and at truck stops.
- Increased transmission of STDs including HIV/AIDS has the potential to affect households in the proposed AoI and the presence of CSWs in larger towns. The increase in risk of STDs including HIV/AIDS will be long-term, as it can take time for prevalence/ incident rates to return to baseline levels. Furthermore, those infected with HIV/AIDS will have health effects, which last beyond the duration of the construction activities.
- Some of the essential infrastructure that will be built as part of the Project can lead to improved access to healthcare, such as the construction of a first aid centre. Nevertheless, it is unsure if the communities will directly or indirectly benefit from these improvements.
- Although the direct impacts are considered minor, there are indirect risks on the environmental health caused by the establishment of the industrial units within the Project area. The influx of workforce expected is high, this indirect impact is of medium magnitude, local scope, and long duration, due to the nature of the Project and the impact.

Therefore, the resulting impact on community health is considered of **Moderate** negative significance.

- These impacts will be negative affecting both women and men, but with different incidence; as women are the most involved in these activities, this impact will affect significantly more women than men.

8.4.4 LABOUR AND WORKING CONDITIONS.

8.4.4.1 POTENTIAL IMPACTS

Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working or living conditions. These issues should be considered not only for those who are directly employed by BSEZ Ltd but also its contractors (including sub-contractors) and within the supply chain.

The Project could potentially lead to workforce-related social and health issues throughout the life cycle of the Project if worker management and rights do not meet Rwandan law or international best practice.

TABLE 8-21 presents the potentially significant impacts associated with occupational health and safety and worker management during the construction and operation phases. The potential for occupational health and safety incidents throughout the life cycle of the Project is higher during construction phase.

TABLE 8-21 POTENTIAL IMPACTS ON LABOUR AND WORKING CONDITIONS

Construction Phase	Operation Phase
• Labour and working conditions / workers' rights; • Worker health and safety; • Forced child labour in the supply chain. • Women's rights (GBVH, approach to recruitment, promotion, and treatment with respect to equal opportunity)	• Labour and working conditions / workers' rights. • Worker health and safety • Forced child labour in the supply chain.

8.4.4.2 EMBEDDED MEASURES

Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working or living conditions. These issues should be considered not only for those who are directly employed by BSEZ Ltd but also its contractors (including sub-contractors) and within the supply chain. Labour and working conditions as compared to relevant in Country laws need to be respected.

BSEZ Ltd will develop and implement a worker's grievance mechanism to collect workers' grievances and concerns.

Note that BSEZ Ltd has already developed an integrated HSE management system which will be included/described as part of ESMMP.

8.4.4.3 IMPACT ASSESSMENT

8.4.4.3.1 Construction Phase

Labour and Working Conditions / Workers' Rights

As a result of the policies and procedures presented in Human Resources Module (HR001) and Risk & Governance Module (RG001) worker rights should be protected. However, issues with implementation and capacity may result in some breaches of workers' rights especially within the supply chain and among casual labourers. If issues arise, there is the opportunity for these to be identified and addressed through the worker grievance mechanism. However, individuals may be unwilling to Report issues, and as such breaches may go unnoticed.

There is the potential for positive legacy in terms of strengthening knowledge and practice of worker rights of contracted and supplier companies and their employees.

During construction, local employment will be subject to local labour laws and applicable international standards to which Rwanda is party (ILO conventions) in particular with respect to safeguarding the health and safety of workers. In addition, contractors will need to comply with BSEZ Ltd HSE Policy standards aimed at safeguarding the health and safety of its employees and subcontractors. These include the use of appropriate equipment and facilities to allow employees to undertake their duties in a professional and safe manner ensuring rights and working conditions as well as providing a safe and sound work environment for workers. The employer / contractor is therefore expected to develop and implement appropriate health and safety measures for its workforce including always enforcing the use of appropriate PPE.

BSEZ Ltd is committed to managing business activities in such a way that risks to the environment and the communities where they operate are minimized and to providing a healthy and safe workplace for all the workforces. BSEZ Ltd is committed to align with environmental, health and safety, and social and governance practices and international standards through its policies.

All employees and contractors are required to acknowledge and adopt BSEZ Ltd's environmental and social work practices and comply with all HSE policies and procedures as well as the Code of Conduct, Reporting safety hazards, unsafe work practices, unacceptable conditions, and environmental and social issues.

All contractors engaged by BSEZ Ltd during construction and operation will include explicit reference to the need to abide by Rwandan law and BSEZ Ltd standards and policies in relation to health and safety in their contracts. Further, all individual developers will be required to develop site specific environmental impact assessments and issued with requisite licences from RDB. Thus, each plot operator will be controlled by the regulator (RDB/REMA).

During construction, the direct interaction between the Project and the workforce if not managed properly, may result in negative impacts on the workers' working conditions. This can potentially lead to permanent impacts on their health and safety, resulting in medium magnitude, occasional scope, and medium duration due to the nature of the Project and the Impact. Therefore, the impact is considered **Moderate** as local communities may not have an understanding of their labour rights as enshrined in the law or may be willing to waive these rights in order to earn incomes.

Workers' Health and Safety

Activities of the site personnel will involve typical construction risks such as risks due to moving equipment.

Accidents resulting in injuries or fatalities remain a possibility albeit with reduced likelihood due to the implementation of the management system. Injuries and fatalities could have long-term impacts on workers and their families. Potential for positive legacy in terms of strengthening knowledge and practice of worker health and safety of contracted and supplier companies and their employees**.**

The rate of accidents will be dependent on the consciousness and cautiousness of the personnel regarding the specific hazards of the construction work they are involved in. These risks may be managed with adequate trainings in accordance with the good management approaches and international construction site practices avoiding problems with the worker-employer relations and significant occupational health and safety risks. The impact of accidents resulting in injuries or fatalities is considered of medium magnitude, the scope is considered occasional and will have a medium duration. Therefore, the impact on workers' health and safety is considered **Moderate.**

Women's Rights (GBVH, approach to recruitment, promotion, and treatment with respect to equal opportunity)

The general principle of equality and non-discrimination is a fundamental element of international human rights law. Discrimination of workers and members of the community may be on the basis of their race, gender, sexuality, religion, political affiliation, etc. Women might face indirect forms of discrimination with respect to their right to work (i.e., access to job opportunities, unequal access to promotions, GBV and harassment, discrimination upon recruitment, and others. Therefore, due to the nature of the Project, there is potential of occupational management risks to arise in the recruitment process, which can result in impacts to women workers' rights. A major influx of male workers may pose a threat for women workers and community in terms of safety and GBVH. This may also translate to heightened tension leading to violence.

There is a risk of association with workforce providers (e.g., recruitment agencies) using abusive recruitment practices (i.e., recruitment fees) which may increase the risk of bonded labour.

BSEZ Ltd is committed to having a grievance mechanism in place that should allow workers to introduce any grievance they may have regarding issues with equal opportunity and discrimination in the workplace. However, women might also be unable or less likely to access workers grievance mechanisms and might not be willing to raise their concerns due to fear of repercussions. This limits the women workers' ability to readily access remedy without fear of retaliation.

The magnitude of the impact on vulnerability of women's rights is considered medium as management measures are in place, reducing the likelihood of this impacts to occur. However, should incidences occur the impacts on the individuals affected will remain unchanged. the scope of the impact is considered occasional, and with medium duration, resulting in a **Moderate** impact.

Child Labour and Forced Labour in the Supply Chain

The use of child labour or youths aged 16-18 in hazardous work within the supply chain remains a possibility albeit with reduced likelihood due to the implementation of mitigation measures. If there are incidences of child labour, the magnitude of the effect to the individual affected will remain unchanged. However, taking into account that there will be 800 workers at peak (including workforce and subcontractors) during the construction phase, there is potential for child labour or youths 16-18 to be involved in hazardous work in the supply chain.

ARISE has the potential to have a positive impact by increasing awareness and improving methods for preventing and addressing child labour within contracted and supplier companies.

The likelihood of the use of forced labour is of low magnitude and will be significantly reduced as a result of the proposed mitigation, such that it will become a non-routine event. However, should incidences occur the impacts on the individuals affected will remain unchanged. In addition, the scope is considered occasional, and of medium duration, resulting in a **Minor** significance impact.

8.4.4.3.2Operations Phase

Labour and Working Conditions / Workers' Rights

As a result of the policies and procedures worker rights should be protected. However, issues with implementation and capacity may result in some breaches of workers' rights especially within the supply chain and amongst casual labourers. If issues arise there is the opportunity for these to be identified and addressed through the worker grievance mechanism.

Potential for positive legacy in terms of strengthening knowledge and practice of worker rights of contracted and supplier companies and their employees.

Thus, the magnitude of the impact is considered medium, local scope, and medium duration, resulting in a **Moderate** impact on violations to labour rights. During operation, the BSEZ is expected to employ 7,500 directly and at least 2,500 indirectly.

Workers' Health and Safety

Accidents resulting in injuries or fatalities remain a possibility albeit with reduced likelihood due to the implementation of the management system and nature of work being undertaken. Injuries and fatalities could have long term impacts on workers and their families.

Potential for positive legacy in terms of strengthening knowledge and practice of worker health and safety of contracted and supplier companies and their employees.

Thus, the magnitude of the impact is considered medium, local scope, and medium duration, resulting in a **Moderate** impact on accidents resulting in injuries or fatalities as operations activities will be less intense and will involve less workforce. However, accidents resulting in injuries or fatalities remain a possibility albeit with reduced likelihood.

Child Labour and Forced Labour in the Supply Chain

During operations, the use of child labour or use of people aged 16-18 in hazardous work within the supply chain remains a possibility albeit with reduced likelihood due to the implementation of mitigation measures. If there are incidences of child labor, the magnitude of the effect to the individual affected will remain unchanged.

BSEZ Ltd has the potential to have a positive impact by increasing awareness and improving methods for preventing and addressing child labour within contracted and supplier companies.

Considering that BSEZ Ltd. will employ 30 workers for the operation of the Project, the magnitude of the impact is considered low, the scope is considered occasional, and of medium duration. Therefore, although the use of child labour or use of people aged 16-18 to be involved in hazardous work in the supply chain remains a possibility, the likelihood of the use of forced labour is of **Minor** significance and will be significantly reduced as a result of the proposed mitigation such that it will become a non-routine event. However, should incidences occur the impacts on the individuals affected will remain unchanged.

8.4.5 ACCESS TO INFRASTRUCTURE AND SERVICES

8.4.5.1 POTENTIAL IMPACTS

Construction activities of the sites may induce impacts on utilities and infrastructure, mainly due to site clearance works, excavation and movement of soil, embankment construction, and construction of the various elements of the Project and its essential infrastructure to be built. This is likely to generate pressure on existing local utility supplies (which already have temporary disruption), disturbance to traffic and transportation due to increase of traffic and movements, and short-term planned and unplanned supply disruption during construction and localized flood events due to insufficient drainage.

Local communities will benefit from long-term infrastructure improvements made during construction and throughout the Project itself. BSEZ Ltd will develop essential infrastructure within the Project area (such as standard factories, warehouses, administrative buildings, logistics and parking centres, commercial buildings, internal road networks, drainage, and sewerage, etc.). Additionally, BSEZ Ltd will develop on-site roads and drainage systems, of sewerage and water supply systems (boreholes, piping, manholes, water storage tanks), of electrical distribution (power poles, transformer platforms...), several facilities (in the fields of glass manufacturing, paper production, oxygen bottling, fertilizer production, plastic recycling that will be developed by investors) and potentially a wastewater treatment plant and a pumping station for the Project and future tenants. This will result in improved access to infrastructures in the Project area. Nevertheless, it is unclear if the communities will directly or indirectly benefit from these improvements.

TABLE 8-22 summarizes the potentially significant impacts on access to Infrastructure and Services during the construction and operation phases of the Project.

TABLE 8-22 POTENTIAL IMPACTS ON ACCESS TO INFRASTRUCTURE AND SERVICES

Construction Phase	Operation Phase
· Disruption to infrastructure and utilities during construction;	· Benefits from improvements to infrastructure and services

8.4.5.2 EMBEDDED MEASURES

BSEZ Ltd intends to reduce the risks and negative impact to infrastructure and utilities by adopting the following embedded measures in the Project design with the development of essential infrastructure within the Project site. This includes standard factories, warehouses,

administrative buildings, logistics and parking centres, commercial buildings, internal road networks, drainage, and sewerage, etc. Furthermore, it includes the construction of on-site roads and drainage systems, of sewerage and water supply systems (boreholes, piping, manholes, water storage tanks), of electrical distribution (power poles, transformer platforms...), several facilities (industrial, logistics, offices, first aid centre, fire station etc.,) and a Common Effluent Treatment Plant (CETP) at Phase 2 for the Project and future tenants of Bugesera SEZ.

8.4.5.3 IMPACT ASSESSMENT

8.4.5.3.1 Construction Phase

Disruption to infrastructure and utilities during construction

Potential impacts on utilities and infrastructure during Project construction will stem from construction activities including site clearance works, excavation and movement of soil, and construction of the various elements of the Project.

The main potential impacts on local infrastructure and utilities as a result of these Project activities are disturbance to traffic and transportation due to increase of traffic and movements during construction, pressure on existing local utility supplies and short-term planned and unplanned supply disruption during construction and localized flood events due to insufficient drainage.

With regard to road and traffic disruption specifically, BSEZ Ltd plans to use existing roads where applicable to access the greenfield (Phase 1A and Phase 2). It is noted that the access roads have already been constructed for Phase 1. This might result in increased traffic disruption, temporary increases in traffic flows, potential for delays and congestion, and conflicts between Project employees and public road users and workers of the adjacent companies. The use of the existing roads could also lead to access restrictions, short-term closures/diversions of existing transport routes (e.g., roads, paths, railways) where routes crossed, traffic accidents and dust and noise nuisance can increase.

Disruption to infrastructure and utilities could result in impacts to local livelihoods or quality of life and, if left unmanaged, could result in negative health impacts (e.g., water restrictions, electricity disruptions, etc.).

If unmanaged, disruption to services might result in community distrust and resentment towards the Project. Considering the above and the distance of the Project from the nearest communities and the embedded measures in place, the magnitude of the impact is considered low, the scope occasional and of short duration, resulting in an overall impact to disruption to infrastructures and utilities is expected to be **Minor** negative in significance.

8.4.5.3.2 Operations Phase

Benefits from improvements to infrastructure and services

The Project is mainly intended to develop industrial activities with high added value for the national economy. The development of competitive industrial infrastructure in the country for the processing of Chemical & Pharmaceutical Industries, Clay Products, Agriculture Equipment, Cold Storage, Packaging, Agro Processing (Banana, Beans), Plastic Industry, Electrical &

Telecom Cables, Painting Industries, Assembly Industries Appliances, and the improvements to local infrastructure and services will bring socioeconomic opportunities and increased well-being of the communities.

The operation of the Project might result in increased traffic disruption, temporary increases in traffic flows, potential for delays and congestion, and conflicts between Project employees and public road users and workers of the adjacent companies.

In addition, local communities will benefit from long-term infrastructure improvements made during construction and throughout the Project itself. The essential infrastructure developed by BSEZ Ltd within the Project area (such as standard factories, warehouses, administrative buildings, logistics and parking centres, commercial buildings, internal road networks, drainage, and sewerage, etc.) BSEZ Ltd will also construct on-site roads and drainage systems, of sewerage and water supply systems (boreholes, piping, manholes, water storage tanks), of electrical distribution (power poles, transformer platforms...), several facilities (industrial, logistics, offices, first aid centre, fire station etc.,) and a wastewater treatment plant at Phase 2 (CETP) and a pumping station for the Project and future tenants of Bugesera SEZ. This will result in improved access to infrastructures in the Project area. Nevertheless, it is unsure if the community will directly or indirectly benefit from these improvements.

Thus, the improvement and promotion of access to infrastructures will bring a significant development regarding economic and social conditions of the communities, improving the quality of life and economic development of the local communities in the AoI, and thus, the magnitude of the impact is considered high, with a regional scope and of long duration. The resulting impact is expected to be of a long-term direct Major positive significance.

8.4.6 COMMUNITY COHESION

8.4.6.1 POTENTIAL IMPACTS

Impacts to community cohesion are of particular importance to industrial projects that may attract a large influx of workforce, which can often raise tensions within communities (intra-community tension) and between communities (inter-community tension).

The installation of the Project will most certainly lead to a mixing of the indigenous communities with foreigners attracted by the work opportunities offered or induced by the Project. This new situation could induce social deviations (alcoholism, etc.), that can promote community severance and cohesion impacts.

Table 8-23 presents the potential impacts associated with disruptions to community cohesion during the construction and operation phases.

TABLE 8-23 POTENTIAL IMPACTS ON COMMUNITY COHESION

Construction Phase	Operation Phase
• Unmet expectations of benefits.	• Disturbance from the presence of workforce.

8.4.6.2 EMBEDDED MEASURES

As it is anticipated that skilled and wage labour roles will be available to local communities during construction, BSEZ Ltd intends to contribute to the development of local companies and Bugesera District's economy. Also, through local sourcing of supplies including construction materials, equipment, water sourcing, medical equipment, fuel, engineering tools as well as services.

BSEZ Ltd will ensure inductions and training are delivered to the workforce, promoting competencies and technical content.

Embedded measures supporting benefits to the local economy and local employment include BSEZ Ltd's contractual commitments to meeting specific local employment targets for Rwandan Nationals.

One of the key considerations of the construction phase is the prioritization of the use of local workforce and the implementation of adequate system of communication and shared services throughout the lifecycle.

8.4.6.3 IMPACT ASSESSMENT

8.4.6.3.1 Construction Phase

Unmet Expectations of Benefits

As the implementation of the Project is considered a large development project, there is a high degree of expectation that the proposed Project will bring local and district level benefits. The main expectation for benefits is access to employment opportunities, construction of infrastructure and development centres in the villages, and economic and livelihood benefits thanks to the establishment of the Project. In addition, there is a lot of expectations about employment opportunities and economic development due to the Project.

Due to the extent of these expectations, and the potential for unmet expectations from the Project, the magnitude of the impact is considered medium, the scope is local, and the duration is medium term. Therefore, the significance of the impact before mitigation is **moderate.**

8.4.6.3.2 Operation Phase

Disturbance from the presence of workforce

The Project is expected to have the capacity to accommodate a high number of industrial units that will attract a large workforce, which can create potential disturbances regarding inter-community and intra-community tensions. This is likely to cause communities, households, and individuals to be affected due to severance in community cohesion.

The construction of the Project will result in changes in local communities and villages in the AoI, including worker influx and changes in households' dynamics that can be exacerbated such as alcoholism or drug use and social disturbances. Shifts in power dynamics between workers and community members and within households can result in increased violence and tensions.

In order to limit disturbances related to the influx of outside workers into the Project area, the Employment Strategy and Recruitment Process will clearly communicate to stakeholders that local candidates will be prioritized to the fullest extent possible.

Information will also be shared on the number of local wage labour and semi-skilled positions available to residents, along with the recruitment methods used to identify potential candidates.

Taking into account the above, the magnitude of the impact is considered medium, local scope and of long duration. Therefore, the significance of the impact before mitigation is **moderate** on the potential disturbances regarding inter-community and intra-community tensions.

TABLE 8-24: SUMMARY OF IMPACT ASSESSMENT DURING CONSTRUCTION AND OPERATION

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
Construction Phase	Employment of labour	Expert Judgement	Employment	Both	Positive	Medium	Local	Long	Positive	The anticipated impacts are positive and local in extent due to the high number of primarily wage labour positions available during construction. In addition to direct employment, the Project will result in the indirect employment of workers through procurement of select local goods and services, and the trigger and development of businesses involved in building materials and satellite businesses, creation of jobs, increasing budget revenues and incomes

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
	Economic Impacts from Taxes and Fees, Procurement and Worker Spending	Expert Judgement	Local economy	Both	Positive	Large	Local	Medium	Positive	The large scale of the Project is likely to attract a high number of labourers and jobseekers, who will spend locally (e.g. food, accommodation) and local and regional profit generation from taxes/fees and procurement of goods and services. The magnitude of the impact is likely to be large; the scope will be occasional and the duration, medium, as the hiring of direct workforce and contribution to regional and local economy (through taxes/fees and procurement of local goods and services) will be significantly reduced for the operation phase.
	Capacity Enhancement	Promoted capacity enhancement of local	Economy and Employment	Both	Positive	Large	Occasional	Long	Positive	The number of individuals benefiting from enhanced capacity development both directly and indirectly is

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
		individuals and businesses.								high as well as the potential to source local contracts.
	Permanent Loss of Livelihoods and/or Household Income	Permanent loss of access to Land in the Project footprint	Land Use and Livelihoods	Direct	Negative	Large	Local	Permanent	**Major**	The affected agricultural land, crops and trees will be entirely cleared for the construction of the Project. Land users will be affected facing the loss of livelihood source through permanent land take leading to economic displacement.
	Road Safety	Increased traffic accidents due to traffic increase	Community Health, Safety and Security	Direct	Negative	Medium	Occasional	Medium	**Moderate**	Increased traffic associated with construction activities, and the potential risk of accidents.
	Site Trespass and Injury	Accidents resulting from trespass onto project sites	Community Health, Safety and Security	Direct	Negative	small	Occasional	Short	**Minor**	The Project site will be be fenced prior to start of construction, so site trespassing will be very limited and the risk for intrusion low.

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
	Environmental Health	Environmental changes as a result of noise, changes on the landscape, dust and other emissions from construction activities	Community Health, Safety and Security	Direct	Negative	Large	Local	Medium	**Moderate**	Impacts on the health of the community as a result of environmental changes from construction activities, including changes on the landscape that can affect water quantity and/or quality. Considering the temporary nature of the works and the sequential approach, the magnitude is considered large, scope is considered local, and the duration medium, taking into account the nature of the impacts. The impact significance is therefore considered major
	Transmission of Communicable Diseases	Increased Transmission of Communicable Diseases	Community Health, Safety and Security	Both	Negative	Small	Local	Short	**Minor**	As the majority of the workforce is expected to be sourced locally, the potential impact of the increased transmission of communicable diseases within the workforce and the nearby

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
										communities is expected to be limited. Transmission of communicable diseases should be minimized by education and training on the risks and implementation of Workers Code of Conduct.
	Pressure on Healthcare	Increased Pressure on Healthcare due to influx of workers	Community Health, Safety and Security	Both	Negative	small	Local	Short	**Minor**	.Basic health care for Project workers will be provided and an agreement with hospitals following a needs assessment and upgrade support ensuring no or minimal decreased access for communities.
	Use of Security Personnel	Risk of abuse and/or excessive use of force	Community Health, Safety and Security	Direct	Negative	small	Local	Short	**Minor**	Security Management training, grievance mechanism, and engagement with local stakeholders reduces impact to minor.

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
	Worker's Rights and Labour and Working Conditions	Violations to labour rights as workers may not be aware of their rights	Labour and Working Conditions	Both	Negative	Medium	Occasional	Medium	**Moderate**	If labour is not managed properly, it may result in negative as some workers may not be aware of their rights.
	Workers' Health and Safety	Increased occupational Accidents and Injuries	Labour and Working Conditions	Both	Negative	Medium	Occasional	Medium	**Moderate**	Accidents resulting in injuries or fatalities remain a possibility, as activities of the site personnel will involve typical construction risks such as risks due to moving equipment
	Women's rights	Increased GBVH, approach to recruitment, promotion, and treatment with respect to equal opportunity	Labour and Working Conditions	Both	Negative	Medium	Occasional	Medium	**Moderate**	Women might face indirect forms of discrimination with respect to their right to work and harassment (ie. access to job opportunities, unequal access to promotions, GBV and harassment, discrimination upon recruitment, and others

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
	Child Labour and Forced Labour	Use of Child Labour and Forced Labour	Labour and Working Conditions	Both	Negative	small	Occasional	Medium	**Minor**	The use of child labour or use of people aged 16-18 in hazardous work within the supply chain remains a possibility
	Disruption to infrastructure and utilities	Disruption to infrastructure and utilities	Access to infrastructures and services	Direct	Negative	small	Occasional	Short	**Minor**	Impacts on utilities and infrastructure, mainly due to site clearance works, excavation and movement of soil, embankment construction, and construction of the various elements of the Project
	Unmet Expectations of Benefits	Demands and expectations of benefits from the Project.	Community Cohesion	Both	Negative	Medium	Local	Medium	**Moderate**	There is a high degree of expectation that the proposed Project will bring local and municipal/district level benefits.
Operation phase	Temporary Direct and Indirect Employment	The approximate number of labour is	Economy and Employment	Both	Positive	Large	Regional	Long	**Positive**	The operations phase employment will constitute direct and indirect employment. The approximate number of labour is

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
	Opportunities	expected to be 7,500 directly employed by Bugesera Industrial Park								expected to be 7,500 directly employed by Bugesera Industrial Park development Special Purpose Vehicle (SPV) and its contractors of which 80% will be Rwandan nationals. Therefore, direct recruitment is not expected to be extensive at this stage. Considering the above, the impact on direct employment is expected to be long-term positive, however of a relatively negligible significance, as the recruitment in this phase is not supposed to be extensive.
	Regional and National economic development	Increased economic development and improved socioeconomic conditions	Economy and Employment	Both	Positive	Large	Regional	Long	**Positive**	The nature of the Project will strengthen the local production, transforming local commodities and logistics services into exportable goods and products. The operation activities associated

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
										with the Project will generate economic and development benefits
	Permanent Loss of Livelihoods and/or Household Income	Permanent loss of access to Land in the Project footprint	Land Use and Livelihoods	Direct	Negative	large	Local	Permanent	**Major**	The permanent loss of access to land in the Project footprint is anticipated to have a major negative economic impact on local communities, especially for vulnerable groups and households with particularly low incomes and high land dependency for subsistence and income generation. Impact will occur once during the construction phase.
	Environmental Health	Environmental changes as a result of the operation of the Project	Community Health, Safety and Security	Both	Negative	Medium	Local	Long	**Moderate**	Impacts on the health of the community as a result of environmental changes from operation activities

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
		as noise, dust and other emissions from industrial activities								
	Transmission of Communicable Diseases	Increased Transmission of Communicable Diseases due to the influx workforce	Community Health, Safety and Security	Indirect	Negative	Medium	Local	Long	**Minor**	The number of staff required for the operation phase can only be defined after elaboration of operation plan. Although the exact size of the workforce needed for operation of the Project is not clear at this stage, recruitment is not expected to be extensive. Therefore, the direct impacts of the Project during operations are expected to be minor .
	Transmission of STDs	Increased Transmission of STDs due to the	Community Health, Safety and Security	Indirect	Negative	Medium	Local	Long	**Moderate**	Eventhough a significant influx of workforce is expected to operate the industrial units, the

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
		influx workforce								workforce will be sourced locally.
	Workers' Rights	Breaches of workers rights especially within the supply chain and amongst casual labourers	Labour and Working Conditions	Both	Negative	Medium	Local	Medium	**Moderate**	Limited impact on violations to labour rights as workforce number and use of contractors will decrease
	Workers' Health and Safety	Increased Labour Accidents and Injuries	Labour and Working Conditions	Both	Negative	Medium	Local	Medium	**Moderate**	Impact on accidents resulting in injuries or fatalities as operations activities will be less intense and will involve less workforce
	Forced Child Labour	Use of Child Labour	Labour and Working Conditions	Both	Negative	Small	Occasional	Medium	**Minor**	The use of child labour or use of people aged 16-18 in hazardous work within the supply chain remains a possibility.

Project phase	Source of impact		Social component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Scope	Duration	Significance of the Impact	
	Benefits from improvements to infrastructure and services	Developed industrial infrastructure and activities with high added value for the national economy	Access to infrastructures and services	Both	Positive	Large	Regional	Long	**Positive**	The improvements to local infrastructure and services will bring socioeconomic opportunities and increased well-being of the communities.
	Disturbance from the presence of the workforce	A large workforce, can create potential disturbances regarding inter-community and intra-community tensions	Community Cohesion	Indirect	Negative	Medium	Local	Long	**Moderate**	Changes in local communities and villages in the AoI, including worker influx and changes in households' dynamics, including community tensions and exacerbated use of alcohol and drugs. Nevertheless, the workforce is expected to be sourced locally,

8.4.7 CULTURAL HERITAGE

The baseline study for cultural heritage (Chapter 6.5) identified 8 Cultural Heritage resources, comprising 0 Designated resource and eight Non-Designated resources within the Project Area of Influence (AoI). The sensitivity/value of receptor for the cultural heritage resources identified in the baseline has been assigned based on ERM's internal impact assessment standard criteria for cultural heritage impact significance, professional judgement, desk-based research, and the field survey on tangible and intangible cultural heritage. The sensitivity of identified cultural heritage impacts is presented in below:

TABLE 8-25: IDENTIFIED CULTUTURAL HERITAGE RESOURCES

Cultural Heritage Resource	Sensitivity
Historic cattle watering trough associated with the palace of King Rwabugiri (AB_CH_001)	High Sensitivity
Indigenous medicinal plant (AB_CH_002)	Low Sensitivity
Indigenous medicinal plant (AB_CH_003)	Low Sensitivity
Sacred Tree (AB_CH_004)	Medium Sensitivity
Indigenous Tree Zone (AB_CH_005)	Low Sensitivity
Trees associated with the palace of King Rwabugiri (AB_CH_006)	Medium Sensitivity
Historic agro-pastoral landscape (AB_CH_007)	Low Sensitivity
Possible location for the palace of King Rwabugiri (AB_CH_008)	Medium Sensitivity

The impact assessment considers both tangible and intangible cultural heritage resources as described below:

- Tangible cultural heritage – such as (but not limited to) archaeological sites, built heritage (historic or culturally significant buildings or structures), places of worship, historic enclosures, and potential settlements; and
- Intangible cultural heritage – such as (but not limited to) places that hold cultural, artistic, or religious values, knowledge, innovations, and practices of communities embodying traditional lifestyles, and living heritage resources (shrines, cemeteries, religious/ritual sites) etc.

Three types of impacts to cultural heritage resources are considered in this assessment resulting from construction and operation phases of the Project:

- **Direct**: ground disturbance due to earthworks are the most likely source of direct, physical impacts to known and unknown cultural heritage resources, with the potential to partially or wholly remove these resources. Direct impacts have the potential to be once off, non-reversible and permanent. **Unless the principle of avoidance is adopted in the first instance, mitigation measures may not**

significantly reduce the predicted residual effect of this impact on the cultural heritage.

- **Indirect**: cultural heritage resources are susceptible to indirect impacts through the introduction of intrusive visual, auditory or dust elements to their physical environment or 'setting'. Indirect impacts also include restricted access to existing cultural heritage resources as a result of construction and/or operation phases; and
- **Cumulative**: impacts to cultural heritage resulting from incremental change caused by surrounding projects in the past, present or reasonably foreseeable future, combined with this Project.

8.4.7.1 CONSTRUCTION PHASE IMPACTS

Five potential impacts (PI) are considered during the construction phase:

- **PI1 Physical ground disturbance through earthworks:** a direct impact, ground disturbance and earthworks associated with the construction phase has the potential to partially or wholly remove cultural heritage resources, such as:

  Buried archaeology, including undiscovered archaeological sites;

  Built heritage including historic buildings, places of worship;

  Historic agricultural, irrigation, settlements or enclosures; and

  Industrial heritage including historic railways, rail and road bridges.
- **PI2 Restriction of access:** Restriction zones associated with the construction phase have the potential to temporarily or permanently restrict the access for traditional users or researchers to existing tangible and intangible cultural heritage resources;
- **PI3 Visual**: The construction of temporary or permanent structures has the potential indirectly impact built and living cultural heritage through the introduction of intrusive visual elements to the physical environment or 'setting' where the resource draws value from its surroundings.
- **PI4 Auditorial:** The construction phase has the potential to introduce intrusive auditorial (noise) elements through associated construction works to the physical environment or 'setting' of cultural heritage resources; and
- **PI5 Dust:** The construction phase has the potential to introduce intrusive dust elements through associated works to the physical environment or 'setting' of cultural heritage resources.

8.4.7.2 IMPACT ASSESSMENT DURING CONSTRUCTION

8.4.7.2.1 Pre-mitigation Direct Impacts

Pre-mitigation construction phase direct impacts are presented below. For clarity, the pre-mitigation impacts are presented by the cultural heritage sensitivity of receptor.

Direct Impacts on High Sensitivity resources:

There were no identified direct impacts on **high** sensitivity cultural heritage resources during the construction phase.

Direct Impacts on Medium Sensitivity resources:

There were no identified direct impacts on **medium** sensitivity cultural heritage resources during the construction phase.

Direct Impacts on Low Sensitivity resources:

The magnitude of impact through physical ground disturbance activities on the following 2 **low** sensitivity cultural heritage resources during the construction phase is assessed as:

- **Large** for AB_CH_002 (indigenous medicinal plant) as the entire site may be lost or damaged, resulting in a complete loss of scientific or cultural value. The resulting significance of impact pre-mitigation (based on the sensitivity of the resource and the magnitude of impact) is **permanent, moderate, adverse.**
- **Medium** for AB_CH_007 (historic agro-pastoral landscape) as a significant portion of the site may be lost or damaged, resulting in a loss of scientific or cultural value. The resulting significance of impact pre-mitigation (based on the sensitivity of the resource and the magnitude of impact) is **permanent, minor, adverse.**

8.4.7.2.2Pre-mitigation Indirect Impacts

Pre-mitigation construction phase indirect impacts are presented below. For clarity, the pre-mitigation impacts are presented by the cultural heritage sensitivity of receptor.

Indirect Impacts on High Sensitivity Resources

There were no identified indirect impacts on **high** sensitivity cultural heritage resources during the construction phase.

Indirect Impacts on Medium Sensitivity Resources

The magnitude of impact through intrusive noise, dust, and restricted access on the following **medium** sensitivity cultural heritage resource during the construction phase is assessed as:

- **Small** for AB_CH_004 (sacred tree) as the resource is situated next to the boundary of the construction footprint. Noise and dust from the construction phase may mean the resource undergoes temporary or permanent change that has a limited effect on the site's value. Access to the resource, and therefore ability to practice any associated intangible culture, may also be temporarily impeded. The resulting significance of impact pre-mitigation impacts (based on the sensitivity of the resource and the magnitude of impact) is **temporary, minor, adverse.**

Indirect Impacts on Low Sensitivity Resources

The magnitude of impact through auditory disturbance, dust, and changing access on the following 2 **low** sensitivity cultural heritage resources during the construction phase is assessed as:

- **Small** for AB_CH_003 (indigenous medicinal plant) as the resource is situated next to the boundary of the construction footprint. Noise and dust from the construction

phase may mean the resource undergoes temporary or permanent change that has a limited effect on the site's value. Access to the resource, and therefore ability to practice any associated intangible culture, may also be temporarily impeded. The resulting significance of impact pre-mitigation impacts (based on the sensitivity of the resource and the magnitude of impact) is **temporary, negligible, adverse.**

- **Small** for AB_CH_007 (historical agro-pastoral landscape) as the resource is situated adjacent to the construction footprint on the south boundary. During construction phase the Project may introduce intrusive noise and dust to the setting of the resource which reduces the ability to practice intangible traditions. The setting of this resource may undergo permanent change that temporarily diminishes the resource's perceived value to stakeholders. The resulting significance of impact pre-mitigation impacts (based on the sensitivity of the resource and the magnitude of impact) is **temporary, negligible, adverse.**

8.4.7.3 IMPACT ASSESSMENT DURING OPERATION

Three types of indirect impacts may be considered during the operation phase:

- **PI6 Restriction of access**: the potential to permanently restrict access for traditional users or researchers to existing cultural heritage resources;
- **PI7 Visual:** the potential to introduce intrusive visual elements to the physical environment or 'setting' of cultural heritage resources;
- **PI8 Auditorial**: the potential to introduce intrusive auditorial elements to the physical environment or 'setting' of cultural heritage resources;

8.4.7.3.1 Pre-mitigation Direct Impacts

No pre-mitigation direct impacts to cultural heritage resources have been identified at the operation phase of the Project, as direct impacts to cultural heritage resources will happen at construction phase during earthwork activities, either partially or wholly removing the resource.

8.4.7.3.2 Pre-mitigation Indirect Impacts

Pre-mitigation operation phase indirect impacts are presented below. For clarity, the pre-mitigation impacts are presented by the cultural heritage sensitivity of receptor.

Indirect Impacts to High Sensitivity Resources

There were no pre-mitigation indirect impacts to **high** sensitivity cultural heritage resources identified for the operation phase.

Indirect Impact to Medium Sensitivity Resources

The magnitude of impact through changing access on the following **medium** sensitivity cultural heritage resource during the operation phase is assessed as:

- **Large** for AB_CH_004 (sacred tree) as the resource is situated within the Project footprint and may become permanently inaccessible to traditional users. The resource may become inaccessible which may prevent associated intangible cultural practices from being performed. The resulting significance of pre-mitigation impacts

(based on the sensitivity of the resource and the magnitude of impact) is **permanent, major, adverse**.

Indirect Impact to Low Sensitivity Resources

The magnitude of impact through changing access on the following **low** sensitivity cultural heritage resources during the operation phase is assessed as:

- **Large** for AB_CH_003 (indigenous medicinal plant) as the resource is situated adjacent to the project footprint and may become permanently inaccessible to traditional users. The resource may become inaccessible which may prevent associated intangible cultural practices from being performed. The resulting significance of pre-mitigation impacts (based on the sensitivity of the resource and the magnitude of impact) is **permanent, moderate, adverse**.
- **Small** for AB_CH_007 (historic agro-pastoral landscape) as the resource is situated adjacent to the project footprint. The introduction of noise to the setting of the resource may prevent associated intangible cultural practices from being performed. The resulting significance of impact pre-mitigation impacts (based on the sensitivity of the resource and the magnitude of impact) is **permanent, negligible, adverse.**

8.4.7.4 SUMMARY OF PRE-MITIGATION IMPACTS ASSESSMENT DURING CONSTRUCTION AND OPERATION

TABLE 8-26

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Extent	Duration	Significance of the Impact	
Construction phase	Physical ground disturbance through earthwork activities	500 metres from the physical limits of the proposed development and associated infrastructure	Cultural heritage: - Indigenous medicinal plant (AB_CH_002)	Direct	Negative	Large	Local	Permanent	Moderate	The indigenous medicinal plant is situated within the construction footprint. The resource may be damaged as part of construction, resulting in a direct impact.
	Noise, dust, and restricted access	500 metres from the physical limits of the proposed development and associated	Cultural heritage: Indigenous medicinal plant (AB_CH_003) and historic agro-	Indirect	Negative	Small	Local	Temporary	Negligible	The resources are situated adjacent to the construction footprint. Noise and dust from the construction may affect the perceived value of the resources. Access to the indigenous medicinal

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Extent	Duration	Significance of the Impact	
		infrastructure	pastoral landscape (AB_CH_007)							plant may also be limited.
	Noise, dust, and restricted access	500 metres from the physical limits of the proposed development and associated infrastructure	Cultural Heritage: - Sacred tree (AB_CH_004)	Indirect	Negative	Small	Local	Temporary	Minor	The sacred tree is situated adjacent to the construction footprint. Noise and dust from the construction may affect the perceived value of the resource and access to the resource may be limited.
	Physical ground disturbance through earthwork activities	500 metres from the physical limits of the proposed development and associated	Cultural heritage: - Historic agro-pastoral landscape (AB_CH_007)	Direct	Negative	Medium	Local	Permanent	Minor	The historic agro-pastoral landscape is situated partially within the construction footprint. The resource will be partially removed as part of construction.

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Extent	Duration	Significance of the Impact	
		infrastructure								
Operational Phase	Noise, dust, and restricted access	500 metres from the physical limits of the proposed development and associated infrastructure	Cultural Heritage: - Sacred tree (AB_CH_004)	Indirect	Negative	Large	Local	Permanent	Major	The resource is situated adjacent to the project footprint and may become permanently inaccessible to traditional users. The resource may become inaccessible which may prevent associated intangible cultural practices from being performed.
	Noise, dust, and restricted access	500 metres from the physical limits of the proposed development and associated	Cultural heritage: Indigenous medicinal plant (AB_CH_003)	Indirect	Negative	Large	Local	permanent	Moderate	The resource is situated adjacent to the project footprint and may become permanently inaccessible to traditional users. The resource may become inaccessible which may prevent associated intangible

Project phase	Source of impact		Environmental component affected	Nature of impact		Impact significance assessment				Summary of Reasoning
	Activity	Criteria		Direct/ Indirect	Positive / Negative	Magnitude	Extent	Duration	Significance of the Impact	
		infrastructure								cultural practices from being performed.
	Noise, dust, and restricted access	500 metres from the physical limits of the proposed development and associated infrastructure	Cultural heritage: historic agro-pastoral landscape (AB_CH_007)	Indirect	Negative	Small	Local	permanent	Negligible	The resource is situated adjacent to the project footprint. The introduction of noise to the setting of the resource may prevent associated intangible cultural practices from being performed

8.5 CUMULATIVE IMPACT

8.5.1 INTRODUCTION

The IFC Performance Standard 1 (Paragraph 5) defines the broader Project area to include "*… areas potentially impacted by cumulative impacts from further planned development of the Project, any existing project or condition, and other project-related developments that are realistically defined at the time the Social and Environmental Assessment is undertaken*."

In addition, the IFC Performance Standard 1 (Paragraph 6) states that the "*… assessment will also consider potential trans-boundary effects, such as pollution of air, or use or pollution of international waterways, as well as global impacts, such as the emission of greenhouse gases*." However, since the information pertaining to the future industries remain largely unknown, transboundary effects have not been assessed.

Cumulative impacts are those impacts that act together with other impacts (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as the Project. Cumulative impacts are therefore generally impacts that act with others in such a way that the sum is greater than the parts. This is, however, not always the case – sometimes they will simply be the sum of the parts, but that sum becomes significant.

In practice, effective design and implementation of a complete Cumulative Impact Assessment processes is beyond the technical and financial capacity of a single developer. This is particularly true since a single developer will not have authority on other developers within the region. Cumulative Impact Assessments have to be conducted and implemented with the authorities associated with developments, and are multi-stakeholder, iterative processes that:

- Require the involvement of multiple multi-disciplinary teams and an effective, efficient governance structure; and
- Tend to be time and data intensive.

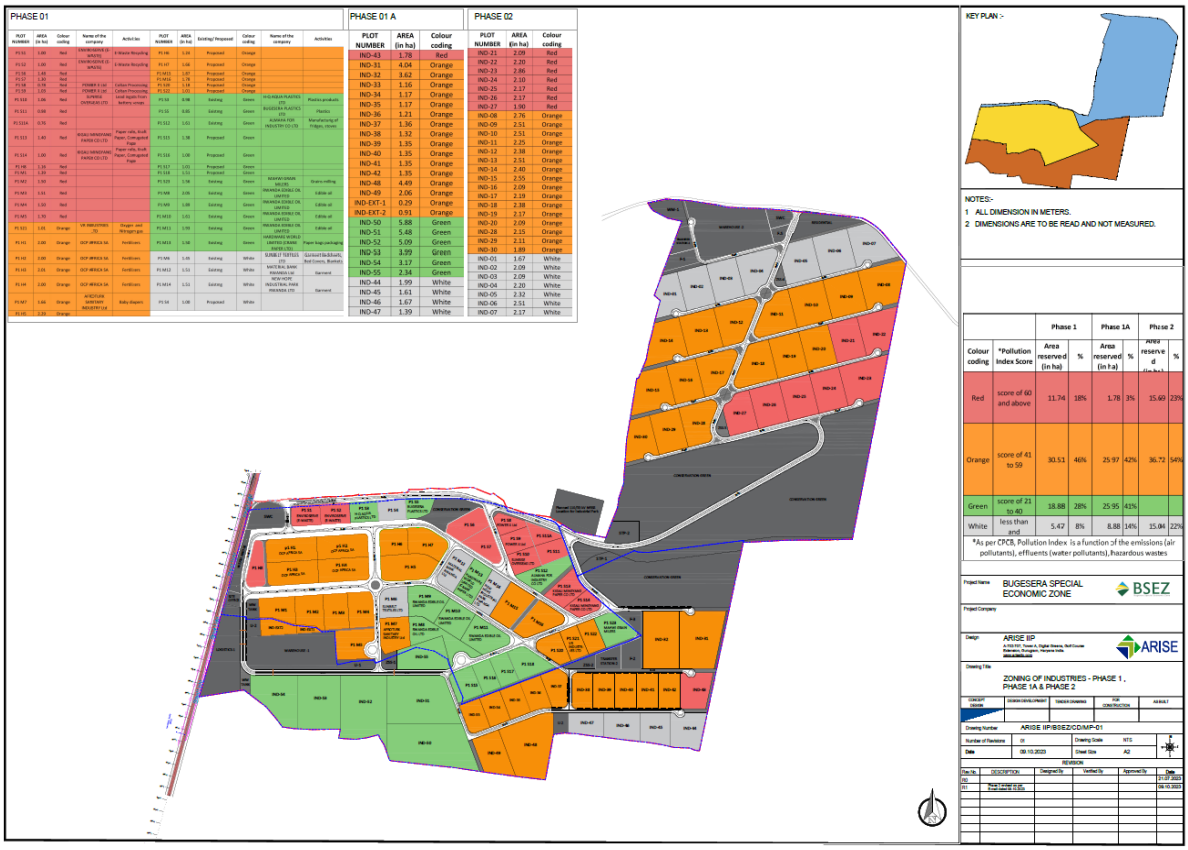
This Section provides a qualitative assessment of the cumulative impacts that would result from the combination of the proposed Bugesera SEZ Project, and *other* actual or proposed future developments in the broader Project Area.

8.5.2 BSEZ ZONATION

There is presently very little information regarding the future tenants or the type of the industries that will settle in the 335.68 ha of BSEZ. BSEZ Ltd has developed Zonation Plan for the Project area and decided on the targeted industry sectors for the future tenants based on the feasibility study previously conducted by ARISE IIP (FIGURE 8-4). Thus, the whole basic infrastructure of the 335.68 ha BSEZ is being designed and built in anticipation of the future full occupation of the BSEZ, including the electric utilities, water-wastewater provisions, roadways etc. At present, within Phase 1 some industries are already operational, some are under construction, and others are still on the design stage. Some of the key considerations include: Wastewater Treatment Plant is located at

the valley bottom and treated water is released downstream away from the Kagasa village; the zoning allocation for west end of Phase 2 consider the presence of Kagasa Village and a green buffer of 10m is proposed between the residential and industrial zones, IND-5, IND-6 & IND-7 are zoned in the white category of industries.

FIGURE 8-4: BSEZ ZONATION PLAN



8.5.3 DEVELOPMENT CONTEXT

In addition to what has already being assessed, the Project may experience cumulative impacts as a result of:

Development and construction of Bugesera International Airport expected to be completed and inaugurated with 8-million passenger capacity annually by the year 2024/2025. The Airport Area comprises approximately 2,500 ha, of which the actual Airport footprint will only be approximately 360 ha[194].

- Gako Meat Company Ltd is investing in an integrated beef farming project on a consolidated pastureland of 6,000 ha located in the Bugesera district. The beef project is anticipated to have an abattoir that will be slaughtering at least 120 cows per day.

194 https://www.miga.org/sites/default/files/archive/Documents/SPGDisclosures/BAC%20ESMS%20Manual%20Rev%20AA.pdf

- Imana Steel Rwanda, a steel manufacturing company adjacent to the Project Site in Gashora sector, Bugesera District
- The Project site is within 10km from Burundi border which has been subject to periodic opening and closure. Once the border is fully open, it is anticipated to increase traffic along the main road to the Project site.

8.5.4 IDENTIFIED CUMULATIVE IMPACTS

The cumulative impacts that would result from a combination of the Project and other actual or proposed future developments in the broader Study Area include:

- Unforeseen impacts on biological resources and receptors may result from continued in-migration of people and associated modification of land as BSEZ-associated development in surrounding areas may occur, leading to a further reduction in the extent of natural habitat.
- Increased need of water and discharge of stormwater may place further pressures on the ecological condition and functionality of Lake Gaharwa and the associated wetland complex.
- Sedimentation due to accelerated erosion and the transfer of associate alien plant species regenerative material, as well as an increase in treated wastewater discharge (which may still have an increased level of nutrients) may lead to significant changes in the species assemblage of riparian areas and Lake Gaharwa. This may further affect fish stocks that are currently a major source of protein for the local and regional population. Water quality monitoring at the point of effluent release to the environment from BSEZ should be undertaken periodically to ensure that it meets national and international standards.
- Dust and emissions during construction phase should be considered on different projects cumulatively. It is incumbent on the BSEZ Ltd to ensure that an air quality monitoring is continued to quantify the anticipated impact.
- During operation, air quality related impacts might result in significant cumulative impacts due to emissions of the manufacturing process. Air quality monitoring should continue, and assessments undertaken against the baseline data generated as part of this ESIA.

8.5.5 HOLISTIC MANAGEMENT OF CUMULATIVE IMPACTS

The following measures will help to holistically mitigate and manage cumulative impacts:

- **Undertaking a Strategic Regional Environmental and Social Impact Assessment** – a strategic regional impact assessment would allow a comprehensive assessment of potential impacts that may result from BSEZ operations in the region together with other developments within the broader Study Area. This type of assessment would consider the cumulative impacts associated with the presence of developments and would prevent isolated and iterative decision-making. The assessment would require greater integration and planning by private developers and should be led by the Government of Rwanda. Such an assessment would ideally feed into combined and issue-specific mitigation and enhancement measures.

- **Revenue Management** – the Project and developments in the region will generate revenue for the local, regional and national government through taxes and royalties. The extent that this revenue is invested and used productively (by national or regional government) back into the Study Area and surrounds would determine the extent to which local infrastructure and resources will be provided to manage a range of social and environmental impacts effectively. Developers / Operators in the area should combine to lobby the Rwandan Government for a systematic system of revenue recording and management that would enable directing benefits back to the region.
- **Regional Forum** – the establishment of a Regional Forum, where companies in the area can share lessons learnt, align strategies, and agree coordinated approaches to responding to social and environmental issues, will help to improve cooperation in managing stakeholder (including community) expectations, avoid setting bad precedents and improve ways in the pursuit of joint goals for sustainable development.
- **Data Sharing** – a data sharing agreement should be setup with other developers/operators in the region to share operational monitoring data. Data should be shared with regulators and interested stakeholders to allow cumulative impacts to be documented and to inform adaptive operational management.

8.5.6 IMPLICATIONS OF UNCERTAINTY

The cumulative environmental and social impacts described in this Section were assessed on the basis of the information available at the time and using information made available to ESIA team. The cumulative impact assessment has a certain level of uncertainty, which is inevitable with a study of this type.

9 MITIGATION MEASURES

9.1 PHYSICAL ENVIRONMENT

9.1.1 AIR QUALITY

9.1.1.1 POST-MITIGATION ASSESSMENT

Without mitigation there is the potential for substantial dust emissions to arise from the Project activities, particularly from the construction phase. The measures required to mitigate dust during construction and operation phases are set out below. Alongside these mitigations, the Project boundary monitoring should be undertaken during the construction phase to allow dust emissions to be actively quantified and controlled.

9.1.1.1.1 Proposed Mitigation Measures during construction

- Site Planning:
    - Plan Project layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
    - Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
    - Consider fences and enclosures around specific operations where there is a high potential for dust production and the site is actives for an extensive period.
    - Limit site runoff (of water or mud) to prevent egress of material to other areas which can create dust emissions when dried.
    - Keep site fencing, barriers and scaffolding clean using wet methods.
    - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
    - Impose and signpost a maximum-speed-limit of 30 kph on surfaced and 10 kph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided). Implement awareness training for drivers.
- Dust Management:
    - Develop and implement an Air Quality Management Procedure (with a Dust management plan (DMP) including dust deposition, dust flux, real-time PM10 continuous monitoring and visual inspections. The DMP should also include 'action levels' for triggering further dust mitigation when exceeded (feed-back loop).
    - Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.

  - Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in a logbook.
- Earthworks Management:
  - Re-vegetate or hard stand earthworks and exposed areas and open soils to stabilise surfaces as soon as practicable.
  - Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
  - Only remove the cover in small areas during work and not all at once.
- Construction Management:
  - Re-vegetate or hard stand earthworks and exposed areas and open soils to stabilise surfaces as soon as practicable.
  - Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
  - Only remove the cover in small areas during work and not all at once.

9.1.1.1.2Proposed Mitigation Measures during Operation

- General Operational Measures:
  - Where construction compounds cannot be hardstanding, use lignin-based surface sealants or watering as required to supress dust generation.
  - Only use cutting, grinding, or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
  - Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
  - Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
  - Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
  - Avoid bonfires and burning of waste materials.
- Mitigation specific to Track out on Hardstanding Public Roads
  - Use water-assisted dust sweeper(s) on hardstanding access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
  - Avoid dry sweeping of large areas.
  - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.

- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

9.1.1.1.3 General monitoring measures (construction and operation phase)

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and record inspection results.
- Carry out regular site inspections to monitor compliance with the Air Quality Management Procedure, record inspection results and identify any events that require further investigation or actions.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Undertake real-time PM10 monitoring around the Project boundary.

Post Mitigation strategies mainly focus on monitoring assessing and maintaining improvements. These regular assessments will help to ensure sustained progress and identify areas of improvement.

All suggested measures will allow to reduce the residual impact of the Project on the air quality as shown in Table 9-1.

TABLE 9-1: AIR QUALITY MITIGATION MEASURES AND RESIDUAL IMPACT ASSESSMENT

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Development & construction phase	Dust generation from construction activities	Air Quality	Direct	Control of dust from construction	Medium	Small	Medium	Minor
	Vehicles on unpaved roads and surfaces	Air Quality	Direct	Control of dust from construction	Medium	Small	Medium	Minor
Operation phase	Operation of basic infrastructure	Air Quality	Direct	Control of dust from operations	Medium	Small	Medium	Minor
	Vehicle movement and track out	Air Quality	Direct	Vehicle movement and track out dust and emissions controls	Medium	Small	Minor	Minor to Negligible
Closure or rehabilitation phase	Dust from demolition activities and traffic accessing the site. Mitigation measures are similar to the construction phase for dust.							

9.1.2 NOISE

9.1.2.1 POST-MITIGATION ASSESSMENT

Noise impacts during construction are anticipated to be moderate. The following mitigation measures should be used where necessary to keep the noise levels below the applicable standards at the closest sensitive receptors to the source:

- Where practicable noisy equipment will be sited as far away as possible from receptors.
- Where practicable noisy equipment will be orientated to face away from the receptors at which significant noise impacts are predicted.
- Construction contractors will use alternatives to audible reversing alarms, such as visual and/ or broadband noise emitting alarm-models that provide a safe system of work; or configuring the Project work sites to maximise forward movements of mobile plant.
- Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable.
- Where practicable, stationary equipment will be located in an acoustically treated enclosure.
- Throttle settings will be reduced, and equipment and plant turned off, when not being used.
- Onsite chutes and bins will be lined with damping material.
- Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked. Equipment will not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified.
- Use of compressors, generators and pumps fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use, and positioning of all ancillary plant (e.g., generators, compressors) so as to cause minimum noise disturbance.
- Fitting of mufflers or silencers of the type recommended by manufacturers.
- Storage of excavated material between the construction site and the sensitive use building to form a noise barrier (with cover to avoid dust erosion) or installation of other (temporary) noise barriers.
- Taking advantage of the natural topography for noise shielding.
- Limiting hours of operation for specific equipment or operations.

Based on the successful implementation of the noise control mitigation and management measures described above, it is envisaged that a reduction in the overall noise from construction plant teams of 5 dBA is achievable from the noise data provided in BS 5228. For a reduction of more than 5 dBA, noise shielding is required. In addition, site office structures/containers or noise screens, earth mounds or rock piles can provide a typical reduction up to 15 dBA.

If a reduction of 5 dB(A) is achievable, the predicted noise levels at the nearest NSR would decrease from 62 dB(A) to 57 dB(A) for scenario S1 and from 63 dB(A) to 58 dB(A) for scenario S2. Consequently, these reduced levels would indicate a reduction in the significance of impacts, changing from **Moderate** to **Minor.**

For a reduction greater than 5 dB(A), noise shielding measures are required, such as workers' containers, noise screens, earth mounds, or rock piles may be necessary. These measures can typically provide a reduction of up to 15 dB(A). A minimum reduction of 8 dB(A) would lower the significance of impact from **Minor** to **Negligible** at the NSRs.

Table 9-2 includes a summary for the noise topic of the impact assessment for the all phases of the Project - pre and post mitigation.
As evident from the table, noise impacts are predicted to be of minor-negligible impact significance.

Table 9-2 Noise Mitigation Measures and Residual Impact Assessment

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Development & construction phase	Construction equipment and generators	Noise	Direct	Control of noise level from equipment	Small	Small	Minor	Minor to (Negligible)
Operation phase	Operational Activities	Noise	Direct	Control of noise level from equipment	Small	Small	Minor	Minor to (Negligible)
Closure or rehabilitation phase	Noise from demolition equipment. Mitigation measures are similar to the construction phase for noise.							

9.1.3 HYDROGEOLOGY AND SURFACE WATER HYDROLOGY

9.1.3.1 PRE-CONSTRUCTION AND CONSTRUCTION PHASES

Potential mitigation measures include:

- Surface infrastructure: Construction of the surface infrastructure will include shallow excavation to established foundations which can negatively impact the groundwater level and flow patterns. Hydrocarbons and chemical contamination from vehicles and chemicals used on site can impact the groundwater quality.
    - The impact on recharge to the groundwater resource can be reduced by minimising the infrastructure built on site, and/or the footprint of the infrastructure. However, surface infrastructure that will be built is likely already optimized to save costs, and it is not expected that significant changes to the surface infrastructure can be made. Overall, the impact of construction of surface infrastructure on the groundwater resource is rated to be a "minor" impact before mitigation. The rating post-mitigation remains "Minor Negative Impact" post mitigation (please refer to Table 9-3).
    - Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas, and limiting driving and operating on unpaved areas, can potentially reduce the impact from hydrocarbons spills on the groundwater qualities. Storage of chemicals in appropriate storage areas will reduce the impacts from chemical spills. Impacts from chemical and hydrocarbon spills will be a "Moderate Negative Impact" pre-mitigation and are reduced to a "Minor Negative Impact" post-mitigation (please refer to TABLE 9-3).
- Water supply: The impacts are expected to be from excavation for the water pipelines in areas where the groundwater levels are shallower than the excavation depth. The impact can be reduced by avoiding areas of shallow groundwater which could be identified from geotechnical surveys. Impacts from excavations for the pipelines are classified as being a "Minor Negative Impact" pre-mitigation and are reduced to a "Negligible Negative Impact" post-mitigation (please refer to TABLE 9-3).
- Wastewater: Construction of the wastewater system will include excavation for installation of pipelines and construction of a CETP which could impact the groundwater levels and flow patterns. The impact from excavation of the pipelines can be reduced by avoiding areas of shallow groundwater which could be identified from geotechnical surveys. Similarly, the location of the CETP can avoid areas of very shallow groundwater. Impacts from excavations for the pipelines are classified as being a "Minor Negative Impact" pre-mitigation and are reduced to a "Negligible Negative Impact" post-mitigation (please refer to TABLE 9-3).
- Drainage: During construction of the drainage system the site will be graded and a channel constructed to direct surface runoff to the green zone. Groundwater levels and flow patterns might be impacted due to the reduced recharge from rainfall caused by increased surface runoff, and groundwater qualities might be impacted by hydrocarbons spills from vehicles on site.

- The increased surface runoff can be controlled by minimizing the surface runoff, without causing a flood risk. The impact on the groundwater levels and flow patterns are expected to be a "Negligible Negative Impact" pre-mitigation and remains a "Negligible Negative Impact" post-mitigation (please refer to TABLE 9-3).
- Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas, and limiting driving and operating on unpaved areas, can potentially reduce the impact from hydrocarbons spills on the groundwater qualities. Storage of chemicals in appropriate storage areas will reduce the impacts from chemical spills. Impacts from chemical and hydrocarbon spills will be a "Minor Negative Impact" pre-mitigation and are reduced to a "Negligible Negative Impact" post-mitigation (please refer to TABLE 9-3).

- Energy: Construction of the energy system includes laying of 19,660 m of underground cabling and construction of 4 sub-stations. There is a slight possibility that excavations for laying the cables or the foundations could breach the groundwater level but is not expected to have any notable impact on the groundwater levels or flow patterns. Machinery and vehicles operating on site could impact the groundwater qualities through hydrocarbon spills.
    - Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas, and limiting driving and operating on unpaved areas, can potentially reduce the impact from hydrocarbons spills on the groundwater qualities. Impacts from hydrocarbon spills will be a "Minor Negative Impact" pre-mitigation and are reduced to a "Negligible Negative Impact" post-mitigation (please refer to TABLE 9-3).

TABLE 9-3: SUMMARY OF PRE-CONSTRUCTION AND CONSTRUCTION IMPACTS POST-MITIGATION

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Construction phase	Construction of Surface Infrastructure	Groundwater Volumes	Direct	Minimising the infrastructure built on site	Small	Small	Minor	Minor
	Construction of Surface Infrastructure	Groundwater Quality	Direct	Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas	Small	Small	Minor	Minor
	Construction of water supply infrastructure	Groundwater levels	Direct	Avoiding areas of shallow groundwater which could be identified from geotechnical surveys	Small	Negligible	Minor	Negligible
	Construction of wastewater infrastructure	Groundwater levels	Direct	Avoiding areas of shallow groundwater which could be identified from geotechnical surveys	Small	Negligible	Minor	Negligible
	Construction of wastewater infrastructure	Groundwater Quality	Direct	Avoiding areas of shallow groundwater which could be identified from geotechnical surveys	Small	Negligible	Minor	Negligible
	Construction of drainage systems	Groundwater Quality	Direct	Minimizing the surface runoff, without causing a flood risk	Small	Negligible	Minor	Negligible

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Drainage systems increasing surface runoff and reducing recharge	The groundwater levels	Direct	Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas	Small	Small	Minor	Negligible
	Laying of underground power cables	Groundwater quality	Direct	Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas	Small	Small	Minor	Negligible

9.1.3.1.1 Operational and closure phases

- Surface infrastructure: Increased paved and roofed areas will increase surface runoff, thereby reducing groundwater recharge into the underlying aquifers, leading to a minor, localised, drawdown in the groundwater levels and reducing groundwater flow velocities underlying the BSEZ. Vehicular use on site in the execution of tasks can impact the groundwater quality through accidental spills of fuels and oils, as well as other contaminants related to the transportation of equipment and materials during the Operation phase.
    - The impact on recharge to the groundwater resource can be reduced by minimising the infrastructure built on site, and/or the footprint of the infrastructure. However, surface infrastructure that will be built is likely already optimized to save costs, and it is not expected that significant changes to the surface infrastructure can be made. Overall, the impact of construction of surface infrastructure on the groundwater resource is rated to be a "**minor**" impact before mitigation. The rating post-mitigation remains "**Minor** Negative Impact" post mitigation (please refer to Table 9-4).
    - Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas, and limiting driving and operating on unpaved areas, can potentially reduce the impact from hydrocarbons spills on the groundwater qualities. Impacts from hydrocarbon spills will be a "**Moderate** Negative Impact" pre-mitigation and are reduced to a "**Minor** Negative Impact" post-mitigation (please refer to Table 7 5).
- Wastewater: Discharged wastewater concentrations can impact the groundwater quality negatively. The impact can be reduced by optimizing the treatment plant design. Impacts from discharge water on the groundwater resource are classified as a "**Moderate** Negative Impact" pre-mitigation, and a "**Minor** Negative Impact" post-mitigation (please refer to Table 7 5).
- Drainage: Increased runoff due to the improved site runoff management can reduce groundwater recharge into the underlying aquifers leading to a minor, localised, drawdown in the groundwater levels and change in groundwater flow velocities underlying the BSEZ.
    - The increased surface runoff can be controlled by minimizing the surface runoff, without causing a flood risk. The impact on the groundwater levels and flow patterns are expected to be a "**Negligible** Negative Impact" pre-mitigation and remains a "**Negligible** Negative Impact" post-mitigation (please refer to TABLE 9-4
- Energy: Groundwater contamination could potentially result from accidental spill or leakage of mineral oil at the substation transformers during facility operation. Impacts can be mitigated by ensuring all fuel and mineral oil areas are within appropriately designed areas, including a floor, bunding, and an oil trap. Impacts from chemical and hydrocarbon spills will be a "Minor Negative Impact" pre-

mitigation and are classified as a “Negligible Negative Impact” post-mitigation (please refer to Table 7 5).

- The green zones (green corridors, drain buffers and conservation green) have been designed to act as green lungs and service corridors between different areas, and also can act as storm water paths.

TABLE 9-4: SUMMARY OF IMPACT ASSESSMENT DURING OPERATIONAL AND CLOSURE PHASES POST-MITIGATION

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Operational & closure phase	Surface Infrastructure reducing recharge to the aquifers	Groundwater Recharge	Direct	Minimising the infrastructure built on site	Small	Small	Minor	Negligible
Operational phase	Vehicular use	Groundwater Quality	Direct	Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas	Small	Small	Minor	Minor
Operational phase	Wastewater infrastructure contaminating the groundwater	Groundwater Quality	Direct	Avoiding areas of shallow groundwater which could be identified from geotechnical surveys	Small	Negligible	Minor	Minor
Operational & closure phase	Drainage systems increasing surface runoff and reducing recharge	Groundwater recharge	Direct	(See avoiding areas of shallow groundwater.)	Small	Negligible	Minor	Negligible
Operational phase	Energy infrastructure	Groundwater quality	Direct	(See vehicular use)	Small	Negligible	Minor	Negligible

9.1.4 CLIMATE CHANGE AND GHG EMISSIONS

A Climate change and GHG Assessment study was undertaken by BSEZ Ltd and shared to the ESIA consultant for incorporation in November 2023 (Appendix H and Appendix I). The assessment methodology and detailed calculations are provided in the appendices section of this ESIA report. The Sections 9.1.4.1 and Section 9.1.4.2 provide excerpts of summaries drown from the detailed reports.

9.1.4.1 CONSTRUCTION PHASE

During the 30 months of construction, the main source of emissions is from change of land use and fuel usage in construction equipment's, transportation (14,500 t CO2e). BSEZ LTD will encourage fuel efficiency of its contractors during construction as far as reasonably feasible. This can be achieved, for example, by optimising the transport routes on the construction site. Furthermore, it should be ensured that no machines are running when they are not needed. In general, given that fuel is expensive and reduces the profit margins of the contractors, there is a natural economic incentive for contractors to operate their vehicles and other equipment in a fuel-efficient manner.

9.1.4.2 OPERATION PHASE

During operation the Project causes approximately 87 700 t CO_2e. Most of the operation emissions per year will come from energy consumption, and in particular from electricity consumption (87 700 t CO_2e with fuel only accounting for 150 tCO2e). In addition, a very minor % of emission comes from (2 t CO_2e) waste generation. Tree planting activities planned will only reduce the emissions of approximately 80 tCO2e, considering that they are coming in replacement of crops.

Therefore, BSEZ LTD should consider installing energy-saving lightning system within the Project site and encourage the tenants to do so as well. In a future scenario of low carbon transition, it is likely that the grid electricity supplied to the Project site in the operational lifetime will be from 'greener' energy sources such as renewables, thus minimising future GHG emissions.

ARISE IIP as a standard Group practice seeks to lessen their reliance on carbon-intensive energy sources in their projects by allocating funds to decarbonisation and climate change adaptation techniques. BSEZ LTD should be working on a design and implementation of a Net Zero Strategy[195] which will:

- Establish a carbon baseline across global operations;
- Determine areas of opportunity and emission reduction;
- Promote knowledge sharing with business partners such as host governments, employees, contractors, and local communities; and
- Create a Science-based reduction plan to become net zero by 2030.

[195] „ARISE IIP Brochure - Committed to making Africa Thrive ", ARISE, 2022. More information on https://www.ariseiip.com/carbon-neutral-initiatives-in-africa/

Furthermore, regarding the industrial zones projects of BSEZ LTD, the strategic initiatives towards carbon neutral goal include:

- Invest in renewable energy in proximity to industrial zones;
- Ensure that businesses may utilize renewable energy resources; and
- Provide incentives to industries that promote renewable energy.

TABLE 9-5 presents a summary of post-mitigation impact assessment for GHG and climate change impacts.

TABLE 9-5 CLIMATE CHANGE MITIGATION MEASURES AND RESIDUAL IMPACT ASSESSMENT

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Development & construction phase	Fuel Consumption and Electricity use	Climate Change	Direct	• Transport logistics (locations/routes) will be optimised to ensure efficient carriage of raw materials and promote fuel efficiency; • Vehicle idling times will be reduced through focus on scheduling of construction operations; • The use of fuel-efficient transportation vehicles will be prioritised when possible, and regular maintenance of vehicles ensured; • Energy efficiency specifications for new and retrofitted site accommodation will be created; • Sourcing renewable energy fuels will be considered if feasible; and/or • Energy efficiency usage among workers will be promoted.	Medium	Medium	Medium	Minor
	Electricity use	Climate Change	Direct	• Decarbonizing energy use, when possible, through renewable sources or waste to energy plants; • Consider the use of Renewable Energy Certificates (RECs), and/or Power Purchase Agreements, and/or;	Medium	Negligible	Medium	Negligible

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
				• Promote Energy efficiency				
	Crops destruction	Climate Change	Direct	• Limit deforestation and crop destruction only to when it is necessary; • Conserve existing vegetated areas, • Plant trees for carbon sequestration, in areas that should not come in replacement of crops, and/or; • Maintain crop areas through agroforestry practices through panting fruit trees in the green areas.	Medium	Medium	Medium	Medium
Operation phase	Fuel Consumption and	Climate Change	Direct	• The use of fuel-efficient transportation vehicles will be prioritised, and regular maintenance of vehicles ensured; • Sourcing renewable energy will be considered if feasible; and/or • Energy efficiency usage among workers will be promoted.	Negligible	Negligible	Negligible	Negligible
	Electricity use	Climate Change	Direct	• Decarbonizing energy use, when possible, through renewable sources or waste to energy plants; • Consider the use of Renewable Energy Certificates (RECs), and/or Power Purchase Agreements, and/or;	Medium	Minor	Medium	Minor

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
				• Promote Energy efficiency				
Closure Phase	Fuel Consumption and Electricity use during closure phase. Mitigation measures are similar to the construction phase for energy and resource use							

9.2 BIOLOGICAL ENVIRONMENT

The impacts related to the Project area are inherent to the Project itself and its location and cannot be fully avoided. These impacts must be therefore managed using the mitigation hierarchy prioritising avoidance and nature-positive actions where possible.

9.2.1 MITIGATION PROVIDED AS PART OF THE MASTER PLAN

The BSEZ includes several actions that will contribute to mitigation of impacts on biodiversity. These can be summarised as follows:

- Layouts of key roads along contours and terraced/graded stands to reduce surface runoff.
- Incorporation of a 'conservation area' near around the eastern 'central valley' of the overall site and smaller 'green areas and corridors' scattered throughout the Project site:
    - It is anticipated that the conservation area will be planted with a variety of indigenous trees (so far *Albiza adianthifolia*, *Entada abyssinica*, *Polyscias fulva*, *Erythrina abyssinica* selected for carbon sequestration), but further details are still to be determined:
    - **Note**: currently part of the 'conservation area' is covered by soil stockpiles, with increasing establishment of alien invasive plant species
    - It is specified that mostly indigenous species will be used for green areas and -corridors, but no details provided.
    - **Note**: This policy does not appear to have been transferred to individual companies establishing on site, as exotic plants have been noted in some of the established gardens. However, it is noted that hey were built/began construction before the establishment of BSEZ Ltd.
- *Planned* waste-water treatment plant, with treated water to be discharged into the natural drainage system downstream of the site.

9.2.2 GENERAL MITIGATION FOR BIODIVERSITY

- To avoid: (a) a lack of overview of biodiversity mitigation implementation; (b) lack of verification of efficiency of mitigation measures; and (c) a potential resultant unchecked aggravation of all potential impacts anticipated and potentially significantly higher costs of rehabilitation:
    - Create a suitable document control system, which will also cater for alerts to be sent on requirements for specific monitoring, training, incident-responses, etc.;
    - Assign a responsible person/entity to manage this documentation and the manner in which documents are to be submitted (templates, key information, etc) named, filed, and stored;
    - Develop regular trend-analyses methods for different types of data / information collected during the course of the Project, and ways to efficiently visualise or map such trends (e.g., using Power BI);

- Ensure all documents are in a readily accessible state to authorities, auditors as well as other stakeholders requiring duly authorised and or motivated access;
- Implementation reports linked to a spatial database must be established;
- Biodiversity information and mitigation requirements will be adequately incorporated in all induction training for all staff and site visitors;
- Ensure biodiversity mitigation measures are incorporated and adequately cross-referenced in all relevant management policies;

Employment/appointment of an **Ecological Clerk of Works (ECoW)**[196] is recommended, who will prepare the environmental documentation on delivery of ecological requirements on the Project before construction activities commence (including tree inventory). The ECoW will monitor construction activities to ensure that all activities are delivered in accordance to relevant laws and Project commitments.

- Detailed plans to be drafted as soon as possible:
  - **Topsoil handling, storage and re-use plan**

    Include considerations to avoid using topsoil from areas colonized by alien invasive species or alien species infested soils for final landscaping, as this will encourage the propagation and spread of invasive flora. Only consider the use of such soils, if they will be deeply buried or sealed to ensure regenerative material contained in such soils are destroyed.
  - **Alien plant control and management plan**

    The implementation of the alien plant control plan must be regarded as priority, even prior to the start of additional clearance and construction.

    Continued implementation of this plan will be done across the entire Project site during the operational phase, and responsibilities carried over to individual owners or -operators or industrial stands.

    This plan needs to contain a species identification guide (including species that could be introduced from surrounding areas or transport routes), recommended control measures per species (or species group with similar growth characteristics), a list of permissible herbicides to control large-scale infestations (such as *Lantana camara*) as well as a monitoring and follow-up procedure.
  - **Conservation area development, management and monitoring plan** as part of an overall biodiversity management plan, to achieve a functional habitat resembling natural patchiness (e.g. riparian forest or woodland) and providing value to biodiversity, rather than a (rowed) tree plantation.

    Where possible, indigenous trees such as Ficus species, Lannea fulva, Euphorbia candelabra and Erythrina abyssinica still present within undeveloped sections of the Project area are recommended to be mapped and retained where or as long as feasible.

[196] Or an equal specialist.

Similar, specimens of Aloe species and indigenous geophytes are recommended to be retained in an on-site nursery until they can be re-used in the conservation or green corridor areas.

Hedges consisting of a mixture of indigenous species provide significant habitat value for small fauna and are recommended to be incorporated into green corridor edges where feasible.

Objectives of this plan will go beyond carbon capture and look at contributing to regional enhancement of habitat of value to indigenous biodiversity and also consider the importance of reducing impacts on downstream wetland habitats.

The above will also include a clear biodiversity monitoring protocol and be revised at least every 5 years to allow for adaptive management where required.

Revegetation plan of disturbed and landscaped areas, initiating soil stabilisation with a dense low grass layer to suppress alien invasive plant establishment and reduce soil erosion until full revegetation measures can be implemented

- Design/engineering considerations to benefit biodiversity and ecosystem functionality:
    - Reduce the amount of sealed surfaces (and runoff volumes) by considering partially permeable surfaces for parking areas and green corridors.
    - Incorporate structures within the stormwater drainage system that can significantly reduce the speed of stormwater during high rainfall events (without creating a flooding risk).
    - Lighting required at night to be installed as low as possible with a shield above (downlighting), and where possible being motion activated for temporary higher illumination levels when and where needed.
- Waste generated will be managed under site-specific Waste Management Plan. Construction waste generated due to Project activities will first be stored at designated storage areas and then disposed. Solid waste will not be allowed to be left at natural habitats, neither will this be buried or burned onsite.
    - Areas where spillage of soil contaminants occurs, must be excavated (to the depth of contamination) and suitably rehabilitated. If any other minor spillage occurs the spillage must be cleaned as soon as possible, but within the same shift and the contaminated area must be reinstated. All contaminated material will be suitably (bio) treated and cleaned or disposed of.
    - Parking and operational areas must be regularly inspected for oil spills and covered with an impermeable or absorbent layer or grease pans (with the necessary storm water control) if oil and fuel spillages are highly likely to occur.
- The washing of Project vehicles in any surface water bodies in and around the Project Roads must be prohibited. All Project vehicles must be washed at designated wash bays on site. These wash bays need to be fitted with oil/grease and sediment traps for grey water.

- No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas

9.2.3 CONSTRUCTION PHASE-SPECIFIC BIODIVERSITY MITIGATION

- Create a site clearance procedure that will include the following:
    - Clearly specify what will be done with cleared biomass, preferentially using it as optimally as possible, e.g., reducing leaves and branches to mulch, using smaller branches as brush-packing to control erosion or protect re-vegetation areas, using logs as erosion control berms, brush-fences to prevent fauna (including livestock) access, etc. Note that the burning of biomass may be prohibited.
    - All cuttings/cleared biomass will be raked off and removed from site on the same day they are generated, to avoid creating refugia for wildlife on active construction sites.
    - All daily clearing activities will be preceded by a rapid site-walk-over to detect and flush out any fauna in an appropriate manner without creating harm or undue stress to such fauna:
    - Active breeding (nest or burrows), if present, will be marked, monitored and clearance within that location should only resume once all young offspring have independently left such site.
    - All open excavations/active construction sites will be suitably barricaded to prevent access to fauna that could become entrapped. Excavations will be inspected daily and pre-continuation of work to ensure no fauna is trapped within.
    - A faunal handling procedure will be drafted that will specify how which fauna needs to be handled if encountered, ensuring minimal distress and no injury:
    - Ensure enough staff is adequately trained to handle fauna.
    - Include clear measures to be taken and agencies/professionals to be engaged in the case that injured fauna is encountered and/or larger fauna may have to be relocated.
    - Include measures to minimise the spread of alien plant species as well as avoid accelerated erosion.
    - Limit the movement of vehicles and heavy machinery to the area currently being worked on and implement the rehabilitation plan as soon as possible.
- Project construction sites, access roads, borrow pits and storage areas will be separated from other areas with appropriate signboards, signs, and fences. Similarly, areas of medium to high sensitivity (i.e., the wetland on Phase 2) will be clearly delineated and any activities (except clearing of alien plants) in that area will be avoided.
- Activities such as hunting, trapping, and disturbance (other than legitimate flushing) of wild animals will be prohibited. Informative and warning signs will be placed at

construction sites. BSEZ LTD staff who are responsible for monitoring sub-contractor staff in this regard will be instructed on prohibitions regarding hunting and poaching control.

- Maintain vehicles and equipment in good working condition. Use noise minimizing technology where possible.
- Maintain speed limits to reduce disturbance and risks related to wildlife.
- Limit construction activities to daytime hours to limit impacts to nocturnal species. Where works need to take place at night, use low intensity lighting (within safe and legal limits) and/or aim lights down and away from nearby habitats. Use non-UV sources of lighting to avoid attracting wildlife.

9.2.4 OPERATION PHASE

- Update the relevant plans as described under Section 9.2.2 to ensure a smooth transition of and continued implementation of such plans for the operational phase, with emphasis on, conservation/biodiversity management plan and the alien plant control plan later to be expanded to fauna if required).
- Reduce the speed limit within the BSEZ, especially near forest patches and wetlands, particularly at blind rises or corners to reduce the risk of collisions with fauna.
- Fence off the section of road in the vicinity of the wetland to direct fauna away from the BSEZ and access roads.
- Proper sustainable urban drainage design to be implemented to reduce direct discharge to watercourses (e.g., storm water to drain through vegetated swales, bunds or detention ponds).
- Limit (within legal and safety limits) the intensity of lighting in the vicinity of the wetland on Phase 2 and remaining forest patches to minimise light disturbance to nocturnal fauna, such as small mammals and bats.
- Workers, visitors and residents will strictly be forbidden from hunting and poaching, and any other kind of illegal activities related to wildlife and indigenous flora.
- Overall mitigation specified for air-quality, water management and noise will also cater for biodiversity.

9.2.5 SUMMARY OF BIOLOGICAL RESIDUAL IMPACTS

The Table 9-6 below builds upon the impacts originally characterised in Section 8.3. As evident from the table, implementation of mitigation measures as listed above are anticipated to reduce the significance of impacts from the previously "**Major to Moderate**" and "**Moderate**" significance to acceptable levels of "**Minor**" or "**Minor** (Negligible)" where possible.

TABLE 9-6 BIODIVERSITY RESIDUAL IMPACT ASSESSMENT

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Development & construction phase	Vegetation clearing, landscaping, uncontrolled establishment of alien invasive species	Flora and terrestrial habitats	Direct	As per Section 9.2.2 and 9.2.3	Medium	small	Major to Moderate	Moderate
	Loss, disturbance, and displacement of Fauna	Fauna	Direct	As per Section 7.2.2 and 7.2.3	Medium	Low	Moderate	Minor (Negligible)
	Soil disturbance, accelerated erosion, contamination	Degradation of downstream wetland and aquatic habitats	Direct and indirect	As per Section 7.2.2 and 7.2.3	Medium	Low	Major to Moderate	Minor
Operation phase	Inappropriate landscaping/ planting,	Flora and terrestrial habitats	Direct	• As per Section 7.2.2 and 9.2.4 • Conduct a full biodiversity assessment every 5 years and	Medium	Low	Major to Moderate	Minor

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	uncontrolled establishment of alien invasive species			update the Biodiversity management (and monitoring) plan accordingly				
	Site operation and maintenance	Fauna	Direct and indirect	• As per Section 7.2.2 and 7.2.4 • Conduct a full biodiversity assessment every 5 years and update the Biodiversity management (and monitoring) plan accordingly	Medium	Low	Moderate	Minor (Negligible)
	Site operation and maintenance Large rainfall events	Wetlands and downstream aquatic habitats	Direct and indirect	• As per Section 7.2.2 and 7.2.4 • Create and maintain a bi-annual wetland/aquatic monitoring program with emphasis on wetlands downstream of the Project site • Conduct a full biodiversity assessment every 5 years and update the Biodiversity management (and monitoring) plan accordingly	Medium	Low	Major to Moderate	Minor

Project phase	Activity/ Source of impact	Environmen-tal component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Closure and Decommissioning	Loss of vegetation during closure and decommissioning. Mitigation measures are similar to the construction phase for biodiversity loss.							

9.3 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

The impacts related to the Project area are inherent to the Project itself and its location and cannot be fully avoided. These impacts must be therefore managed using the mitigation hierarchy prioritising avoidance and nature-positive actions where possible.

9.3.1 ECONOMY AND EMPLOYMENT

9.3.1.1 CONSTRUCTION PHASE

The BSEZ Project shall include several actions that will contribute to mitigation of impacts on socio-economic and cultural environment (some of these already being implemented for Phase 1 under construction). These can be summarised as follows:
Temporary Direct and Indirect Employment Opportunities

A **Recruitment and Employment Plan** will be developed by BSEZ LTD, which will define the process to be followed for the recruitment, training, and development of local personnel, concretely:

- BSEZ LTD will work with local authorities and employment organizations to ensure that all positions are advertised in a manner that is accessible to the communities in the AoI;
- BSEZ LTD will ensure that the recruitment process is fair and transparent, public and open to all regardless of ethnicity, religion or gender;
- BSEZ LTD will continue to develop specific measures to facilitate access to employment of women and youth.

A **Stakeholder Engagement Plan (SEP)** will be implemented to outline how BSEZ LTD will ensure regular, open, and transparent communication with all stakeholders, concretely:

- To provide clear information on the number and limited timescales of employment opportunities.
- To ensure information on the employment and the procurement strategies is disclosed at all settlements within the AoI.
- To plan an engagement with stakeholders through early, inclusive dialogue to build a shared understanding of the potential positive and negative impacts of workers' influx, and the associated risks and opportunities.
- Continuing to engage local people in the employment opportunities and work with suppliers to enable capacity building, procurement, employment and contracting opportunities at a settlement-level, as part of maximizing the positive benefits.

A **Community Grievance Management Procedure (GMP)** will be implemented, to promote the integration of the Project into the social and economic environment and to ensure that individuals who wish to Report their potential expectations or concerns related to local economy and employment can communicate directly with BSEZ LTD.

Temporary Economic Impacts from Taxes and Fees, Procurement and Worker Spending

A **Local Content and Procurement Plan** will be developed to inform the Project's in-country value planning, specifically, with respect to the employment potential for

multiple positions and the local provisioning potential through local suppliers from the area, concretely:

- As part of the tendering process, BSEZ Ltd's contractors will be required to develop a procurement strategy that stipulates how national and local procurement of goods will be optimised. The procurement strategy will be required to adhere to all BSEZ Ltd HSE policies and procedures. Agreed measures will be monitored and reported on;
- BSEZ Ltd will enhance national supplier capacity through a comprehensive demand and supply analysis; phased capacity building program; targeted training agreed with local government and other organizations.
- BSEZ Ltd will implement a phased capacity building program (sector by sector) that will enable local companies to achieve qualifications and potentially certification with the relevant standards and requirements well in advance of the tendering process;
- BSEZ Ltd will engage with local government, and other organizations to determine opportunities for targeted training. Any selected potential suppliers will have to meet health, safety, and quality standards;
- BSEZ Ltd will require the contractors develop their own E&S and H&S policies or apply BSEZ Ltd's as relevant. BSEZ Ltd will develop a contractor management plan to pass on E&S requirements to its contractors and monitor their effective implementation.

Long-term benefits of capacity enhancement (on-the-job and formal training opportunities)

The **Local Content and Procurement Plan** will include the following:

- BSEZ Ltd will carry out training of contractors on Project Health and Safety Requirements (aligned with internal BSEZ Ltd HSE Management Plan) and socioeconomic policies prior to the start of construction activities and during operations when needed.
- BSEZ Ltd will require the contractors develop their own E&S and H&S policies or apply BSEZ Ltd's as relevant. BSEZ Ltd will develop a contractor management plan to pass on E&S requirements to its contractors and monitor their effective implementation.
- To maximise capacity enhancement and transfer of knowledge to local contractors and their employees, BSEZ will advertise the required skills/certifications needed. On the job training will be the responsibility of the contractor/state.

9.3.1.2 OPERATION PHASE

The following mitigation measures are proposed for the operation phase:

Temporary Direct and Indirect Employment Opportunities

As operator of the 335.68 ha Bugesera SEZ, BSEZ Ltd will develop a Recruitment and Employment Plan ensuring that the recruitment process is fair and transparent, public, and open to all regardless of ethnicity, religion, or gender.

The **Stakeholder Engagement Plan (SEP)** will continue to be implemented during site operations to outline how BSEZ Ltd will ensure regular, open, and transparent communication with all stakeholders, concretely:

- To provide clear information on the number and limited timescales of employment opportunities.
- To advertise all openings in ways that are accessible to local communities.

The **Community Grievance Management Procedure (GMP)** will continue to be implemented during site operations to ensure that individuals who have concerns or complaints about the Project or wish to Report their potential expectations or concerns related to local economy and employment can communicate directly with the Project.

Furthermore, BSEZ Ltd will use its leverage and encourage the BSEZ tenants to develop and implement their own Recruitment and Employment Plan, SEP and GMP based on the respective documents prepared by BSEZ Ltd for the Project and applicable standards.

Regional economic development and strengthening of local production.

The above-mentioned measures to enhance the "Temporary Direct and Indirect Employment Opportunities" will also serve to maximise positive impacts of Project on the Regional economic development and strengthening of local production.

9.3.2 LIVELIHOOD ACTIVITIES

9.3.2.1 CONSTRUCTION PHASES

Permanent Loss of Livelihoods and/or Household Income due to Permanent loss of access to Land in the Project footprint

As a first step in the process for managing displacement impacts, BSEZ LTD will carry out a detailed Due Diligence of the land acquisition and compensation processes that have been carried out to date as compared to both national regulations and international standards (particularly IFC PS5).

It is noted that a Resettlement Action Plan was undertaken by MINICOM and the land was thereafter transferred to the government. Whereas the ownership of land was transferred from RDB to BSEZ Ltd, it was noted during site visit that members of the local community were still engaged in farming activities at the project site. Therefore, a **Livelihood Restoration Plan (LRP)** in line with IFC PS5 to address the gaps identified is required. The LRP will outline BSEZ LTD's commitment to mitigate adverse socio-economic impacts from land acquisition or restrictions on affected persons' use of or access to land and livelihoods. The LRP will provide the foundation for the livelihood restoration process including an entitlement matrix that will ensure adequate compensation and livelihood restoration options are provided to Project Affected Peoples (PAPs).

However, for the next phase of development (Phase 1A and Phase 2), it is understood that there has been an agreement reached between Arise and the GoR that BSEZ Ltd will monitor grievances lodged by the local communities and resettled households through the formal external grievance mechanism.

Should any grievances be raised regarding the historical resettlement process during this next phase, BSEZ Ltd. will not be responsible for resolution, but ensure that the GoR handles and closes out the grievances in a manner that is aligned with International standards.

Impact on Natural Resources and Related Livelihoods

The **Livelihood Restoration Plan (LRP)** includes key compensation and livelihood restoration measures to restore land-based livelihood sources, specifically agricultural activities. As per the framework agreement, the government is in charge of relocating and compensating current land users. BSEZ Ltd will ensure that the current land users receive fair compensation from the government, and, if needed, will fill the compensation gaps through an LRP (which is currently being developed). BSEZ LTD will ensure that temporary income losses through the clearance of crops are compensated for.

- As per the framework agreement, GoR will compensate for all eligible crops identified and valued in the asset inventory. Compensation payments for crops, trees and other agricultural assets will be awarded according to official government rates, or based on full replacement value, whichever rate is higher and in line with applicable law. It should be noted that it is not BSEZ Ltd responsibility to take care of compensation. However, BSEZ Ltd can step I where there are gaps in procedures.
- The value of perennial crops and economic trees will include compensation for production lost during the time it will take for replacement crops and trees to reach the same maturity / productivity level as the plants being lost.
- The asset inventory will be designed to identify the different crop categories and crop owners, and to ensure that compensation is calculated in accordance with agreed upon rates for compensation of crops and economic trees.

9.3.2.2 OPERATIONS PHASE

Permanent Loss of Livelihoods and/or Household Income due to Permanent loss of access to Land in the Project footprint

Impacts originally triggered during the construction phase will continue to be managed by BSEZ LTD during operations. Mitigation measures will include monitoring, evaluating, and providing the necessary follow-up to support households to restore their livelihoods. The goal is to help affected families achieve a socio-economic situation that is better than the pre-Project conditions.

The GMP established during the construction phase will be maintained during operations to ensure that local communities and stakeholders have an adequate channel to voice concerns.

9.3.3 COMMUNITY HEALTH SAFETY AND SECURITY

9.3.3.1 CONSTRUCTION PHASE

Road Safety

As per BSEZ LTD's HSE management system, the HSEQ Team will establish corporate-and-Project-level management procedures and plans, including a **Traffic Management Plan**.

BSEZ LTD will develop an engagement program with affected communities and land users, as well as appropriate signage/information boards (with consideration for illiteracy levels) will be required to minimise risks associated with increased traffic.

- Drivers of Project vehicles will be trained/briefed about safe driving with respect to other drivers, pedestrians, and livestock;
- Project vehicles to be identifiable to the Project (e.g., an easy to read/see sign or symbol on vehicles which shows that they are connected to the Project); and
- Address how the BSEZ LTD can reduce the exposure of vehicle drivers, their passengers and other road users from the hazards of road-related accidents.

A Project GMP will be developed and implemented, and information about this mechanism will be shared amongst local communities. BSEZ LTD will also be responsible for managing a grievance mechanism that allows communities and employees to raise complaints. This will be a key monitoring and Reporting requirement of the Project. The grievance mechanism will be implemented prior to commencement of the construction phase, with all relevant staff fully cognizant of their roles in the grievance resolution process so that quick and effective response is provided to the concerns raised by local stakeholders.

During operations, BSEZ LTD will maintain the GMP that will be accessible to all communities.

Site intrusion and Injury

As part of the SEP, BSEZ LTD will undertake a program of stakeholder engagement and consultation to educate local communities of the risks of intruding onto sites, the meaning of signs, the dangers of playing on or near equipment or entering fenced areas, as part of an awareness raising programme on community health and safety behaviours.

BSEZ LTD will select a security provider that is well versed in international conventions pertaining to security and human rights. The security contractor will undergo a due diligence process and an induction prior to working on site. They shall primarily be responsible for controlling site access and perimeter security.

Appropriate signage and information boards will be required to minimise risks associated with restricted access in a culturally appropriate manner.

A community meeting regarding Project intrusion will also be held in each of the villages concerned by the Project. Records of the meeting and attendees should be kept within the SEP.

BSEZ LTD or its respective contractor will provide access to health care for those injured by its activities. BSEZ LTD will ensure that signs are put up around work fronts and construction sites advising people of the risks associated with trespassing.

Environmental Health

As per BSEZ LTD's HSE management system, the HSEQ Team will establish corporate-and-Project-level management procedures and plans, including the following:

- Aspects, impacts, hazards, and risks,

- Guidelines for environmental, safety and health monitoring
- Grievance mechanism (external and internal)
- Community Health and Safety Procedure
- Stakeholder Engagement Plan.

As part of the **SEP** implemented by BSEZ LTD, awareness sessions to explain the type of noise, dust and emissions from Project activities, the mitigation measures implemented and a point person to contact in case of emergency etc. to alleviate potential concerns.

In addition, the Project will need to engage with the neighbouring communities to ensure they are not disturbed by air quality, water quality or noise impacts. In case air quality levels differ from time to time, depending on the activities, the Project will need to inform communities in advance.

The mitigation measures identified under the sections on noise, air quality, resource and waste management, and hydrology and hydrogeology will minimise the potential negative impacts on human receptors and are thus not repeated here. Please refer to the relevant sections under Chapter 9 of this Report.

Increased Transmission of Communicable Diseases

As part of BSEZ LTD's HSE management system and its **Occupational Health and Safety Management Plan (OHSMP)**, BSEZ LTD will ensure the following actions:

- Workforce, including contractors and subcontractors, will be provided with health awareness training, including a significant briefing of hygiene practices (such as hand washing), implementation of educational outreach to increase awareness of major communicable disease and how to protect against infection and about transmission routes and the symptoms of the communicable diseases of concerns (including STDs and SARS CoV-2).
- Workers will also have access to an on-site medical team for first aid, occupational health concerns and advice.

As part of its **Emergency Preparedness and Response Plan (EPRP)**, BSEZ LTD will establish preparedness medical services in case of severe illness, e.g., malaria (especially in workers without semi-immunity).

Increased Transmission of Sexually Transmitted Diseases (STD)

As part of the **OHSMP** to be developed by BSEZ LTD, the following measures will be included:

- BSEZ LTD will provide training on the worker code of conduct to all employees including contractors and subcontractors as part of the induction process.
- BSEZ LTD will consult with local leaders such as village elders among others. The consultations should be aimed at finding ways of ensuring social vices such as prostitution are minimised either through punitive measures for clients, in particular Project workers, or rehabilitative measures for the Commercial Sex Workers (CSWs).

Increased Pressure on Health Care

A **Community Health and Safety Management Plan (CHSMP)** will be developed by BSEZ LTD, including the following health issues:

- BSEZ LTD will undertake a health facility assessment of medical infrastructure as part of the BSEZ LTD Health and Safety Management System to determine if facilities have sufficient resources and equipment to deal with emergencies. Agreements will be entered into with suitable hospitals to provide health care in emergency situations. These agreements will include provision of additional equipment or training for staff if required by BSEZ LTD. Project-dedicated international medical providers will complement the services of the local medical facilities that could be utilised by the Project and/or training of local medical personnel.
- BSEZ LTD will monitor the emergence of major pandemics through World Health Organization (WHO) alerts. When the WHO Pandemic Alert Scale Reaches Level 4, BSEZ LTD will implement the relevant **Emergency Preparedness and Response Plans**.
- An **EPRP** will be developed by BSEZ LTD, covering the emergency situations (involving vehicles and pedestrians) that may occur during the Project construction, should be prepared, and implemented by trained personnel to avoid significant risks. The EPRP to include:
    - The emergency response in the event of fire, accidents, earthquake, flood etc.
    - Procedure for staff and subcontractors to report any incidents and the investigation and preventive actions taken;
    - Regular emergency response training including in the use of response equipment;
    - Emergency Communication Procedure (under the SEP and the EPRP) including with local communities and authorities.
    - A first aid centre and fire station will be built as part of the Project. BSEZ LTD should clarify and communicate if these facilities can also be used by the population of the local villages.

Use of Security Personnel

BSEZ LTD will select a security provider that is well versed in international conventions pertaining to security and human rights. The security contractor will undergo a due diligence process and an induction prior to working on site. They shall primarily be responsible for controlling site access and perimeter security. As a general rule, BSEZ LTD does not permit private security providers to handle firearms.

A **Security Management Plan** will be implemented by BSEZ LTD, including the following measures:

- A Security Management training will be provided to security personnel. Security Arrangements will be based on the Voluntary Principles for Security and Human Rights, which are international best practice. This involves e.g., the selection based on a careful background screening of security forces, their training with regard to Human Rights and a careful monitoring of their services. BSEZ LTD will make security

arrangement transparent to the local communities and consult regularly with them about the impact of arrangements on communities;

- Violation of the required standards will result in corrective actions, including termination of sub-contracts with security firms. Sufficient training including clear instructions on the objectives and the permissible actions will be provided to the security personnel. The instructions will be based on the relevant Rwandan law and will be communicated as terms of employment and reinforced through periodic professional training. Given regular contact with the local communities, training on Grievance Mechanism, such as handling of community grievance will also be provided to the security staff as part of their periodic professional training.
- Complaints by the public (or other workers) with respect to behaviour of Security Personnel can be made via the **GMP**.
- As part of the **SEP**, BSEZ LTD and contractors will have an engagement meeting with chiefs and traditional leaders informing about the safety management plan and the procedures adopted. BSEZ LTD and contractors will consider and incorporate feedback and concerns of chiefs and traditional leaders into the safety management plan.
- BSEZ LTD will engage with public security services on a regular basis to assess security risks, monitor, and evaluate security and human rights arrangements.
- BSEZ LTD will only call Rwandan police and/or military services in a situation involving a level of threat the security provider is not able to deal with (such as armed intruders);
- BSEZ LTD will assess the risks associated with public security providers' involvement and take appropriate actions to mitigate those risks, following these considerations:
    - The likely scenarios where they may be involved.
    - Their locations/postings.
    - Their reputation and capabilities.
    - Their relationship/ reputation with the local community.
    - The risks of the Project being associated with inappropriate behaviour by the public security providers.

9.3.3.2 OPERATIONS PHASE

Environmental Health

During operations, BSEZ LTD will maintain all provisions of the existing HSE management system and will develop a **CHSMP**. In addition, as part of **SEP** implemented by BSEZ LTD, awareness sessions are foreseen to explain the type of noise, dust and emissions and water-related impacts from Project activities, the mitigation measures implemented and a point person to contact in case of emergency etc. in order to alleviate potential concerns.

In addition, BSEZ LTD will maintain the **GMP** that will be accessible to all communities and will be implemented to ensure that individuals who have concerns or complaints about the Project or wish to Report their potential expectations or concerns related to local community Health and Safety concerns can communicate directly with the Project.

The mitigation measures identified under the sections on noise, air quality, resource and waste management, and hydrology and hydrogeology will minimise the potential negative impacts on human receptors and are thus not repeated here. Please refer to the relevant sections in Chapter 8 of this Report.

Increased Transmission of Communicable Diseases

During operations, BSEZ LTD will maintain all provisions of the existing HSE management system and its **OHSMP**, **CHSMP** and **EPRP** in line with Rwandan regulations which are specified in the construction phase section above. BSEZ LTD will ensure that all industrial units, as well as other contractors and subcontractors, are aligned with environmental, health and safety, and social and governance practices of the national and international standards.

Furthermore, BSEZ LTD will use its leverage and encourage the Bugesera SEZ tenants to develop and implement their own plans (e.g., OHSMP, CHSMP, EPRP etc.) based on the respective documents prepared by BSEZ LTD for the Project and applicable standards.

BSEZ LTD will maintain a GMP that will be accessible to all communities, to ensure that all health and safety concerns are addressed.

Increased Transmission of Sexually Transmitted Diseases (STD)

During operations, BSEZ LTD will maintain all provisions of the existing HSE management system and its **OHSMP**, **CHSMP** and **EPRP** in line with Rwandan regulations which are specified in the construction phase section above. BSEZ LTD is responsible for setting up the basic infrastructure and operating their offices and facilities. Each tenant is responsible for their own permits and compliance with E&S standards. BSEZ LTD will encourage that all industrial units, as well as other contractors and subcontractors are aligned with environmental, health and safety, and social and governance practices of the national standards.

BSEZ LTD will maintain a **GMP** that will be accessible to all communities, to ensure that all health and safety concerns of the communities regarding STDs are addressed.

9.3.4 LABOUR AND WORKING CONDITIONS

Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working or living conditions. These issues should be considered not only for those who are directly employed by BSEZ LTD, but also its contractors (including sub-contractors) and within the supply chain.

9.3.4.1 CONSTRUCTION PHASE

The following mitigation measures should be implemented during the construction phase to reduce any impacts on workers' health and safety and labour rights.

Labour and Working Conditions / Workers' Rights

As per BSEZ LTD's HSE management system, BSEZ LTD will develop a **Human Resources Policy** to ensure the following:

- Access to clear and understandable information regarding workers' labour and working conditions;
- Provision of reasonable working conditions and terms of employment;
- Provision of employment, compensation/remuneration and working conditions, including working hours, based on equal opportunity and fair treatment, avoiding discrimination on any aspects;
- Implementation of a grievance mechanism for the Project workers including subcontractor workforce;
- Adoption of open attitude towards freedom of association and in conformance with Rwanda laws.
- Retrenchment preventive measures will be implemented to reduce adverse impacts as a result of termination of contracts which will consider benefits to boost worker's employment opportunities post construction where possible. Notice of dismissals will be done in due time and will manage employment expectations of the construction workforce.

In addition, a **Labour Management Procedure** will be developed by BSEZ LTD considering the following elements:

- No employee or job applicant will be discriminated against on the basis of his or her gender, marital status, nationality, age, religion or sexual orientation;
- All workers will, as part of their induction, receive training on worker rights in line with Rwandan legislation to ensure that positive benefits around understanding labour rights are enhanced;
- All workers (including those of contractors and subcontractors) will be able to join unions of their choice and have the right to collective bargaining;
- All workers (including those of contractors and subcontractors) will have contracts which clearly state the terms and conditions of their employment and their legal rights;
- Contracts will be verbally explained to all workers where this is necessary to ensure that workers understand their rights;
- As part of the contractor and supplier selection process BSEZ LTD will take into consideration performance with regard to worker management, worker rights, health and safety as outlined in Rwandan law, international standards and BSEZ LTD (ARISE IIP) policies;
- BSEZ LTD will provide support to contractors and subcontractors to ensure that labour and working conditions are in line with Rwanda law and any standard applicable to BSEZ LTD through gap analysis and capacity building;
- Contractor contracts will establish the right for BSEZ LTD monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, BSEZ LTD's policies or clauses in the contract. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers;
- BSEZ LTD and contractors' will implement a program of socio-economic compliance monitoring to inform internal auditing and monitoring process in the framework of the ESMMP. As such, key performance indicators (KPIs) will be developed around

worker rights, discrimination and management, workforce grievance mechanism and monitoring of outcomes. As part of the contractor and supplier selection process, BSEZ LTD will take into consideration performance with regard to worker management, worker rights, health and safety as outlined in Rwanda law and ILO international standards;

- As part of the contractor and supplier selection process, BSEZ LTD will take into consideration performance with regard to worker management and rights as outlined in Rwanda law and international standards;
- BSEZ LTD and its contractors (and subcontractors) will oversee whether suppliers comply with all applicable child labour laws and only employ workers who meet the applicable minimum legal age requirement in accordance with international standards.
- BSEZ LTD will put in place a **GMP** that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed including contractor workers.

As part of stakeholder monitoring, BSEZ LTD will review and monitor the outcomes of community engagement, media coverage and its workforce and GMP for additional indications of labour-related issues that may arise.

The Project ESMS and applicable standards will be put as contractual commitments in all contracts of contractors and subcontractors.

Workers Health and Safety

BSEZ LTD will develop an **OHSMP** as part of BSEZ LTD's Health and Safety Management System for the Project. This management system will be enforced throughout the Project including all Project personnel (including direct hire employees, advisors and consultants, contractors and sub-contractor personnel). It will include aspects such as regular training and monitoring, as well as inspections and audits.

Within the **OHSMP**, the following measures will be included:

- Identification and provision of personal protective equipment (PPE) to all concerned workers during activities to avoid health implications (e.g., dust masks, protective clothing for handling waste materials etc.);
- Pre-employment screening protocols for all employees, including contractors and subcontractors, which will include medical checks of SARS CoV 2 history and symptoms, Tuberculosis (TB) and other diseases appropriate to WHO recommendations, the individual's country of origin and vaccinations.
- Workers will be provided with primary health care and basic first aid at worksites;
- All work of persons under the age of 18 will be subject to an appropriate risk assessment and regular monitoring of health, working conditions, and hours of work.
- Regular medical check-ups and centralised medical treatment for all workers of the Project (BSEZ LTD, contractors and subcontractors) will be provided;
- Workforce, including contractors and subcontractors, will be provided with health awareness training, including hazardous works, a significant briefing of hygiene practices (such as hand washing), implementation of educational outreach to increase awareness of major communicable diseases and how to protect against infection and about transmission routes and the symptoms of the communicable diseases of concerns (including STDs and SARS CoV-2);

- Contractor contracts will specify monitoring to be undertaken by the contractor, establish the right for the Project monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, policies or clauses in the contract. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers;
- As part of the contractor and supplier selection process, BSEZ LTD will take into consideration performance with regard to worker health and safety as outlined in Rwandan law, international standards and BSEZ LTD policies;
- Any appointed contractors should establish their own Emergency Response Plan and communicate key information to the Project workforce prior to work commencing on any site.

Women's Rights (GBVH, approach to recruitment, promotion, and treatment with respect to equal opportunity)

In the event that BSEZ LTD engages a third-party recruiting firm to support in the hiring of the Project workforce, the **Recruitment and Employment Plan** to be developed by BSEZ LTD has to address the aspects and risks associated with their involvement, and workforce providers have to abide to its rules.

BSEZ LTD will develop and implement a **Human Resources Policy** aligned with relevant international standards with respect to recruitment, promotion, and access to remedy.

BSEZ LTD will ensure that the recruitment process is fair and transparent, public, and open to all without discrimination, paying heightened attention to ethnic minorities and vulnerable groups. This should include a gender quota to ensure women are represented in the pool of candidates or workers, the use of inclusive vocabulary in job descriptions, as well as collaboration with local unemployment agencies.

The **Labour Management Procedure** will include mitigation measures in relation to Gender-Based Violence and Harassment (GBVH). The strategy will include *inter alia* the following points:

- In consultation with workers and their representatives, a workplace policy on violence and harassment will be adopted and implemented;
- Violence and harassment and associated psychosocial risks in the management of occupational health and safety will be taken into account;
- Hazards will be identified and the risks of violence and harassment will be assessed, with the participation of workers and their representatives, and to prevent and control them measures, such as ensuring access to clean, safe, secure and separate toilet and welfare facilities at work, will be taken. Lack of access can create or exacerbate health problems for workers as well as put them at risk of violence, including sexual violence;
- Workers and other persons will be provided concerned information and training, in accessible formats as appropriate, on the identified hazards and risks of violence and harassment and the associated prevention and protection measures, including on the rights and responsibilities of workers; and
- Effective means of inspection and investigation of cases of violence and harassment will be ensured, including through labour inspectorates or monitoring.

Specific provisions will be implemented in the **GMP** to manage grievances related to GBVH (e.g., the complainant will be able to communicate the grievance to a person of its preferred gender, for example, if a woman prefers to explain the grievance to another woman, that will be possible).

Child Labour and Forced Labour in the Supply Chain

The **Contractor Management Plan** and **Labour Management Plan** that will be developed by BSEZ LTD will provide for measures to avoid child and forced labour among contractors and in the supply chain and will consider the following elements:

- BSEZ LTD will oversee if suppliers, contractors and subcontractors comply with all applicable child labour laws and only employ workers who meet the applicable minimum legal age requirement in accordance with international standards;
- Contractor contracts will specify monitoring to be undertaken by the contractor, establish the right for the Project monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, policies or clauses in the contract regarding forced and/or child labour. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers;
- In all contractor contracts the Project will make explicit reference to the need to abide by Rwanda law and international standards in relation to child labour and forced labour; and
- Contractors and subcontractors will need to monitor closely the potential existence of irregular forms of child and forced labour in the supply chain. Action measures and notice to BSEZ LTD will be carried out immediately if this is found.

9.3.4.2 OPERATIONS PHASE

Labour and Working Conditions / Workers' Rights

During the operations phase, BSEZ LTD will maintain all provisions of the existing **Labour Management Procedure** in line with Rwandan regulations. BSEZ LTD will maintain a **GMP** that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed. Contractors and sub-contractors will be required to put in place a worker grievance mechanism. The BSEZ LTD worker grievance mechanism shall be open to the contractor and subcontractor workforce in the event that their grievance is not adequately resolved by their direct employer. BSEZ LTD will then have the authority to act to resolve this grievance.

Workers' Health and Safety

Operations phase will be led by BSEZ LTD, following its internal management frameworks. BSEZ LTD will maintain the specific **OHSMP**. In addition, BSEZ LTD will maintain the grievance mechanism that will ensure the delivery of grievances and community concerns.

Child Labour and Forced Labour in the Supply Chain

BSEZ LTD will maintain the **Contractor Management Plan** and **Labour Management Plan** for the operations phase with the provision for measures to avoid child and forced labour among contractors and in the supply chain.

9.3.5 ACCESS TO INFRASTRUCTURE AND SERVICES

9.3.5.1 CONSTRUCTION PHASE

Disruption to infrastructure and utilities during construction

The following mitigation measures will be implemented:

- Where infrastructure supply is suffering disruption episodes, BSEZ LTD will find local solutions to be put in place.
- BSEZ LTD will liaise and engage with local authorities and utilities companies to minimize disruptions due to construction activities. Only short term "planned" disruption to drinking water or electricity services will be allowed.
- BSEZ LTD will work with local utilities companies to ensure coordinated and rapid response to unplanned events such as damage to electric lines and water pipes where such damages are caused by its construction activities.
- BSEZ staff will be present at work fronts to ensure that impacts from planned disruptions are minimised and that unplanned disruptions are properly managed.
- **GMP** will be in place ensuring rapid response time and access to a compensation process should unplanned disruption due to construction activities result in loss of livelihoods that could not otherwise be avoided.

9.3.5.2 OPERATIONS PHASE

Benefits from improvements to infrastructure and services (maximization measure)

The following maximization and enhancement measures will be taken into account to maximise the positive outcomes that will stem from the improvement of the infrastructure and service's quality:

- The Project will promote and carry out programs and initiatives to promote employment and social benefits to neighbouring communities, especially to the villages in the AoI.
- As part of the **Stakeholder Engagement Plan** maintained by BSEZ LTD, awareness sessions will be held with local villages to explain the benefits from Project development and the mitigation measures implemented, and a point person will be designated to contact in case of emergency etc. in order to alleviate potential concerns.

BSEZ LTD will ensure through its **GMP** that all concerns or problems of the villages regarding the infrastructure operation are being managed and acknowledged.

9.3.6 COMMUNITY COHESION

9.3.6.1 CONSTRUCTION PHASE

Unmet Expectations of Benefits

Communities will be engaged in the preparation of the **Social Investment and Development Programme** activities to be taken forward in the vicinity of their communities. The village leaders will then be kept informed on the progress of such activities and opportunities for their involvement will be maximised.

BSEZ LTD will release leaflets with information emphasizing the limited nature of employment and the recruitment processes and the progress of the Social Investment and Development Programme.

9.3.6.2 OPERATIONS PHASE

Disturbance from Presence of Workforce

The **SEP** developed by BSEZ LTD will consider the following:

- Communication will be based on the principle of transparency and clarity, clearly explaining the selection process and criteria.
- Ongoing dialogue between the Project, through its ESG Manager and local communities to assist in information sharing with regard to employment practices and the use of non-local staff. Local communities to be provided information on the number of non-locals to be brought to the area, their housing arrangements, and the measures that the Project is putting in place to ensure that all workers abide by local customary practices. Information will also be shared on the number of local unskilled and semi-skilled positions available to local residents, along with the recruitment methods used to identify potential candidates.
- Relevant Project information in particular those related to environmental and socioeconomic impacts, employment and project benefits will be disclosed at the local level in a manner that is accessible, understandable and culturally appropriate for those affected. This will be facilitated by the ESG Manager. The ESG Manager will proactively and regularly engage with local stakeholders prior to commencement of construction activities and during the operation phase, providing updates and answering their queries. The ESG Manager will be present on the ground during the whole construction process and available to the affected communities. The aim of this is to ensure that all working practices are transparent and any issues between local residents and non-local workers are communicated and dealt with early on.

A **Social Investment and Development Programme** will be developed by the Project in consultation with local communities, with active engagement required to determine the location and nature of investments. All stakeholders will be kept informed on the progress of investment activities and opportunities.

Information about the **GMP** will be shared amongst local communities. The contractors will also be responsible for managing a grievance mechanism that allows communities and employees to raise complaints.

9.3.7 SUMMARY OF SOCIO-ECONOMIC MITIGATION MEASURES AND ASSESSMENT OF RESIDUAL IMPACT

This section presents a summary of the assessment of the effects of the above-described mitigation measures for each of the defined socio-economic impact topics/sub-topics, per the assessment methodology given in section 8.1 above. The mitigations and residual impact significance are summarised in the table below. Essentially this table builds upon the impacts shown in Table 8-24.

As can be seen in the table below, the mitigation measures are expected to be successful in reducing each of the negative impacts down to acceptable levels.

TABLE 9-7 SOCIO-ECONOMIC MITIGATION MEASURES AND RESIDUAL IMPACT ASSESSMENT

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Development & construction phase	Temporary Direct and Indirect Employment Opportunities	Economy and Employment	Both	• Development of a Recruitment and Employment Plan • Development of a Stakeholder Engagement Plan • Establishment of a Community Grievance Mechanism Procedure	Large	Large	**Positive**	**Positive**
	Taxes and fees, procurement, and worker spending	Economy and Employment	Both	• Development of a Local Content and Procurement Plan	Large	Large	**Positive**	**Positive**
	Capacity Enhancement	Economy and Employment	Both	• Development of a Local Content and Procurement Plan	Large	Large	**Positive**	**Positive**
	Permanent Loss of Livelihoods and/or Household Income due to Permanent loss of access to	Land Use and Livelihoods	Direct	• Due Diligence Process of the land acquisition and compensation process and	Large	Medium	**Major**	**Moderate**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Land in the Project footprint			livelihood restoration process • Livelihood Restoration Plan • Establishment of a Community Grievance Mechanism Procedure				
	Impact on Natural Resources and Related Livelihoods due to the loss of access to natural resources provisions and uses as water streams or collection of NTFPs[197]	Land Use and Livelihoods	Direct	• Due Diligence Process of the land acquisition and compensation process and livelihood restoration process • Livelihood Restoration Plan • Establishment of a Community Grievance Mechanism Procedure	Large	Medium	**Moderate**	**Minor**

[197] Non-timber forest products

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Road Safety	Community Health, Safety and Security	Direct	• Development of a Traffic Management Plan • Development of a Stakeholder Engagement program to minimise risks associated with increased traffic. • Establishment of a Community Grievance Mechanism Procedure • Drivers of Project vehicles will be trained/briefed about safe driving	Medium	Small	**Moderate**	**Minor**
	Site Trespass and Injury	Community Health, Safety and Security	Direct	• Stakeholder engagement program through awareness on community health and safety behaviour	Small	Small	**Minor**	**Minor (Negligible)**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
				• Signage and information boards will be required to minimise risks associated with restricted access. • Selection and due diligence process of the security workforce.				
	Environmental Health	Community Health, Safety and Security	Direct	• HSE management system • Community Grievance Mechanism Procedure • Stakeholder Engagement Plan • Mitigations proposed in other related sections (air quality, noise, resources and waste, and hydrology and hydrogeology).	Large	Low	**Moderate**	**Minor**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Transmission of Communicable Diseases	Community Health, Safety and Security	Both	• HSE management system • Community Health and Safety Management Plan • Occupational Health and Safety Management Plan • Emergency Preparedness and Response Plan	Small	Small	**Minor**	**Minor (Negligible)**
	Pressure on Healthcare	Community Health, Safety and Security	Both	• HSE management system • Community Health and Safety Management Plan • Occupational Health and Safety Management Plan • Emergency Preparedness and Response Plan	Small	Small	**Minor**	**Minor (Negligible)**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Use of Security Personnel	Community Health, Safety and Security	Direct	• Security Management Plan • Selection and due diligence process of the security workforce.	Small	Small	**Minor**	**Minor (Negligible)**
	Worker's Rights and Labour and Working Conditions	Labour and Working Conditions	Direct	• Human Resources Policies • Labour Management Procedure • Grievance Mechanism • Ensuring compliance with Rwandan and International requirements in contractor and supplier selection process considering worker management and rights	Medium	Small	**Moderate**	**Minor**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Workers' Health and Safety	Labour and Working Conditions	Direct	• Occupational Health and Safety (OHS) Plan • Human Resources Policies • Labour Management Procedure • Grievance Mechanism • Ensuring compliance with Rwandan and International requirements in contractor and supplier selection process considering worker management and rights	Medium	Small	**Moderate**	**Minor**
	Child Labour and Forced Labour	Labour and Working Conditions	Both	• Contractor Management Plan	Small	Small	**Minor**	**Minor (Negligible)**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
				• Labour Management Procedure • Grievance Mechanism • Ensuring compliance with Rwandan and International requirements in contractor and supplier selection process considering worker management and rights				
	Women's Rights (GBVH, approach to recruitment, promotion, and treatment with respect to equal opportunity)	Labour and Working Conditions	Both	• Recruitment and Employment Plan to address the aspects and risks associated with the provision of workforce-by-workforce providers. • Human Resources Policy aligned with relevant	Medium	Small	**Moderate**	**Minor (Negligible)**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
				international standards with respect to recruitment, promotion, and access to remedy. • BSEZ LTD should ensure that the recruitment process is fair and transparent, public, and open to all without discrimination, paying heightened attention to ethnic minorities and vulnerable groups. • Workforce Code of Conduct will include commitments for the prevention of sexual exploitation and abuse and sexual harassment at workplace and will be signed by all Project contractors. • BSEZ Ltd. will develop a package				

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
				of trainings for construction workforce on respecting local communities and vulnerable people, with a special focus on gender, Human rights and GBVH risks awareness. • BSEZ LTD will encourage the submission of grievances/ complaints related to GBVH.				
	Disruption to infrastructure and utilities	Access to infrastructures and services	Direct	• Find local solutions if infrastructure suffers disruption. • Liaise and engage with local authorities and utilities companies. • Intervention from CLOs • Grievance Mechanism	Small	Small	**Minor**	**Minor (Negligible)**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Unmet Expectations of Benefits	Community Cohesion	Both	• Development of a Social Investment and Development Programme • Releasing information about employment and recruitment processes and the Social Investment and Development Programme	Medium	Small	**Moderate**	**Minor**
Operation phase	Temporary Direct and Indirect Employment Opportunities	Economy and Employment	Both	• Development of a Recruitment and Employment Plan • Development of a Stakeholder Engagement Plan • Establishment of a Community Grievance Mechanism Procedure	Large	Large	**Positive**	**Positive**
	Regional and National economic development	Economy and Employment	Both	• Development of a Recruitment and Employment Plan	Large	Large	**Positive**	**Positive**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
				• Development of a Stakeholder Engagement Plan • Establishment of a Community Grievance Mechanism Procedure				
	Permanent Loss of Livelihoods and/or Household Income due to Permanent loss of access to Land in the Project footprint	Land Use and Livelihoods	Direct	• Due Diligence Process of the land acquisition and compensation process and livelihood restoration process • Livelihood Restoration Plan • Establishment of a Community Grievance Mechanism Procedure	Large	Medium	**Major**	**Moderate**
	Impact on Natural Resources and Related Livelihoods due to	Land Use and Livelihoods	Direct	• Due Diligence Process of the land acquisition and compensation process and	Large	Medium	**Moderate**	**Minor**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	the loss of access to natural resources provisions and uses as water streams or collection of NTFPs[198]			livelihood restoration process • Livelihood Restoration Plan • Establishment of a Community Grievance Mechanism Procedure				
	Environmental Health	Community Health, Safety and Security	Both	• Community Health, Safety and Security Management Plan • Stakeholder Engagement Plan • Grievance Mechanism • Mitigations proposed in other related sections (air quality, noise, resources and waste, and hydrology and hydrogeology).	Medium	Small	**Moderate**	**Minor**

[198] Non-timber forest products

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Transmission of Communicable Diseases	Community Health, Safety and Security	Indirect	• HSE management system • Community Health and Safety Management Plan • Occupational Health and Safety Management Plan • Emergency Preparedness and Response Plan • Grievance Mechanism	Medium	Small	**Moderate**	**Minor**
	Workers' Rights	Labour and Working Conditions	Both	• Workers Management Plan • Workers Grievance Mechanism	Medium	Small	**Moderate**	**Minor**
	Workers' Health and Safety	Labour and Working Conditions	Both	• Occupational Health and Safety (OHS) Plan • Grievance Mechanism	Medium	Small	**Moderate**	**Minor**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Child Labour and Forced Labour	Labour and Working Conditions	Both	• Contractor Management Plan • Labour Management Procedure • Grievance Mechanism • Ensuring compliance with Rwandan and International requirements in contractor and supplier selection process considering worker management and rights	Small	Small	**Minor**	**Minor (Negligible)**
	Benefits from improvements to infrastructure and services	Access to infrastructures and services	Both	• Stakeholder Engagement Plan • Grievance Mechanism • Promote and carry out programs and initiatives to promote	Large	Large	**Positive**	**Positive**

Project phase	Activity/ Source of impact	Social component affected	Nature of impact (Direct/ Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
				employment and social benefits to neighbouring communities				
	Disturbance from the presence of the workforce	Community Cohesion	Indirect	• Stakeholder Engagement Plan • Social Investment and Development Programme • Community Grievance Mechanism Procedure	Medium	Small	**Moderate**	**Minor**
Closure or rehabilitation phase	The significance of the impact to employment and community health indicators during decommissioning will need to be assessed prior to starting this phase, based on an updated socioeconomic baseline.							

9.3.8 CULTURAL HERITAGE

A comprehensive Cultural Heritage Management Plan (CHMP) will be developed for the Project to ensure all cultural heritage resources are addressed and managed adequately. The plan will be developed and agreed pre-construction to allow appropriate mitigation measures to be applied before any impact occurs. Items to be covered in the CHMP include (but are not limited to):

- Regulator engagement with the National Directorate of Historical Heritage to agree site-specific mitigation measures;
- Access management (Memorandum of Understanding with local communities regarding access and activities). Access arrangements will be made to the satisfaction of identified stakeholders through a Memorandum of Understanding agreed to by authorities and identified stakeholders, which will allow unrestricted access to Cultural Heritage resources. This memorandum should be in place before construction begins.
- Establishment of exclusion zones with adequate buffer around cultural heritage sites;
- Construction of noise bunds where appropriate for cultural heritage resources;
- Detailed site-specific archaeological mitigation, such as pre-construction investigations, archaeological excavations, etc.;
- Built heritage recording;
- Chance Finds Procedure. A Chance Finds Procedure will be designed and implemented to manage any unexpected discovery of archaeological material in-line with international requirements and guidelines IFC PS8.
- Cultural Heritage input into the Community Grievance Mechanism;
- Mapping and protection of remaining indigenous trees, as per 9.2.2General Mitigation for Biodiversity;
- Grave Relocation Plan. This will be designed and implemented with the agreement of the local communities if required; and
- Monitoring of mitigation measures and Mitigation Control.

9.3.8.1 POST-MITIGATION OF DIRECT IMPACTS

As presented in section 8.4.7.2 there are no direct impacts on **high** and **medium** sensitivity cultural heritage resources during the construction phase. The direct impacts presented in section 0 on **low** sensitivity cultural heritage resources may not change with the imposition of specific mitigation measures presented in this section. Direct impacts may not be reduced unless the principle of avoidance is adopted in the first instance. The only mitigation measure that would be effective in reducing the significance of direct physical impact would be avoidance by re-design. If this were to be applied, the resulting post-mitigation significance would be **negligible**. Table 9-8 present the post mitigation direct impacts to **high**, **medium**, and **low** sensitivity resources by impact type and magnitude of impact

9.3.8.2 POST MITIGATION OF INDIRECT IMPACTS

As presented in section 0 there are no indirect impacts on **high** sensitivity cultural heritage resources identified for the construction phase of the project. The indirect impacts described in sections 8.4.7 on **medium** and **low** sensitivity cultural heritage resources are summarized in Table 9-8. As outlined in this section, appropriate mitigation measures, that will be detailed more fully in the CHMP, consisting of access management and the construction of noise bunds, will be agreed with community representatives to ensure the continued use of these resources. Taking into account these proposed measures, the resulting post-mitigation significance is assessed as **negligible.**

TABLE 9-8 CULTURAL HERITAGE MITIGATION MEASURES AND RESIDUAL IMPACT ASSESSMENT

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct / Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
Construction phase	Physical ground disturbance through earthwork activities	Cultural Heritage– Indigenous medicinal plant (AB_CH_002)	Direct	Direct impacts may not be reduced unless the principle of avoidance is adopted in the first instance. The only mitigation measure that would be effective in reducing the significance of direct physical impact would be avoidance by re-design.	Large	Large	Major	Moderate
	Physical ground disturbance through earthwork activities	Historic agro-pastoral landscape (AB_CH_007)	Direct		Medium	Medium	Minor	Minor
	Noise, dust, and restricted access	Cultural Heritage– Sacred tree (AB_CH_004)	Indirect	Implementation of Cultural Heritage Management Plan	Small	Negligible	Minor	Negligible

Project phase	Activity/ Source of impact	Environmental component affected	Nature of impact (Direct / Indirect)	Mitigation measure recommended	Magnitude		Significance	
					Pre-mitigation	Post-mitigation (Residual)	Pre-mitigation	Post-mitigation
	Noise, dust, and restricted access	Indigenous medicinal plant (AB_CH_003) and historic agro-pastoral landscape (AB_CH_007)	Indirect	Implementation of Cultural Heritage Management Plan	Small	Negligible	Negligible	Negligible
Operation phase	The impact from construction will have wholly removed the identified potential cultural heritage resources and therefore there will be no impact at operation phase							
Closure and Rehabilitation	The impact from construction phase will have wholly removed the identified potential cultural heritage resources and therefore there will be no impact at Closure or rehabilitation phase							

10 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

10.1 INTRODUCTION

This Chapter presents a framework Environmental and Social Management and Monitoring Plan (ESMMP) for the construction and operation phases of the Project, with the purpose to specify standards, and controls required to manage and monitor the environmental and social impacts. To achieve this the ESMMP draws from the potential adverse impacts from the planned activities as identified in the ESIA and outlines mitigation measures required to reduce the likely negative impacts on the biophysical and social environment.

The tenants of the Project BSEZ (i.e., future resident industry units within 335.68 ha) will be responsible to develop their own industry/project specific ESMMP considering the provisions and requirements listed in the Project ESMMP (see Table 10-4) and the applicable national standards and guidelines.

10.2 OVERVIEW AND SCOPE

The ESMMP is intended to cover the Project activities described in Chapter 4 of this ESIA Report. It covers Project activities during construction and operation and will be subject to thorough reviews prior to the commencement of activities to ensure completeness.

The ESMMP details roles and responsibilities that will be assumed by each relevant entity as leader and/or supporter. BSEZ Ltd acknowledges its commitments in this regard.

BSEZ Ltd will have responsibility for the implementation of the measures outlined in the ESMMP during construction, but may delegate responsibility to its contractors, where appropriate. In cases where other individuals or organisations have responsibility for mitigation measures, this is clearly indicated within the ESMMP (see Table 10-4).

Capacity building and training requirements are also described within this Chapter, where these relate to specific skills are required to deliver the ESMMP action in question. General training, which will be provided to staff (and contractors' staff as appropriate), is not specifically indicated in the plan.

10.3 OBJECTIVES

The ESMMP is essential for successfully implementing the Project's environmental and social performance throughout the life of the Project. Having this ESMMP in place ensures a systematic approach to bringing environmental and social considerations into decision-making and day-to-day operations. It establishes a framework for tracking, evaluating, and communicating environmental and social performance and helps ensure that environmental risks and liabilities are identified, minimised and managed.

The ESMMP must be viewed as a living document, which will continue to develop during the construction phase to enable continuous improvement of the Project's social and environmental performance.

The core objectives of this ESMMP are as follows:

- Ensuring compliance with regulatory authority stipulations and guidelines, which include local, national and international;
- Ensuring that there is sufficient allocation of resources on the Project budget so that the scale of the ESMMP-related activities is consistent with the significance of Project impacts;
- Verifying environmental and social performance through information on impacts as they occur;
- Periodically updating the ESMMP as the Project activities progress;
- Responding to unforeseen events; and
- Providing feedback for continual improvement in environmental performance.

10.4 PRINCIPLES

The ESMMP was developed on the basis of three major groups of general principles: Principles of Sustainable Development, Principles of Ethics and Quality and Principles of Best Practice. These key principles are described below.

10.4.1 PRINCIPLES OF SUSTAINABLE DEVELOPMENT

- Protection of public health, welfare and safety – activities on site should be contained and will not impact on human health and well-being. The benefits of the BSEZ Ltd's activities should be realised by the communities during all phases.
- Maintenance of ecological processes – natural resources should be conserved or improved and not decreased in value. The resources are managed in such a way that they will provide for present and future needs.
- Avoidance, mitigation and management of pollution - existing or possible future contamination of surface, ground water and soil and air pollution is avoided where possible and mitigated and managed within the standards set. Waste generated will be eliminated, reduced or minimised, reused or recycled and the residual finally disposed of, if no other option is available.
- Precautionary Principle – in the absence of scientific data confirming a complete evaluation if the risk a cautious approach will be adopted to protect human, animal or plant health, or to protect the environment.

10.4.2 PRINCIPLES OF ETHICS AND QUALITY

- Consistency with legal and planning context – through all phases of the development of the Project, activities will comply with local, national and international legal and regulatory requirements.
- ESMMP implementation and proactive management – the ESMMP is implemented at the start of the activities and aims at continual improvement during all phases of the development.

- Clear and easily understood Reporting – the ESMMP should be easily understood, clearly laid out, an accepted documentation style should be used and all tables, figures and illustrations should be appropriate and necessary.
- Cost effectiveness – ensure that there is a balance between the financial constraints of achieving a maximum return on investment and the reduction of present and future risks and liabilities.

10.4.3 PRINCIPLES OF BEST PRACTICE

- Continuous improvement – the Project Proponent should be committed to review and continually improve environmental management, with the objective of improving overall environmental and social performance.
- Broad level of commitment – commitment is sought from all levels of management as well as the workforce for the development and implementation of the ESMMP to be successful and effective.
- Participative process – consultation will and has been undertaken with all stakeholders to seek their input into the environmental and social management of the Project.

10.5 GENERAL REQUIREMENTS

This ESMMP has been developed in line with applicable legal and policy requirements. These included the national requirements in terms of the Environmental Assessment Regulations and the requirements of the IFC Performance Standards. The ESMMP aligns to:

- National regulations.
- ESIA ToR issued to RDB prior to commencement of BSEZ ESIA.
- IFC Performance Standards and AfDB ISS as follows:

TABLE 10-1: IFC AND AFDB STANDARDS

IFC performance standards	AfDB ISS Operational Safeguards
Performance Standard 1 (PS 1): Assessment and Management of Environmental and Social	Operational Safeguards 1 (OS1): Environmental and Social Assessment
Performance Standard 2 (PS 2): Labour and Working Conditions	Operational Safeguards 5 (OS5): Labour Conditions, Health and Safety
Performance Standard 3 (PS 3): Resource Efficiency and Pollution Prevention	Operational Safeguards 4 (OS4): Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency
Performance Standard 4 (PS 4): Community Health, Safety and Security	Operational Safeguards 1 (OS1): Environmental and Social Assessment

IFC performance standards	AfDB ISS Operational Safeguards
Performance Standard 5 (PS 5): Land Acquisition and Involuntary Resettlement	Operational Safeguards 2(OS2): Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation
Performance Standard 6 (PS 6): Biodiversity Conservation and Sustainable Management of living Natural Resources	Operational Safeguards 3 (OS3): Biodiversity and Ecosystem Services
Performance Standard 7 (PS 7): Indigenous Peoples	Operational Safeguards 1 (OS1): Environmental and Social Assessment6
Performance Standard 8 (PS 8): Cultural Heritage	Operational Safeguards 1 (OS1): Environmental and Social Assessment

- World Bank Group General EHS Guidelines (2007); and
- United Nations Global Compacts (UNGC) Guiding Principles on Human Rights and Labour

In cases where the IFC performance standards and AfDB ISS requirements, guidelines and documents do not address some specific environmental and/or social aspect, other applicable international standards will be considered (e.g., those of the World Health Organization (WHO), International Labour Organization (ILO) and International Union for Conservation of Nature (IUCN). The more stringent approach will be used whenever considered to reduce the risk to ALARP.

Where specific additional standards and guidelines are used, these are noted in the ESMMP table.

10.5.1 PLAN-DO-CHECK-ACT

The structure of this ESMMP is set out according to the Plan, Do, Check, Act (PDCA) process. The PDCA is a well-known management tool that allows for a methodical and ongoing approach to managing environmental and social risks. Each of the primary sections in this Section relate to key components of the process.

Plan, Do, Check, Act is part of international frameworks for quality and environmental management systems including ISO 14001. This process is described in *Box 10-1*.

BOX 10-1 ESMMP PROCESS

Plan

- Define policies and objectives for environmental and social performance;
- Identify environmental and social impacts and risks of the operations;
- Develop mitigations and operational controls to address impacts and risks; and
- Develop a management plan to achieve these objectives.

Do

- Implement management plan; and
- Implement mitigations and operational controls.

Check

- Monitor performance against policies and objectives; and
- Check that mitigations and operational controls are effective.

Act

- Make corrections to plans, mitigations, or controls in response to performance monitoring or out of control events.

10.5.2 BSEZ LTD (ARISE) CORPORATE SUSTAINABILITY SYSTEM, POLICIES AND PROCESSES

BSEZ Ltd is partially owned by the GoR and ARISE IIP, which is a global infrastructure group specialized in conceiving, financing, building and operating integrated and tailor-made industrial zones. Section 1.3.1 provides further information about the company. BSEZ Ltd, for that reason, and for the purpose of this Project will follow ARISE IIP policies, procedures and guidelines and implement them according to the specific context of this project.

Additionally, BSEZ Ltd.is committed to align environmental, health and safety, as well as social and governance practices with international standards. BSEZ Ltd, following ARISE IIP principles, strives to minimise the risks to the environment and the communities they operate in and to provide a healthy and safe workplace for all their workforce. ARISE IIP has four sustainability pillars contributing to the sustainable development goals namely, carbon neutrality, circular economy, diversity and inclusion as well as responsible supply chain management. To fulfill its corporate mission, ARISE IIP is guided by the principles of sustainable development in every aspect of their business strategy and growth.

During the execution of the Projects, BSEZ Ltd believes in strong relationships with partners including investors, governments and local communities.

BSEZ Ltd's vision is to ensure job creation, developing high value-added industrial activities for local economies and to contribute to the global fight against climate change[199].

The Environment, Safety & Governance Policy of BSEZ Ltd comprises rules and mechanisms to ensure compliance with highest possible standards in health, safety, comfort and productivity for staff, visitors and the public.

ARISE IIP's policies, procedures and guidelines related to anti-bribery and corruption as well as anti-money laundering and financing of terrorism have been implemented in all areas of operation and countries in which the company operates.

The **Human Resources Policies** were prepared to maintain the corporate unit and is the strategic guide to achieve its goals of productivity and solid growth, with respect to the diversity and balance of the workforce at the service of ARISE companies. The policies of the Fair Employment and Sexual Harassment, establish that high ethical standards are followed, not admitting any form of discrimination or abuse of authority. All normative documents clearly and objectively express that the organisation will not accept any form of discrimination.

The **Risk and Governance Policies** establishes commitments to conflicts of interest and whistleblowing in accordance with the business model of ARISE, providing the Projects with guidance, tools and knowledge necessary to ensure compliance with its management regulations.

The sourcing and processing of natural commodities is one of the BSEZ Ltd's core operations. Therefore, BSEZ Ltd recognises the importance of understanding the sustainability dimensions of each commodity's supply chain and managing the risks and opportunities along the supply chain.

10.5.3 PLANNING

10.5.3.1.1 Impact Assessment

The Project has utilised the impact assessment through the ESIA process as a tool within the planning process to identify key impacts of the Project and associated mitigation and management measures for the construction and operation phases. The Project will continue to use the impact assessment process as a planning tool for any future development activities. The mitigation hierarchy applied in this ESIA will also be applied the Project construction and operation Phase.

10.5.3.1.2 Environmental and Social Commitments

Through the Project development and ESIA process, mitigation measures have been identified to address environmental and social impacts associated with Project activities (Chapter 9). BSEZ Ltd has made a commitment to implement these measures to ensure or improve environmental and social performance.

The commitments take a number of forms as summarised in Box 10-2, with the specific actions intended to address a particular environmental or social issue.

199 ARISE. Committed to Making Africa Thrive.

BOX 10-2 TYPE OF COMMITMENTS

Avoidance

During the planning phases, potential impacts to sensitive resources are identified. Where feasible, locations or processes can be changed during the planning or design phases to avoid impact to these areas.

Minimisation

Minimisation involves measures to reduce proposed impacts to a resource.

Management

Management commitments include development of plans and procedures for ensuring that measures to protect the environment actually take place and are of the desired standard of practice. Training is another commitment in this category.

Monitoring

Commitments to monitoring are primarily to ensure the above measures are working properly and delivering the desired (and anticipated) results.

Additionality

Additionality involves actions and contributions which are designed to provide a positive benefit. Examples include assisting with additional domestic water supply to surrounding towns.

10.5.3.1.3 Supporting Environmental and Social Management Plans

Following the completion of ESIA studies, the ESMMP will outline the supporting management plans and procedures that will be developed for each topic. These plans will set out how the mitigation measures that will be put into practice, monitored and upheld. As previously explained, BSEZ Ltd is partially owned by ARISE IIP, which integrates ARISE Group, and for that reason the management plans and procedures/ policies for this Project will be used in tandem with the BSEZ Ltd Environmental and Social Management System (ESMS) and also align with the following existing policies, procedures and plans, some of these from ARISE Group:

- ARISE security policy.
- BSEZ Ltd. EHS Code of Conduct.
- BSEZ Ltd. Ethical Recruitment Policy.
- BSEZ Ltd. EHS Requirements for Contractors.
- BSEZ Ltd. ESG Policy.
- BSEZ Ltd. ESMS Plan. The ESMS plan is under continuous review and has the following policies and procedures that can be adopted for the Proposed Project:
    - Corporate Policy Document
    - ESG Policy
    - Health & Safety Policy
    - Human Resources Policy

  - Fair Employment Policy
  - Ethical Recruitment Policy
  - Bi-lingual Policy
  - Employee Confidentiality Policy
  - Sexual Harassment Policy
  - Worker's Grievance Mechanism
  - Job Hazard Analysis
  - Grievance Mechanism Procedure
  - EHS Requirements for Projects
  - Resettlement Policy
- BSEZ Ltd. HSE Policy.
- BSEZ Ltd. Workers Grievance Mechanism.
- BSEZ Ltd. Employee Protection Policies (Sexual Harassment Policy, Sexual exploitation & abuse (SEAH), Gender based violence & GBV, Fair Employment Policy);
- BSEZ Ltd. Employee Confidentiality Policies (Worker's Grievance Mechanism, Whistleblowing Policy)
- BSEZ Ltd. Complaints Procedure for Incidences of Discrimination/Harassment;
- BSEZ Ltd. H&S Program;
- ARISE IIP Sustainability Charter
- ARISE Policy Manual comprising:
  - Environment, Safety & Governance Module – ES001
  - Legal Module – ES001
  - Human Resources Module – HR001
  - Risk & Governance Module- RG001
  - Finance Policy Manual - FN001
  - Communications Module - CM001

The following environmental plans will be applied to the BSEZ Ltd. Project:

- **Environmental:**
  - Air Emissions Management Plan (including Dust Emissions Management Plan);
  - Noise and Vibration Management Plan (NVMP);
  - Ecological Management Plan;
  - Effluent and Waste Management and Disposal Plan;
  - Spill Prevention and Response Plan;
  - Hazardous Materials Management Plan;

- Erosion and Sediment Control Plan;
- Raw Materials Management Plan;
- Topsoil handling, storage and re-use plan
- Alien plant control and management plan
- Conservation area development, management and monitoring plan
- Revegetation plan
- Waste Management Plan
- Environmental Monitoring Program

- **Social and Health and Safety:**

Emergency Preparedness and Response Plans (to be considered within the BSEZ Ltd. ESMS);

- Traffic Management Plan;
- Stakeholder Engagement Plan (SEP) ;
- Community Impact Management Plan;
- Community Health and Safety Management Plan (CHSMP);
- Occupational Health and Safety Management Plan (OHSMP);
- Community Grievance Mechanism Procedure;
- Contractor and Procurement Plan;
- Local Employment and Content Plan;
- Recruitment and Employment Plan
- Influx of Workers Management Plan;
- Workers Grievance Mechanism;
- Livelihood Restoration Plans (LRPs);
- Security Management Plan;
- Chance Finds Procedure;
- Cultural Heritage Management Plan;

Together with this ESMMP, these specific plans will form the overall Environmental and Social Management System (ESMS) for the Project.

The plans have been listed in Table 10-2, alongside with how they related to Project activities and impacts, as well as the identified responsible party for each specific plan. These plans include the management plans within operational BSEZ ESMS.

TABLE 10-2 MANAGEMENT PLANS

Plan Name	Includes	Plan Owner
Specific Management Plans – Environmental		
Air emissions Management Plan (including Dust Emissions Management)	The plan includes management of dust deposition, dust flux, real-time PM10 continuous monitoring and visual inspections. The DMP should also include 'action levels' for triggering further dust mitigation when exceeded (feed-back loop)	BSEZ Ltd HSE Manager
Noise and Vibration Management Plan	The plan is necessary to identify noise sources and implement corrective actions and to ensure regular monitoring through direct measurements at critical NSRs	BSEZ Ltd HSE Manager
Effluent and Waste Management and Disposal Plan	The plan is used to ensure the effluent released from project area is in conformance with the national and international standards applicable to the Project	BSEZ Ltd HSE Manager
Spill Prevention and Response Plan	The management plan ensures all accidental spills are managed and disposed appropriately with minimal interactions with the surrounding environment.	BSEZ Ltd HSE Manager
Hazardous Materials Management Plan	The hazardous materials management plan ensures all hazardous materials are appropriately labelled, stored, transported and handled within the Project area.	BSEZ Ltd HSE Manager
Erosion and Sediment Control Plan	Given the sloppy terrain within the Project area, the appropriate mitigation measures to mitigate on erosion and sediment transport is contained in the management plan.	BSEZ Ltd HSE Manager
Raw Materials Management Plan	The plan is used to ensure efficiency in sourcing raw materials to be used within the Project area. Further, it ensures the requisite permits have been obtained from the respective sources of materials e.g. quarries.	BSEZ Ltd HSE Manager
Topsoil handling, storage and re-use plan	Include considerations to avoid using topsoil from areas colonized by alien invasive species or alien species infested soils for final landscaping, as this will encourage the propagation and spread of invasive flora.	BSEZ Ltd ESG Manager
Alien plant control and management plan	Contain a species identification guide, recommended control measures per species, a list of permissible herbicides to control large-scale infestations as well as a monitoring and follow-up procedure.	BSEZ Ltd ESG Manager

Plan Name	Includes	Plan Owner
Conservation area development, management and monitoring plan	Developed as part of an overall biodiversity management plan, to achieve a functional habitat resembling natural patchiness (e.g. riparian forest or woodland) and providing value to biodiversity, rather than a (rowed) tree plantation	BSEZ Ltd ESG Manager
Revegetation plan	For initiating soil stabilisation with a dense low grass layer to suppress alien invasive plant establishment and reduce soil erosion until full revegetation measures can be implemented	BSEZ Ltd ESG Manager
Waste Management Plan	Project-related waste handling procedures for hazardous and non-hazardous wastes.	BSEZ Ltd HSE Manager
Specific Management Plans – Social		
Emergency Preparedness Plan	Covering the emergency situations (involving vehicles and pedestrians) that may occur during the Project construction, should be prepared, and implemented by trained personnel to avoid significant risks	BSEZ Ltd HSE Manager
Traffic Management Plan	Controls over prescribed routes, driver training, vehicle maintenance, speed restrictions, appropriate road safety signage, and vehicle loading and maintenance measures and vetting procedures. Will also include specification for community awareness and safety programmes.	BSEZ Ltd HSE Manager
Stakeholder Engagement Plan (SEP)	SEP will build on engagement undertaken to date and specify interactions with community and other stakeholders, as well as the grievance procedure to be used throughout the Project. Community and Employee awareness training and code of conduct procedures.	BSEZ Ltd ESG Manager
Community Health Management Plan (including health issues such as transmission of communicable diseases)	The purpose of the CHMP is to provide a clear set of actions and responsibilities for the control of impacts affecting the health and safety of the communities within the Project's area of influence. The plan includes measures to respond to exposure to diseases due to worker interaction, environmental change and safety (traffic, unplanned events, etc.). An Informed Consultation and Participation (ICP) will inform the development of the CHSMP by integrating feedback diagnosis on road safety and related issues	BSEZ Ltd HSE Manager
Occupational Health and Safety Management Plan (OHSMP)	Procedures on chemical hazards, fire and explosions, confined spaces and on site-traffic hazards. Communication and training programmes. Safety analysis and industrial hygiene surveys procedures. Monitoring, record-keeping and audit procedures.	HSE Manager of BSEZ LTD

Plan Name	Includes	Plan Owner
Community Grievance Mechanism Procedure	Procedure for efficiently handling, examining, addressing and resolving complaints or issues raised by impacted communities in a just, prompt and consistent manner.	BSEZ Ltd ESG Manager
Local Content and Procurement Plan	Plan that defines the procedures to be established by the Project to create jobs, promote enterprise development and accelerate the transfer of skills and technologies.	BSEZ Ltd ESG Manager
Recruitment and Employment Plan	Plan for local training and procurement for operations. Also specifies requirements for BSEZ LTD during construction. The Plan will include policies and procedures for hiring of local labour, unskilled, semi-skilled and skilled labour.	BSEZ LTD HR Manager
Livelihood Restoration Plans (LRPs)	This plan defines the procedures and the actions that will be taken to mitigate adverse effects, compensate losses, and provide development benefits to persons and communities affected by the land acquisition process.	BSEZ Ltd ESG Manager
Security Management Plan	Plan coordinates, assigns personnel, directs, and oversees corporate security, communicating the security approach to both internal security personnel and external parties such as the board of directors, top management, and other managers.	BSEZ Ltd HSE Manager
Chance Finds Procedure	Procedure specific to the Project that outlines steps to take if unexpected heritage resources, particularly archaeological ones, are discovered during the Project's construction or operation."	BSEZ Ltd ESG Manager
Cultural Heritage Management Plan	The CHMP is required to ensure all heritage issues are addressed and managed adequately. Items to be addressed in the plan include Regulator Engagement, Access Management, Mitigation control and management of Intangible heritage through community engagement.	BSEZ Ltd ESG Manager
Influx of Workers Management Plan	The influx management plan is required to manage anticipated increase in settlements in the project area due to presence of employment opportunities and livelihood sources from the Project.	BSEZ Ltd ESG Manager

As a contractual requirement, the contractors will be required to demonstrate compliance of their activities against the ESMMP. This includes providing resources to ensure compliance of next tier contractors and a process for emergency stop-work orders in response to monitoring triggers. Contractors will be responsible for performing all work:

- In compliance with relevant national and international EHS legislation and regulations, and with other requirements to which the Project subscribes;

- In conformance with the Project ESMMP, and related management plans for specific aspects; and
- In accordance with contractual technical and quality specifications.

BSEZ Ltd has operational EHS requirements for contractors for performing their Work in a safe and responsible manner to prevent damage, injury, or loss to individuals, the environment, and the Work. The Project's ESMMP and existing documentation will be the main contractual documentation to which the contractor(s) will be bound. Contractors will be required to develop their own management plans which show how they will comply with these environmental and social requirements.

In this way, the ESMMP will be implemented and controlled using both BSEZ Ltd and the contractor management systems. The contractor management systems will therefore:

- Provide the framework that regulates their activities;
- Define responsibilities and Reporting relationships for expediting, mitigation and monitoring actions detailed in the ESMMP; and
- Specify the mechanisms for inspecting and auditing to ensure that the agreed actions are implemented.

Contractors will be required to self-monitor against their plan and compliance with the plan will be routinely monitored by BSEZ Ltd directly or by third parties. Contractors will be required to submit regular Reports of monitoring activities and the Project will review these on a regular basis.

Contractors will be reviewed and approved by BSEZ Ltd. An external audit and assurance process will be conducted for the contractors' and tenants' EHS documentation on an annual basis, the results of which will be disclosed at completion of the process.

10.5.4 IMPLEMENTATION

Construction: BSEZ Ltd is ultimately responsible for the management and supervision of all Project activities during the construction phase of the BSEZ and will have principal responsibility for implementing this ESMMP and the mitigation measures. However, plot owners will be responsible for each specific development and construction. BSEZ Ltd has developed "environment, health and safety" code of conduct to ensure the proper functioning of the Bugesera Special Economic Zone. The code of conduct requires that before the start of its construction works, each Unit must produce an Environmental and Social Impact Assessment (ESIA) and an Environmental and Social Management Plan (ESMP) and must also comply with the environmental and social guidelines set by BSEZ Ltd.

Operations: BSEZ Ltd EHS code of conduct of investors and Units of BSEZ will guide the general environment, social health and safety operations of BSEZ. BSEZ Ltd is responsible for ensuring all companies abide by operational level ESMMP for BSEZ. However, the plot owners must comply to the ESMP developed as part of the unit specific ESIA and the guidelines set by BSEZ Ltd.

BSEZ Ltd is committed to providing resources and establishing the systems and components essential to the implementation and control of the ESMMP. These include appropriate human resources and specialised skills, training programmes, communication procedures, documentation control and a procedure for the management of change. BSEZ Ltd will support the process and have an QHSE team with competent staff on the basis of appropriate education, training and experience.

10.5.4.1.1 Roles and Responsibilities

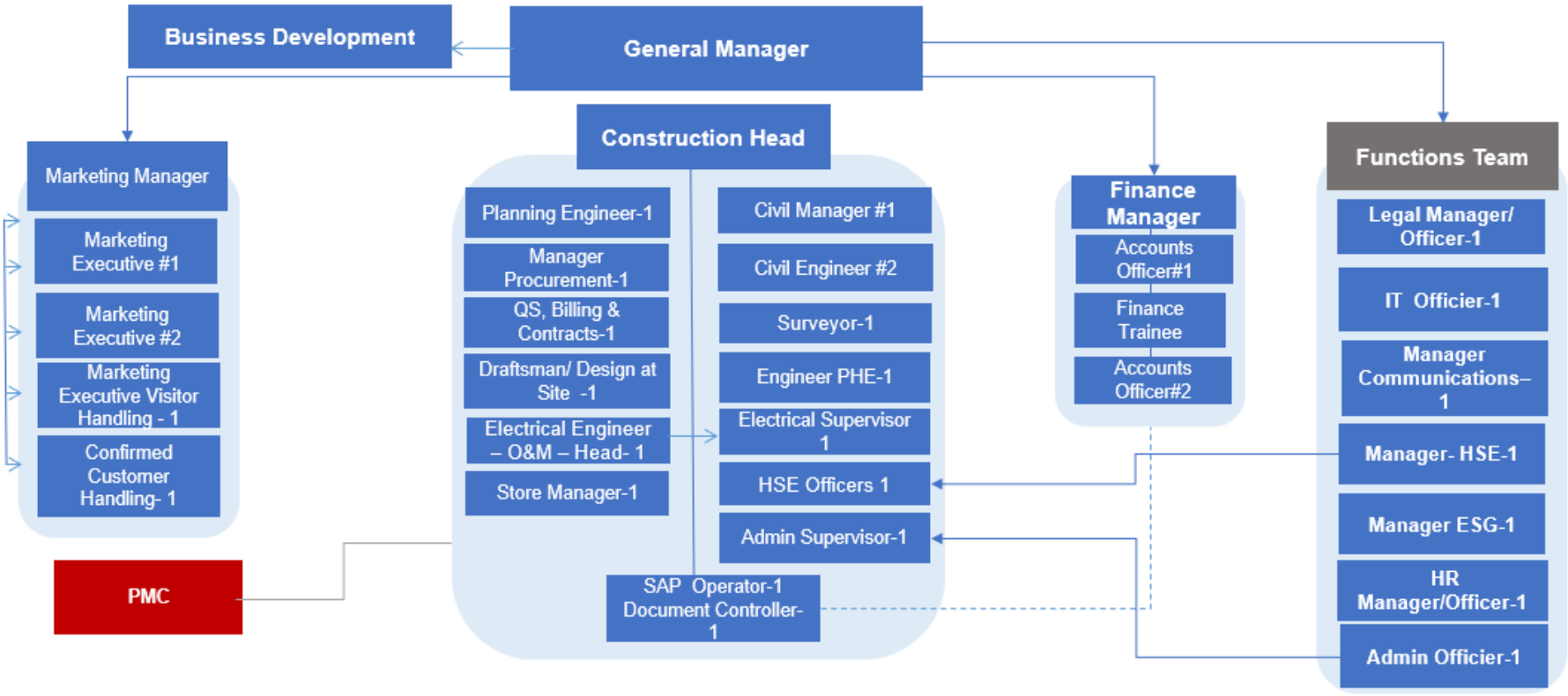
The effective implementation of the ESMMP is dependent on established and clear roles, responsibilities and reporting lines within BSEZ Ltd's organizational structure. The organisational structure for environmental and social management for the Project is defined below. The structure will be maintained throughout the construction and operation phases, whilst being reviewed on a regular basis to adapt the structure as necessary. The FIGURE 10-1 includes an organogram for BSEZ Ltd. The key roles and responsibilities in the QHSE team as outlined in BSEZ ESMS are provided below:

TABLE 10-3: ROLES AND RESPONSIBILITIES OF QHSE TEAM

Role	Overall Responsibilities
BSEZ Management	• Allocating necessary resources, time and budget for the achievement of ESMS requirements; • Designating specific personnel on site or at the administrative level, clearly define their roles and responsibilities within the environmental and social management system; • Regular communication on and promotion of ESMS matters; • Review of regular internal ESMS performance reports; • Timely completion of mandatory ESMS training; • Sample management walk downs and raising observations / near misses; • Encouraging, and responding positively to observations related to ESMS and suggestions for improvements from personnel; • Engaging with the public (including local communities) in a professional and positive manner at all times; • Participation in emergency preparedness drills and exercises; • Participation in internal and external audits; and • Recognising and rewarding good behaviours by personnel at all levels.
BSEZ HSE Manager/ESG Manager	• Ensuring that this Manual and related ESMMPs are up to date; • Programming inspections and follow audit activities to ensure the correct implementation of the ESMMPs and of specialized contractor(s) tasks; • Collecting, organizing and reviewing monitoring data and performance monitoring reports provided by the specialized contractor(s) and tenants and providing summary results of such reports to Management and to stakeholders. • Effective execution of the specific tasks assigned in conformity with ESMS manual, with the ESMMPs and with contractual arrangements; • Respect of EHS requirements included in the ESMS; • Agree with the timing and logistics of the monitoring and reporting activities.

EPC Contractors and subcontractors	• Effective execution of the specific tasks assigned in conformity with ESMS manual, with the ESMMPs and with contractual arrangements; • Respect of EHS requirements included in the ESMS; • Agree with the timing and logistics of the monitoring and reporting activities.
All employees and contractors	• Comply with environmental management requirements; • Report any activities which are causing unnecessary biodiversity issues.

FIGURE 10-1: BSEZ LTD. ORGANOGRAM



Source: BSEZ Ltd

10.5.4.1.2 Training and Awareness

BSEZ ESMS require any person with a role concerning Environmental and Social Risk Management to have the necessary underpinning knowledge and skills to be competent to assess and manage the respective E&S risks and to define and implement the associated control measures. BSEZ Ltd will identify, plan, monitor, and record training needs for personnel whose work may have a significant adverse impact upon the environment or social conditions. BSEZ Ltd recognises that it is important that employees at each relevant function and level are aware of the Project's environmental and social policy; potential impacts of their activities; and roles and responsibilities in achieving conformance with the policy and procedures. Training and awareness-raising therefore forms a key element of both EHS and the expediting of this ESMMP.

Key staff will, therefore, be appropriately trained in key areas of EHS management and operational control with core skills and competencies being validated on an on-going basis. The identification of training and awareness requirements and expediting of the identified training/awareness events will be the responsibility of the BSEZ HSE Manager/Officer.

Training and awareness are not a requisite only of BSEZ LTD personnel (and subcontractors).

This will be achieved through a formal training process. Employee training will include awareness and competency with respect to:

- Environmental and social impacts that could potentially arise from their activities (including, biodiversity and noise);
- Legal requirements in relation to environmental and social performance;
- Necessity of conforming to the requirements of the ESIA and ESMMP, in order to avoid or reduce those impacts;
- Activity-specific training on waste management practices, documentation systems and community interactions; and
- Roles and responsibilities to achieve that conformity, including those in respect of change management and emergency response.

The BSEZ ESMS Plan makes provisions for training to all employees (in appropriate languages) and managers, ensuring that:

- Personnel is aware of the importance of developing and implementing BSEZ Policies, ESMS and ESMPs and fulfilling requirements therein.
- Personnel within the organizational structure with direct responsibility for the Project's environmental, social, health and safety performances have the knowledge, skills, and experience necessary to perform their work.
- Personnel possess the knowledge, skills, and experience to implement the specific measures and actions required under the ESMS.

The HSE Manager/Officer is responsible for coordinating training, maintaining employee-training records, ensuring that these are monitored and reviewed on a regular basis. The BSEZ HSE Manager/Officer will also periodically verify that staff are performing competently through discussion and observation.

Employees responsible for performing site inspections will receive training by drawing on external resources as necessary. The BSEZ HSE Manager/Officer will coordinate training prior to commissioning of the facilities. Upon completion of training and once deemed competent by management, staff will be ready to train other people.

Similarly, the Project will require that each of the contractors organises training programmes for its personnel. Each contractor is responsible for site EHS awareness training for personnel working on the job sites. The contractors are also responsible for identification of any additional training requirements to maintain required competency levels.

The contractor training program will be subject to approval by BSEZ Ltd and it will be audited to ensure that:

- Training programs are adequate;
- All personnel requiring training have been trained; and
- Competency is being verified.

10.5.4.1.3 Communication

BSEZ Ltd will maintain a formal procedure for communications with the regulatory authorities and communities. The HSE Manager/Officer is responsible for communication of EHS issues to and from regulatory authorities whenever required. The HSE Manager/Officer is kept informed of such communications and pertinent information arising from such interactions will be communicated to contractors through the HSE Manager/Officer.

BSEZ ESMS identifies the following communication level can be distinguished regarding the BSEZ's Projects;

- Internal communication among the various levels and functions of the organization;
- Internal Project communication among the various parties involved in a Project; and
- Relevant communication from external interested parties related to ES issues.

Meetings will be held, as required, between BSEZ Ltd and the appropriate regulatory agency and community representatives to review EHS performance, areas of concern and emerging issues. Dealings will be transparent, and stakeholders will have access to personnel and information to address concerns raised.

BSEZ Ltd will have an operational community grievance management procedure. In the Community Grievance Mechanism, community members can raise any issues of concern which they will continue to implement. Grievances may be verbal or written and are usually either specific claims for damages/injury or complaints or suggestions about the way that the Project is being implemented. When a grievance has been brought to the attention of the Project team it will be logged and evaluated. The person or group with the grievance is required to present grounds for making a complaint or claiming loss so that a proper and informed evaluation can be made.

Where a complaint or claim is considered to be valid, then steps are required to be undertaken to rectify the issue or agree compensation for the loss. In all cases the

decision made and the reason for the decision will be communicated to the relevant stakeholders and recorded. Where there remains disagreement on the outcome then an arbitration procedure may be required to be overseen by a third party (e.g., government official). Local community stakeholders will be informed on how to implement the grievance procedures. The grievance mechanisms currently in use is provided in the Stakeholder Engagement Plan (SEP) presented in Section 10.5.4.1.7 and within the BSEZ ESMS plan. In summary, the SEP will ensure the identification and disclosure of the following information to all stakeholders:

- To identify peoples and neighboring projects/businesses that will be affected by Project or Corporate level activities
- The purpose, nature and scale of the proposed Project;
- The duration of proposed Project activities;
- Any risk to and the potential impacts on the stakeholders concerned, as well as the relevant mitigation measures;
- The envisaged stakeholder engagement process; and
- The Grievance Mechanism.

10.5.4.1.4 Documentation

BSEZ LTD will control EHS documentation, including management plans; associated procedures; and checklists, forms, and Reports, through a formal procedure. All records will be kept on site and will be backed up at several offsite locations (including secure cloud storage facilities). Records will be kept in both hard copy and soft copy formats. And all records will be archived for the life of the Project. According to the ESMS, the Company is required to maintain and archive records, under the responsibility of the BSEZ HSE Manager, that demonstrate that the ESMS performance and conformity/compliance to the national, international and ESMS requirements.

Furthermore, the **document control procedure** will describe the processes that the Project will employ for official communication of both hardcopy and electronic (through the internet) document deliverables. In addition, it will describe the requirement for electronic filing and posting and for assignment of document tracking and control numbers (including revision codes).

The HSE Manager/Officer is responsible for maintaining a master list of applicable EHS documents and making sure that this list is communicated to the appropriate parties. The HSE Manager/Officer is responsible for providing notice to the affected parties of changes or revisions to documents, for issuing revised copies and for checking that the information is communicated within that party's organisation appropriately.

The contractors will be required to develop a system for maintaining and controlling its own EHS documentation and describe these systems in their respective EHS plans.

10.5.4.1.5 Operational Control Procedures

Each activity for which a potentially significant environmental or socioeconomic risk or impact is expected will have an operational control associated with it that specifies

appropriate procedures, work instructions, best management practices, roles, responsibilities, authorities, monitoring, measurement and record keeping for avoiding or reducing impacts. Operational controls are monitored for compliance and effectiveness on a regular basis through a monitoring and auditing procedure described in the ESMMP.

Operational control procedures will be reviewed and, where appropriate, amended to include instructions for planning and minimising impacts, or to at least reference relevant documents that address impact avoidance and mitigation.

10.5.4.1.6 Managing Changes to Project Activities

Changes in the Project may occur due to unanticipated situations. Adaptive changes may also occur during the course of the Project life cycle. The Project will implement a formal procedure to manage changes in the Project that will apply to all Project activities.

The objective of the procedure is to ensure that the impact of changes on the health and safety of personnel, the environment, the Project site, and equipment are identified and assessed prior to changes being implemented.

The management of change procedure will ensure that:

- Proposed changes have a sound technical, safety, environmental, and commercial justification;
- Changes are reviewed by competent personnel and the impact of changes is reflected in documentation, including operating procedures and drawings;
- Hazards resulting from changes that alter the conditions assessed in the ESIA have been identified and assessed and the impact(s) of changes do not adversely affect the management of health, safety or the environment;
- Changes are communicated to personnel who are provided with the necessary skills, via training, to effectively implement changes; and
- The appropriate BSEZ LTD person accepts the responsibility for the change.

As information regarding the uncertainties becomes available, the Project ESMMP will be updated to include that information in subsequent revisions. Environmental and social, as well as engineering feasibility and cost, considerations will be taken into account when choosing between possible alternatives.

10.5.4.1.7 Stakeholder Engagement and Grievance Management

In addressing the different needs of stakeholders, the Project has a stand-alone Stakeholder Engagement Plan (SEP), which will be modified and updated as required. Implementation will rest with the BSEZ Ltd General Manager, the BSEZ Ltd ESG Manager, the BSEZ Ltd HSE Manager, and the BSEZ Ltd HR Manager.

The stakeholder engagement activities will include the following:

- Community engagement – recognising and ensuring active participation of differentiated interest groups within the affected communities. Engagement frequently during pre-construction and during site preparation and construction with support of local leaders.

- Engagement with Government Authorities – this will facilitate integration between Project activities with ongoing regional and local planning and implementation. It will also allow partnerships where appropriate.

Project information will be provided in a local manner appropriate for the Project phases and activities. In addition, ongoing verification and monitoring activities will be a key component of continued stakeholder engagement, ensuring reporting on compliance and performance regarding environmental and social commitments.

The GMP as defined in the SEP will be established. This procedure will be implemented by the Project to manage and address all public grievances.

Labour-related grievances will be dealt with internally through specific GMP (i.e., **Workers Grievance Mechanism)** for the Project workforce including contractors and subcontractor workers. BSEZ Ltd will manage grievances of its employees in accordance with Rwanda national regulatory requirements. As above, contractors will be expected to comply with national labour regulations.

10.5.5 CHECKING AND CORRECTIVE ACTION DURING CONSTRUCTION AND OPERATION OF THE PROJECT

The ESMS provides for the management and implementation of all policies. BSEZ Ltd shall ensure transparent communication to all employees, contractors, visitors, and other interested parties by relaying accurate information regarding the H&S performances to demonstrate continual progress towards ESG commitments.

Wherever practicable, corrective actions relating to identified deficiencies or opportunities for improvement are implemented immediately to mitigate the hazard/control the risk, restore the non-compliance or non-conformance, or realise the improvement.

10.5.5.1INTRODUCTION

Checking includes inspections and monitoring as well as audit activities to confirm proper implementation of checking systems as well as effectiveness of mitigations. Corrective actions include response to out-of-control situations, non-compliances, and non-conformances. Actions also include those intended to improve performance.

10.5.5.2INSPECTION

EHS inspections (by internal and/or external auditors) will be conducted periodically. Compliance with different international and national requirements will be evaluated through internal audits. On the other hand, external audits are aimed at verifying compliance with domestic level regulatory and legislative requirements and international standards as well as respective commitments outlined by both Project specific ESIA and ESMMPs respectively. As part of sound ESMS practice, BSEZ ESMS manual expects a regular external audit of all Project sites which will occur at least once a year. BSEZ Ltd's Management and Plot Owners shall provide full availability of their resources, as well as full access to site and documentation for the external audits. The results of the inspection activities will be reported to BSEZ Ltd management to be addressed.

10.5.5.3MONITORING

Monitoring will be conducted to (by internal and/or external auditors) ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts. Monitoring parameters are included in the ESMMP.

The E&S performance will be monitored and measured to ensure compliance with applicable international regulatory requirements, international standards (IFC PS), as well as ESIA and ESMS requirements. At a Project level, BSEZ Ltd has the responsibility to collect and aggregate the information related to monitoring and measurement activities carried out by any contractor/Unit owner/investor, and to manage, update and develop the tools for the collection and aggregation of this data.

Monitoring methodologies or processes will be put in place in order to ensure the efficacy of the mitigation measures identified in the ESIA. Monitoring methodologies will be established to address the following:

- Environmental and social impacts determined in this ESIA;
- Alterations in the interactions between Project activities and environmental sensitivities;
- Monitor the effectiveness of the mitigation measures;
- Determination of long term and residual effects; and
- Identification of Project specific cumulative environmental effects.

The national guidelines require an environmental monitoring plan as part of an ESIA. The aim of the monitoring programme is to ensure that the negative environmental impacts identified in this ESIA are effectively mitigated in the establishment, installation, operations and decommissioning stages of the Project.

10.5.5.4AUDITING

External Audits, to be performed by third parties, aim at verifying compliance with domestic level of regulatory and legislative requirements and international standards as well as respective commitments outlined by both Project specific ESIA and ESMPs respectively. As part of sound BSEZ ESMS practice; this document expects a regular external audit of all BSEZ Project which will occur at least once a year.

The Company's Management and Contractor shall provide full availability of their resources, as well as full access to site and documentation for the external audits.

During the construction phase of all respective projects, BSEZ Ltd will organize one (1) external audit every 6 months across the corporate and project(s) level to ensure that ESMPs are applied throughout the project. External audits will also be conducted during the operation phase, the frequency of which will be defined at that time.

Based on the first external audits, BSEZ Ltd. shall implement an internal audit system to verify periodically and effectively:

- Project operation compliance to the respective domestic regulatory/legislative requirements, to the ESIA commitments, to the IFC Performance Standards and the AfDB Integrated Safeguards System;
- Correct implementation of ESHS Policies and respective ESMPs to ensure the ESMS Manual, and its standards, are maintained across BSEZ Ltd. endeavours;
- Correct implementation of Management Plans; and
- Contractor meets its contractual obligations.

An internal audit program shall be established, implemented and maintained by BSEZ Ltd on a quarterly basis, taking into consideration the ESMS aspects of importance of the operation(s) and the results of previous audits. The program can be amended based on the outcomes of the audits and of the Management Reviews. The ESMS team should coordinate with audit team to ensure baseline standards of practice are being met.

It is the responsibility of the Contractor and tenants to implement a similar system to evaluate compliance during its operation and Subcontractors' operations.

The audits will include a review of compliance with the requirements of the ESIA and ESMMP and include, at a minimum, the following:

- Completeness of EHS documentation, including planning documents and inspection records;
- Conformance with monitoring requirements;
- Efficacy of activities to address any non-conformance with monitoring requirements; and
- Training activities and record keeping.

There will also be a cycle of audits into specific areas or activities of the Project. The frequency of these audits will be risk based and will vary with the stage of the Project and will depend on the results of previous audits.

10.5.5.5CORRECTIVE ACTION

BSEZ LTD will implement a formal non-compliance and corrective action tracking procedure for investigating the causes of, and identifying corrective actions to, accidents or environmental or social non-compliances. This will ensure coordinated action between BSEZ LTD and its contractors. The HSE & ESG Managers will be responsible for keeping records of corrective actions and for overseeing the modification of environmental or social protection procedures and/or training programs to avoid repetition of non-conformances and non-compliances.

10.5.5.6REPORTING

Throughout the construction period, BSEZ Ltd will keep the regulatory authorities informed of the Project performance with respect to EHS matters by way of written status Reports and face-to-face meetings. BSEZ Ltd will prepare a Report on environmental and social performance and submit it to RDB. The frequency of this Reporting will be agreed upon between BSEZ Ltd and the RDB.

If required, BSEZ Ltd will provide appropriate documentation of EHS related activities, including internal inspection records, training records, and Reports to the relevant authorities. Contractors are also required to provide EHS performance Reporting to BSEZ Ltd on a regular basis through weekly and monthly Reports. These Reports will be used as inputs to the BSEZ Ltd Reports to RDB.

10.6 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

Table 10-4 presents the ESMMP for the Project, which summarises all the various mitigation measures that is set out in this ESIA Report. The table shows the responsible entities for implementation for each item, the required timing by which the measure must be implemented, the indicator to demonstrate completion.

The overall, ultimate responsibility for implementation of a given measure for the construction and operation phase rests with BSEZ Ltd. All contractors and subcontractors must adopt and comply with the policies and plans required as part of this ESMMP. Furthermore, this ESMMP should be used as a start point (i.e., guidance for the general measures before the development industry specific ESMMP) for the industries that plans to settle within the 335.68 ha of the Project. Overall, the ESMMP will be used in tandem with existing ESMS plan, EHS requirements for contractors and EHS code of conduct of investors & units of the BSEZ which outlines waste management, hazardous materials management, traffic management among others. It is the responsibility of the Contractor and tenants to implement a similar system to evaluate compliance during its operation and related subcontractors.

As stated previously, the Project will be designed, built, and operated in accordance with the applicable Rwandan regulations and the international standards and guidelines of the lending institutions, including IFC Performance Standards and EHS Guidelines. Together, the applicable standards for the Project are referred to in the ESMMP as the Lender Standards.

TABLE 10-4ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN DURING COSTRUCTION

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
C1	a. Construction, Equipment movement and Earthworks during soil movement during land clearing, preparation and excavations. b. Surface water run-off and storm water drainage c. Contamination by accidental fuel oil, chemicals and hydrocarbon spills	Hydrology & Hydrogeology	Direct	• The impact on recharge to the groundwater resource can be reduced by minimising the infrastructure built on site, and/or the footprint of the infrastructure. • Effective control of number of vehicles, ensuring regular services of the vehicles in designated service areas, and limiting driving and operating on unpaved areas. • Ensure storage of chemicals occur in appropriate storage areas through implementation of Hazardous Materials Management Plan • Completion and implementation of the Effluent and Waste Management and Disposal Plan. • Implementation of the Stakeholder Engagement Plan (SEP). • Implementation of a water monitoring program. • number of complaints regarding of visual/chemical alteration of water quality and/or on community water supply. • Keep record of waste type, quantity, composition, origin, disposal destination and method of transport for all wastes. • Carry out internal environmental audits to evaluate mitigations measures implementation, take note of non-conformities and implement effective corrective measures. • Perform inspections to identify areas where erosion might be occurring as a result of construction activities. Such monitoring will be carried out on a daily basis during the rain seasons and on a periodically scheduled basis during the dry seasons. • Ensure wastewater discharges are in full compliance with national and international standards.	BSEZ Ltd QHSE Officer, water engineers.	BSEZ Ltd's QHSE Manager	• Implementation of Erosion and Sediment Control Plan • Implementation of Spill Prevention and Response Plan • Implementation of Hazardous Materials Management Plan • Continuous monitoring (analytics and visual). • Weekly Inspection Cycle Audit • Monthly reporting, to be included in the Monthly E&S Monitoring Report. • Records of training provided. • Data to be included in the Biannual E&S Report.
C2	Earthworks, construction and track-out	Air Quality	Direct	• Site Planning: o Plan Project layout so that machinery and dust causing activities are located away from receptors, as far as is possible. o Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. o Consider fences and enclosures around specific operations where there is a high potential for dust production and the site is actives for an extensive period. o Limit site runoff (of water or mud) to prevent egress of material to other areas which can create dust emissions when dried. o Keep site fencing, barriers and scaffolding clean using wet methods.	BSEZ LTD (banksmen/ sweepers)	BSEZ LTD QHSE Manager	• Ensure implementation of traffic management plan, air quality management plan and grievance management procedure • Daily visible inspections to avoid visual dust clouds • Bi-annual Internal Audit • Weekly Inspection Cycle Audit

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				○ Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. ○ Impose and signpost a maximum-speed-limit of 30 kph on surfaced and 10 kph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided). Implement awareness training for drivers. • Dust Management: ○ Develop and implement an Air Emissions Management Plan and Procedure (with a Dust management plan (DMP) including dust deposition, dust flux, real-time PM10 continuous monitoring and visual inspections. The DMP should also include 'action levels' for triggering further dust mitigation when exceeded (feed-back loop). ○ Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. ○ Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in a logbook. • Earthworks Management: ○ Re-vegetate or hard stand earthworks and exposed areas and open soils to stabilise surfaces as soon as practicable. ○ Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. ○ Only remove the cover in small areas during work and not all at once. • Construction Management: ○ Re-vegetate or hard stand earthworks and exposed areas and open soils to stabilise surfaces as soon as practicable. ○ Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. ○ Only remove the cover in small areas during work and not all at once.			• Engagement records and grievance procedure • Visual observations and dust complaints • Maintenance records • Documented evidence of topsoil recovery and stockpiling
C3	**Construction Equipment and Earthworks**	Noise	Direct	• Develop and implement site specific Noise and Vibration Management Plan • Where practicable noisy equipment will be sited as far away as possible from receptors. • Where practicable noisy equipment will be orientated to face away from the receptors at which significant noise impacts are predicted. • Construction contractors will use alternatives to audible reversing alarms, such as visual and/ or broadband noise emitting alarm-models that provide a safe system of work; or configuring the Project work sites to maximise forward movements of mobile plant.	BSEZ Ltd HSE Coordinator	BSEZ Ltd HSE Manager	• Weekly Inspection Cycle Audit • Checking the noise monitoring results compliant to noise regulatory standards. • A record of number of penalties issued by authorities • A record of number of complaints pertaining to excessive noise.

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				• Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable. • Where practicable, stationary equipment will be located in an acoustically treated enclosure. • Throttle settings will be reduced, and equipment and plant turned off, when not being used. • Onsite chutes and bins will be lined with damping material. • Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked. Equipment will not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified. • Use of compressors, generators and pumps fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use, and positioning of all ancillary plant (e.g., generators, compressors) so as to cause minimum noise disturbance. • Fitting of mufflers or silencers of the type recommended by manufacturers. • Storage of excavated material between the construction site and the sensitive use building to form a noise barrier (with cover to avoid dust erosion) or installation of other (temporary) noise barriers. • Taking advantage of the natural topography for noise shielding. • Limiting hours of operation for specific equipment or operations.			

C4	Biological resources and receptors-general measures for all construction impacts	Biological receptors (Habitats, Flora, Fauna)	Direct	• Create a suitable biodiversity-related document control system, which will also cater for alerts to be sent on requirements for specific monitoring, training, incident-responses, etc.
				  ○ Assign a responsible person/entity to manage this documentation and data and the manner in which documents are to be submitted (templates, key information, etc) named, filed, and stored.
				  ○ Develop regular trend-analyses methods for different types of data / information collected during the course of the Project, and ways to efficiently visualise or map such trends (e.g., using Power BI).
				  ○ Ensure all documents are in a readily accessible state to authorities, auditors as well as other stakeholders requiring duly authorised and or motivated access.
				  ○ Implementation reports linked to a GIS database must be established.
				• Biodiversity information and mitigation requirements will be adequately incorporated in all induction training for all staff and site visitors.
				• Detailed plans to be drafted as soon as possible:
				  ○ Develop and implement a topsoil handling, storage and re-use plan
					BSEZ Ltd Ecological field officer	BSEZ Ltd QHSE Manager	• Weekly Inspection Cycle Audit
							• Level of implementation of Ecological Management Plan

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				▪ Include considerations to avoid using topsoil from areas colonized by alien invasive species or alien species infested soils for final landscaping, as this will encourage the propagation and spread of invasive flora. Only consider the use of such soils, if they will be deeply buried or sealed to ensure regenerative material contained in such soils are destroyed. ○ Alien plant control and management plan ▪ The implementation of the alien plant control plan must be regarded as priority, even prior to the start of additional clearance and construction. ▪ Continued implementation of this plan will be done across the entire Project site during the operational phase, and responsibilities carried over to individual owners or -operators or industrial stands. ▪ This plan needs to contain a species identification guide (including species that could be introduced from surrounding areas or transport routes), recommended control measures per species (or species group with similar growth characteristics), a list of permissible herbicides to control large-scale infestations (such as *Lantana camara*) as well as a monitoring and follow-up procedure. ○ Conservation area development, management and monitoring plan as part of an overall biodiversity management plan, to achieve a functional habitat resembling natural patchiness (e.g. riparian forest or woodland) and providing optimal value to biodiversity, rather than a (rowed) tree plantation: ▪ Where possible, indigenous trees such as Ficus species, Lannea fulva, Euphorbia candelabra and Erythrina abyssinica still present within undeveloped sections of the Project area are recommended to be mapped and retained where or as long as feasible. ▪ Similar, specimens of Aloe species and indigenous geophytes are recommended to be retained in an on-site nursery until they can be re-used in the conservation or green corridor areas. ▪ Hedges consisting of a mixture of indigenous species provide significant habitat value for small fauna and are recommended to be incorporated into green corridor edges where feasible. ▪ Objectives of this plan will go beyond carbon capture and look at contributing to regional enhancement of habitat of value to indigenous biodiversity and also consider the importance of reducing impacts on downstream wetland habitats. ▪ The above will also include a clear biodiversity monitoring protocol and be revised at least every 5 years to allow for adaptive management where required. ○ Revegetation plan of disturbed and landscaped areas, initiating soil stabilisation with a dense low grass layer to suppress alien invasive plant establishment and reduce soil erosion until full revegetation measures can be implemented. ○ Wetland rehabilitation plan to address the immediate geomorphological, hydrological and biological needs for wetland recovery, as well as to set the wetland monitoring protocol that will			

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				need to become part of the long-term biodiversity monitoring programme. • Design/engineering considerations to benefit biodiversity and ecosystem functionality: o Reduce the amount of sealed surfaces (and runoff volumes) by considering partially permeable surfaces for parking areas and green corridors o Incorporate structures within the stormwater drainage system that can significantly reduce the speed of stormwater during high rainfall events (without creating a flooding risk). o Proper sustainable urban drainage design to be implemented, to reduce direct discharge to watercourses (e.g., storm water to drain through vegetated swales, bunds or detention ponds). o Lighting required at night to be installed as low as possible with a shield above (downlighting), and where possible being motion activated for temporary higher illumination levels when and where needed. • Create a site clearance procedure that will include the following: Some measures applicable to all biodiversity aspects of the construction phase are: o Clearly specify what will be done with cleared biomass, preferentially using it as optimally as possible, e.g., reducing leaves and branches to mulch, using smaller branches as brush-packing to control erosion or protect revegetation patches, using logs as erosion control berms, brush-fences to prevent fauna (including livestock) access, etc. Note that the burning of biomass may be prohibited. o All cuttings/cleared biomass will be raked off and removed from site on the same day they are generated, to avoid creating refugia for wildlife on active construction sites. o All daily clearing activities will be preceded by a rapid site-walk-over to detect and flush out any fauna in an appropriate manner without creating harm or undue stress to such fauna. ▪ Active breeding (nest or burrows), if present, will be marked, monitored and clearance within that location will only resume once all young offspring have independently left such site. o Include measures to minimise the spread of alien plant species as well as avoid accelerated erosion. o Limit the movement of vehicles and heavy machinery to the area currently being worked on and implement the rehabilitation plan as soon as possible. • Ensure biodiversity mitigation measures are incorporated and adequately cross-referenced in all relevant management plans and/or standard operating procedures, and further transferred to all contractors; • Designate an Ecological Field Officer who will be responsible for preparing the environmental documentation on delivery of ecological requirements on site before construction activities commence (including tree inventory).			

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				The officer will monitor construction activities to ensure that construction activities are delivered in accordance with relevant laws and Project commitments. • Project construction sites, access roads, borrow pits, storage areas and camps will be separated from other areas with appropriate signboards, signs, and fences. Similarly, areas of medium to high sensitivity (i.e., the wetland on Phase 2) will be clearly delineated and any activities (except clearing of alien plants) in that area will be avoided. • Waste generated will be managed under a Waste Management Plan. Construction waste generated due to project activities will first be stored at designated storage areas and then disposed. Solid waste will not be allowed to be left near natural habitats or on future green corridor and conservation areas, neither will this be buried or burned. o Areas where spillage of soil contaminants occurs, must be excavated (to the depth of contamination) and suitably rehabilitated. If any other minor spillage occurs the spillage must be cleaned as soon as possible, but within the same shift and the contaminated area must be reinstated. All contaminated material should be suitably (bio) treated and cleaned or disposed of. o Parking and operational areas must be regularly inspected for oil spills and covered with an impermeable or absorbent layer or grease pans (with the necessary storm water control) if oil and fuel spillages are highly likely to occur. • The washing of Project vehicles in any surface water bodies in and around the Project Roads must be prohibited. All Project vehicles must be washed at designated wash bays on site. These wash bays need to be fitted with oil/grease and sediment traps for grey water. • No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas			
C5	Habitat loss, degradation, and fragmentation; Loss of Flora and spread of invasive species	Biological receptors (Habitats, Flora)	Direct	• Ensure implementation of Alien plant control and management plan • Create physical barriers e.g. banks and ensure that clearing and landscaping will be limited to the Project site, to minimize the impacts of erosion and associated sedimentation of downstream wetlands within the Project's AoI. • The revegetation plan to be drafted will be implemented successively as soon as possible after construction in an area has been completed. o The above will require currently stockpiled topsoil to be cleared of alien plants and landscaped as soon as possible. o Choice of plants species will be restricted to indigenous species and requirements passed on to BSEZ stakeholders and will follow recommendations as to be drafted in the overall conservation/biodiversity management plan. • The wetland rehabilitation and management plan will be implemented as soon as possible during site preparation and continued during construction and operation	BSEZ LTD Ecological field officer	BSEZ LTD QHSE Manager	• Level of implementation of Re-vegetation plan • Weekly Inspection Cycle Audit • Records of engagements

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
C6	Loss of fauna; disturbance and displacement of fauna	Biological receptors (Fauna)	Direct	• Provide protection against animal entry on any excavated trenches, pipes. overflow lines, drains, and vents on tanks and vessels. Prevent egress by animals to construction areas e.g., by capping pipes at night, fencing off ditches. Any excavations that are to be left overnight are to be fenced off or covered and ramps installed (e.g., an earthen ramp or wooden board) to allow any trapped animals to escape. • All excavations are to be checked daily prior to commencement of work. • As part of Ecological management Plan, a faunal handling procedure will be drafted that will specify how which fauna needs to be handled if encountered, ensuring minimal distress and no injury: o Ensure enough staff is adequately trained to handle fauna. o Include clear measures to be taken and agencies/professionals to be engaged in the case that injured fauna is encountered and/or larger fauna may have to be relocated. • Activities such as hunting, trapping, and general disturbance of wild animals are to be prohibited. Informative and warning signs will be placed at construction site. The EPC Contractor who is liable to control labour and any sub-contractor staff in this regard will be instructed strictly on prohibitions regarding hunting and poaching control. • Maintain vehicles and equipment in good working condition. Use noise minimizing technology where possible. Maintain speed limits to reduce disturbance and risks related to fauna. • Maintain speed limits to reduce disturbance and risks related to wildlife. • Limit construction activities to daytime hours to limit impacts to nocturnal species. Where works need to take place at night, use low intensity lighting (within safe and legal limits) and/or aim lights down and away from nearby habitats. Use non-UV sources of lighting to avoid attracting animals.	BSEZ Ltd Ecological field officer	BSEZ Ltd QHSE Manager	• Weekly Inspection Cycle Audit • Records of trainings undertaken • Implementation of Ecological Management Plan • Implementation of faunal handling procedure
C7	Spread of invasive species (control and monitoring)	Biological receptors (Habitats, Flora)	Direct	• Start implementing the Alien Plant Control Plan as soon as possible across the entire Project site to reduce the amount of regenerative material being produced. Key species to be addressed due to their ability to spread rapidly include *Lantana camara, Ricinus communis, Mimosa pigra, Datura* species*, Acanthospermum hispidum, Erigeron bonariensis* and *Fucrea/Agave* species*.* o Inspect newly disturbed and re-landscaped areas on a monthly basis (increased to bi-weekly during the rainy season) for new emergence and immediate control of alien invasive plants. • After completion of construction, an operational monitoring plan will be prepared and implemented to record alien species populations in the project AoI and aimed at removing new populations and preventing them from spreading throughout the AoI. In addition, a list of alien plant and animal species that could potentially be introduced from major transport routes or surrounding areas will be drafted and consulted regularly as part of an early response action to prevent such becoming established within the BSEZ.	BSEZ Ltd Ecological field officer	BSEZ Ltd QHSE Manager	• Weekly Inspection • Level of implementation of the Alien Plant Control Plan • Evidence of Internal and external training

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				• Biological control measures will only be applied if the specific measures have been approved for application in Rwanda and have been verified as highly effective. Alternatively, labour intensive manual control of IAPs will be applied in preference to application of herbicides or other chemicals. • Vehicles and construction equipment will be washed on a regular basis and will be kept clean to minimise distribution of seeds and invasive plant material.			
C8	Temporary Direct and Indirect Employment Opportunities	Economy and Employment	Both (positive)	• Develop a Recruitment and Employment Plan (REP) • A Stakeholder Engagement Plan (SEP) will be implemented to outline how BSEZ LTD will ensure regular, open and transparent communication with all stakeholders. • Establishment of a Community Grievance Management Procedure (GMP), to promote the integration of the project into the social and economic environment and to ensure can communicate directly their concerns or complaints	BSEZ LTD HR Coordinator	BSEZ LTD HR Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Implementation of Recruitment and Employment Plan (REP) • Implementation of Stakeholder Engagement Plan (SEP) • Implementation of a Community Grievance Management Procedure (GMP)
C9	Taxes and fees, procurement and worker spending	Economy and Employment	Both (positive)	• A Local Employment and Content Plan will be developed to inform the Project's in-country value planning, specifically, with respect to the employment potential for multiple positions and the local provisioning potential through local suppliers from the area.	BSEZ LTD HR Manager	BSEZ LTD Project Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Implementation of Local Employment and Content Plan
C10	Capacity Enhancement	Economy and Employment	Both (positive)	• Develop and implement a Contractor Management Plan • Carry out training of contractors on Project Health and Safety Requirements (aligned with internal BSEZ LTD HSE Management Plan) and socioeconomic policies prior to the start of construction activities and during operations when needed. • Require the contractors develop their own E&S and H&S policies or apply BSEZ LTD's as relevant. BSEZ LTD will develop a contractor management plan to pass on E&S requirements to its contractors and monitor their effective implementation. • To maximise capacity enhancement and transfer of knowledge to local contractors and their employees, BSEZ LTD will develop formal training programs and formalise on-the-job trainings to the extent possible, including learning targets and performance monitoring.	BSEZ LTD QHSE Coordinator	BSEZ LTD QHSE Manager & Project Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of Local Employment and Content Plan

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
C11	Permanent Loss of Livelihoods and/or Household Income due to Permanent loss of access to Land and natural resources related to livelihoods in the Project footprint	Land Use and Livelihoods	Direct	• Carry on a Due Diligence Process of the land acquisition and compensation process and livelihood restoration process that have been commissioned. • Develop a Livelihood Restoration Plan (LRP) that provides the foundation for the restoration and compensation process including an entitlement matrix that will ensure adequate compensation, replacement and livelihood restoration options are provided to Project Affected People (PAPs). • Resettlement options provided by the Project will ensure that households are able to continue to access the same livelihood resources or otherwise livelihood restoration measures will be provided to adequately manage economic displacement impacts. • Land users will be compensated for the loss of their specific interest in that asset for a period of time and assisted in their re-establishment. • Engagement will be maintained with Affected Communities through the process of stakeholder engagement. A grievance mechanism will be established as early as possible in the Project development phase.	BSEZ LTD ESG Manager Government of Rwanda Contact Person on resettlement	BSEZ LTD ESG Manager and Social Committee	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Level of implementation of Livelihood Restoration Plan (LRP) • Ensure implementation of the grievance redress mechanism.
C12	Road Safety	Community Health, Safety and Security	Direct	• Develop and implement a Traffic Management Plan and a Community Health and Safety Management Plan. • BSEZ Ltd will develop and implement a Stakeholder Engagement Programme (SEP) with affected communities and land users, as well as appropriate signage/information boards (with consideration for illiteracy levels) will be required to minimise risks associated with increased traffic. • Engagements with communities to sensitize them on road safety and the increased road safety risks as a result of the project activities. Sensitize communities on anticipated increased vehicular and mobile equipment traffic transporting items to and from the site so that they can be cautious with human as well as animal/ livestock safety. • Implementation of Community Health MP (including health issues such as transmission of communicable diseases)	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Records of community sensitization about road safety risks. • Records of trainings of Drivers of Project vehicles on safe driving • Implementation of SEP, Traffic Management plan, GRM and community Health Management Plan
C13	Site Trespass and Injury	Community Health, Safety and Security	Direct	• Develop and implement a Security Management Plan that is aligned to IFC PS4 requirements. • Undertake a programme of stakeholder engagement and consultation to educate local communities of the risks of intruding into the Project site, the meaning of signs, the dangers of playing on or near equipment or entering fenced areas, as part of an awareness raising programme on community health and safety behaviours. • Select a security provider that is well versed in international conventions pertaining to security and human rights. The security contractor will undergo a due diligence process and an induction prior to working on site. They shall primarily be responsible for controlling site access and perimeter security.	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Grievance log relating to security issues between site security and community members. • Ensure implementation of the Security Management Plan.

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				• Appropriate signage and information boards will be required to minimise risks associated with restricted access in a culturally appropriate manner. • A community meeting will also be given in each of the villages concerned in the AoI. Records of the meeting and attendees should be kept. Provide access to health care for those injured by its activities. Ensure that signs are put up around work fronts and construction sites advising people of the risks associated with trespassing.			
C14	Environmental Health	Community Health, Safety and Security	Direct	• Engage with the neighbouring communities to ensure they are not disturbed by air quality or noise impacts. In case air quality levels differ from time to time, depending on the activities, the Project will need to inform communities in advance. • Mitigations proposed in other related sections (air quality, noise, resources and waste, and hydrology and hydrogeology) shall also be applicable. • All the necessary permanent and temporary routes will be adequately signalled and upgraded to secure safety to enable continuous vehicle and pedestrian traffic flow at all times with highest safety standards. • Establishment of good construction working practices (e.g., routing of construction traffic, dust suppression). • Maximization of workers originating from the AoI settlements to avoid influx and associated impacts. • Contractors will be required to operate according to best international practice.	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of Community Grievance Management Procedure and SEP
C15	Transmission of Communicable Diseases (including STDs)	Community Health, Safety and Security	Both	• Workforce, including contractors and subcontractors, will be provided with health awareness training, including a briefing of hygiene practices (such as hand washing), implementation of educational outreach to increase awareness of major communicable disease and how to protect against infection and about transmission routes and the symptoms of the communicable diseases of concerns (including STDs and HIV/AIDS). • Workers to be provided with access to an on-site medical team for first aid, occupational health concerns and advice, including a designated first aid room. • As part of its Emergency Preparedness and Response Plan (EPRP), establish preparedness medical services in case of severe illness, e.g., malaria (especially in workers without semi-immunity) by ensuring a stand-by ambulance in case of medical emergencies. • Develop and Implement an Occupational Health and Safety Management Plan. • Provide training on the worker code of conduct to all employees including contractors and subcontractors as part of the induction process. • Consult with local leaders such as village elders among others on finding ways of ensuring social vices such as prostitution are minimised either	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of Emergency Preparedness and Response Plan (EPRP)

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				through punitive measures for clients, particularly Project workers, or rehabilitative measures for the CSWs			
C16	Pressure on Healthcare	Community Health, Safety and Security	Both	• Develop and implement a Community Health MP (including health issues such as transmission of communicable diseases) • Undertake a health facility assessment of medical infrastructure as part of the BSEZ Ltd Health and Safety Management System to determine if facilities have sufficient resources and equipment to deal with emergencies. Agreements will be entered into with suitable hospitals to provide health care in emergency situations. These agreements will include provision of additional equipment or training for staff if required by BSEZ Ltd. Project-dedicated international medical providers will complement the services of the local medical facilities that could be utilised by the Project and/or • Monitor the emergence of major pandemics through WHO alerts. When the WHO Pandemic Alert Scale Reaches Level 4 BSEZ Ltd will implement the relevant ERPs. • Develop and implement an Emergency Preparedness and Response Plan (EPRP) covering the emergency situations (involving vehicles and pedestrians) that may occur during the Project construction, should be prepared and implemented by trained personnel in order to avoid significant risks.	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of Community Health MP (including health issues such as transmission of communicable diseases) and EPRP
C17	Use of Security Personnel	Community Health, Safety and Security	Direct	• Develop and implement a Security Management Plan (SMP) that aligns to IFC PS4 requirements. • Train all security personnel on the SMP	BSEZ Ltd	BSEZ Ltd	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Training records • Implementation of Security Management Plan (SMP)
C18	Worker's Rights and Labour and Working Conditions	Labour and Working Conditions	Direct	Implement a Human Resources Module – HR001 to ensure the following: • Access to clear and understandable information regarding worker's labour and working conditions. • Provision of reasonable working conditions and terms of employment and compliance with the employment laws of Rwanda as well as the ILO Conventions. • Provision of employment, compensation/remuneration and working conditions, including working hours, based on equal opportunity and fair treatment, avoiding discrimination on any aspects. • Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working or living conditions.	BSEZ Ltd HR Officer	BSEZ Ltd HR Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of Employee grievance mechanism • Ensure implementation of Influx Management Plan • Ensure implementation of Labour Management Procedure

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				• Implementation Employee grievance mechanism for the Project workers including subcontractor workforce. • Adoption of open attitude towards freedom of association and in conformance with the employment laws of Rwanda as well as the ILO Conventions. • Retrenchment preventive measures will be implemented to reduce adverse impacts as a result of termination of contracts which will consider benefits to boost worker's employment opportunities post construction where possible. Notice of dismissals will be done in due time and will manage employment expectations of the construction workforce. • Develop and implement a Labour Management Procedure • Contractor contracts will establish the right for BSEZ Ltd monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, BSEZ Ltd's policies or clauses in the contract. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers. • BSEZ Ltd and Contractors' will implement a program of socioeconomic compliance monitoring to inform internal auditing and monitoring process in the framework of an Environmental and Social Management System.			

C19	Workers' Health and Safety	Labour and Working Conditions	Direct	• Develop Community Health Management Plan (CHMP). This management system will be enforced throughout the Project including all Project personnel (including direct hire employees, advisors and consultants, contractors and sub-contractor personnel). It will include aspects such as regular training and monitoring, as well as inspections and audits.
				• Within the OHSMP, the following measures will be included:
				  ○ Identification and provision of personal protective equipment (PPE) to all concerned workers during activities to avoid health implications (e.g., dust masks, protective clothing for handling waste materials etc.).
				  ○ Pre-employment screening protocols for all employees including contractors and subcontractors which will include medical checks.
				  ○ Workers will be provided with primary health care and basic first aid at worksites.
				  ○ Only employ persons over the age of 18 and check their fitness to work through medical exams.
				  ○ Regular medical check-ups and centralised medical treatment for all workers of the Project (BSEZ LTD, contractors and subcontractors) will be provided.
				  ○ Workforce, including contractors and subcontractors, will be provided with health awareness training, including hazardous works, a significant briefing of hygiene practices (such as hand washing), implementation of educational outreach to increase awareness of major communicable diseases and how to protect against infection and about
					BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit
							• Weekly Inspection Cycle Audit
							• Ensure implementation of CHMP
							• Ensure implementation of GRM
							• Ensure implementation of Hazardous Materials Management Plan

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				transmission routes and the symptoms of the communicable diseases of concerns (including STDs and HIV/AIDS). ○ Providing suitable infrastructure, equipment, tools and machinery that safeguards the health and safety of all persons accessing the site.			
C20	Child Labour and Forced Labour	Labour and Working Conditions	Both	• Develop and implement a contractor management plan which will give provision for measures to avoid child and forced labour among contractors and in the supply chain. • Oversee if suppliers, contractors, and subcontractors comply with all applicable child labour laws and only employ workers who meet the applicable minimum legal age requirement in accordance with Rwandan laws and international standards. • Contractor contracts will specify monitoring to be undertaken by the contractor, establish the right for the Project monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, policies, or clauses in the contract regarding forced and/or child labour. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers. • In all contractor contracts the Project will make explicit reference to the need to abide by Rwandan law and international standards in relation to child labour and forced labour. • Contractors and subcontractors will need to monitor closely the potential existence of irregular forms of child and forced labour in the supply chain. Action measures and notice to BSEZ LTD will be carried out immediately if this is found.	BSEZ Ltd HR Coordinator	BSEZ Ltd HR Manager	• Bi-annual Internal Audit • Weekly Inspection labour and supply chain audits Audit • Ensure implementation of Labour management Plan • Ensure implementation of contractor management Plan and code of conduct • Ensure implementation of GRM
C21	Women's Rights (GBVH, approach to recruitment, promotion, and treatment with respect to equal opportunity)	Labour and Working Conditions	Both	• Recruitment and Employment Plan to be developed has to address the aspects and risks associated with the involvement of workforce providers. • Ensure that the recruitment process is fair and transparent, public, and open to all without discrimination, paying heightened attention to ethnic minorities and vulnerable groups. This should include a gender quota to ensure women are represented in the pool of candidates or workers, the use of inclusive vocabulary in job descriptions, as well as collaboration with local unemployment agencies. • The Labour Management Plan will include mitigation measures in relation to Gender-Based Violence and Harassment (GBVH). • In consultation with workers and their representatives, a workplace policy on violence and harassment will be adopted and implemented. • Violence and harassment and associated psychosocial risks in the management of occupational health and safety will be taken into account. • Hazards will be identified, and the risks of violence and harassment will be assed, with the participation of workers and their representatives, and to prevent and control them measures, such as ensuring access to clean, safe, secure and separate toilet and welfare facilities at work, will be	BSEZ Ltd HR Coordinator	BSEZ Ltd HR Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of Recruitment and Employment Plan • Ensure implementation of GRM • Ensure implementation of code of conduct for contractors

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				taken. Lack of access can create or exacerbate health problems for workers as well as put them at risk of violence, including sexual violence. • Workers and other persons will be provided concerned information and training, in accessible formats as appropriate, on the identified hazards and risks of violence and harassment and the associated prevention and protection measures, including on the rights and responsibilities of workers; and • Effective means of inspection and investigation of cases of violence and harassment will be ensured, including through labour inspectorates or monitoring. • Specific provisions will be implemented in the Grievance Management Procedure to manage grievances related to GBVH (e.g., the complainant will be able to communicate the grievance to a person of its preferred gender, for example, if a woman prefers to explain the grievance to another woman, that will be possible).			
C22	Disruption to infrastructure and utilities	Access to infrastructures and services	Direct	• Where infrastructure supply is suffering disruption episodes, find local solutions to be put in place. • Liaise and engage with local authorities and utilities companies to ensure continuity of supply to communities. Only short term "planned" disruption to drinking water or electricity services will be allowed. • Work with local utilities companies to ensure coordinated and rapid response to unplanned events such as damage to electric lines and water pipes. • BSEZ staff will be present at work fronts to ensure that impacts from planned disruptions are minimised and that unplanned disruptions are properly managed. • Grievance mechanism will be in place ensuring rapid response time and access to a compensation process should unplanned disruption result in loss of livelihoods that could not otherwise be avoided	BSEZ Ltd QHSE	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of SEP • Ensure implementation of GRM
C23	Unmet Expectations of Benefits	Community Cohesion	Both	• Communities will be engaged in the preparation of the Social Investment and Development Programme activities to be taken forward in the vicinity of their communities. They will then be kept informed on the progress of such activities and opportunities for their involvement will be maximised. • Release leaflets with information emphasizing the limited nature of employment and the recruitment processes and the progress of the Social Investment and Development Programme.	BSEZ Ltd ESG Manager	BSEZ Ltd ESG Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit
C24	Physical ground disturbance through earthwork activities	Cultural Heritage	Direct	A comprehensive Cultural Heritage Management Plan (CHMP) will be appropriately developed for the Project to ensure all cultural heritage resources are addressed and managed adequately. The plan will be developed and agreed pre-construction, to allow appropriate mitigation measures to be applied before any impact occurs. Items to be covered in the CHMP include (but not limited to):	BSEZ Ltd ESG Manager	BSEZ Ltd ESG Manager	• Weekly Inspection Cycle Audit • Records of cultural heritage finds.

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				• Regulator engagement with the National Directorate of Historical Heritage to agree site-specific mitigation measures; • Access management (Memorandum of Understanding with local communities regarding access and activities). Access arrangements will be made to the satisfaction of identified stakeholders through a Memorandum of Understanding agreed to by authorities and identified stakeholders, which will allow unrestricted access to Cultural Heritage resources. This memorandum should be in place before construction begins. • Establishment of exclusion zones with adequate buffer around cultural heritage sites; • Construction of noise bunds where appropriate for cultural heritage resources; • Detailed site-specific archaeological mitigation, such as pre-construction investigations, archaeological excavations, etc.; • Built heritage recording; • Chance Finds Procedure. A Chance Finds Procedure will be designed and implemented to manage any unexpected discovery of archaeological material in-line with international requirements and guidelines IFC PS8. • Cultural Heritage input into the Community Grievance Mechanism; • Mapping and protection of remaining indigenous trees, as per Section 9.2.2 General Mitigation for Biodiversity; • Grave Relocation Plan. This will be designed and implemented with the agreement of the local communities if required; and • Monitoring of mitigation measures and Mitigation Control.			• Ensure implementation of Chance Find Procedure • Ensure implementation of CHMP
C25	Greenhouse Gas Emissions from Construction activities	Climate Change	Direct	• Optimising the transport routes on the construction site. • Ensured that no machines are running when they are not needed. • Operate vehicles and other equipment in a fuel-efficient manner. • Energy efficiency specifications for new and retrofitted site accommodation will be created; • Sourcing renewable energy fuels will be considered if feasible; and/or • Energy efficiency usage among workers will be promoted	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit
C26	Construction works within BSEZ	Cumulative Impact	Both	• Engage with the Engineering, procurement, and construction contractors (EPCs) to align the implementation of specific management plans (emergency and preparedness, traffic, among others) and to evaluate potential grievances received, analysing causes for those and plan for integrated interventions. • Pay special attention to landowners/ residents in this area and should reach out early to the EPCs representatives to ensure a mutual understanding of the commonly affected persons. The SEP should include and maintain EPCs as an interested stakeholder.	BSEZ Ltd QHSE Coordinator Project Community Liaison Officers	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Ensure implementation of ESMS plan which includes emergency and preparedness, traffic, among others

TABLE 10-5: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN FOR OPERATIONAL PHASE

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
O1	Increased paved and roofed areas. Generation of liquid effluents, solid waste and sanitary sewage leading to contamination of water resources Increased runoff	Hydrology & Hydrogeology	Direct	• Implement monitoring programme for water discharge as part of the overall Environmental Monitoring Program • Develop and implement an Effluent and Waste Management and Disposal Plan • Minimise the infrastructure built on site, and/or the footprint of the infrastructure. • Controlling the number of vehicles, ensuring regular services of the vehicles in designated service areas, and limiting driving and operating on unpaved areas, can potentially reduce the impact from hydrocarbons spills on the groundwater qualities. • Implement Spill Prevention and Response Plan to ensure all fuel and mineral oil areas are within appropriately designed areas, including a floor, bunding, and an oil trap. • Develop or implement a hazardous materials management plan / Effluent and Waste Management and Disposal Plan • Implementation of Erosion and Sediment Control Plan	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Ensure implementation of Spill Prevention and management Plan, Erosion control and sediment and Control Plan, and Erosion and Sediment Control Plan • Continuous monitoring (analytics and visual). • Weekly Inspection Cycle Audit • Monthly reporting, to be included in the Monthly E&S Monitoring Report. • Records of training provided. • Data to be included in the Biannual E&S Report.
O2	Operation Machinery and Equipment	Noise	Direct	• Develop/implement Noise and Vibration Management Plan • Where practicable noisy equipment will be sited as far away as possible from receptors. • Where practicable noisy equipment will be orientated to face away from the receptors at which significant noise impacts are predicted. • Operation contractors will use alternatives to audible reversing alarms, such as visual and/ or broadband noise emitting alarm-models that provide a safe system of work; or configuring the Project work sites to maximise forward movements of mobile plant. • Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable. • Where practicable, stationary equipment will be located in an acoustically treated enclosure. • Throttle settings will be reduced, and equipment and plant turned off, when not being used. • Onsite chutes and bins will be lined with damping material. • Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked. Equipment will not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified.	BSEZ Ltd HSE Coordinator	BSEZ Ltd HSE Manager	• Weekly Inspection Cycle Audit • Ensure development and implementation of Noise and Vibration Management Plan

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				• Use of compressors, generators and pumps fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use, and positioning of all ancillary plant (e.g., generators, compressors) so as to cause minimum noise disturbance. • Fitting of mufflers or silencers of the type recommended by manufacturers. • Taking advantage of the natural topography for noise shielding. • Limiting hours of operation for specific equipment or operations.			
O3	Disturbance due to dust and disturbance due to vehicle emissions	Air Quality	Direct	• Develop/implement Air emissions Management Plan (including Dust Emissions Management) • General Operational Measures: o Where construction compounds cannot be hardstanding, use lignin-based surface sealants or watering as required to supress dust generation. o Only use cutting, grinding, or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems. o Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. o Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. o Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. o Avoid bonfires and burning of waste materials. • Mitigation specific to Track out on Hardstanding Public Roads o Use water-assisted dust sweeper(s) on hardstanding access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. o Avoid dry sweeping of large areas. o Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. o Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. o Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	BSEZ Ltd HSE Coordinator	BSEZ Ltd HSE Manager	• Ensure implementation of Develop/implement Air emissions Management Plan (including Dust Emissions Management) • Ensure implementation of Traffic Management Plan • Ensure implementation of Grievance Procedure

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
O4	Degradation of on-site, surrounding and downstream vegetation and habitats Loss of fauna; disturbance and displacement of fauna	Biological receptors (Fauna and flora)	Direct	• Develop and implement Topsoil handling, storage and re-use plan; Alien plant control and management plan; Conservation area development, management and monitoring plan; Revegetation plan; and Wetland rehabilitation plan. • Toward the end of construction, update the relevant plans as described under C6 to ensure a smooth transition of and continued implementation of such plans for the operational phase, with emphasis on wetland management and monitoring, conservation/biodiversity management plan and the alien plant control plan latter to be expanded to fauna if required) ○ Where applicable, ensure specifications of such plans (e.g. choice of plants to be used in landscaping) are carried over to relevant BSEZ site developers and/or owners and cross-referenced with the BSEZ Master Plan ○ Ensure the efficiency of the management plan actions implemented is continually monitored and improved where required. This is to be supported by the monthly review of all biodiversity incidents and other observations reported. • Reduce the speed limit within the BSEZ, especially near forest patches and wetlands, particularly at blind rises or corners, in order to reduce the risk of collisions with fauna. • Fence off the section of road in the vicinity of the wetland to direct fauna away from the BSEZ and access roads. • Proper sustainable urban drainage design to be monitored and maintained, to avoid or minimise direct discharge to watercourses (e.g., storm water to drain through vegetated swales, bunds or detention ponds). • Limit (within legal and safety limits) the intensity of lighting in the vicinity of the wetland on Phase 2 and remaining forest patches to minimise light disturbance to nocturnal fauna, such as small mammals and bats • Workers, visitors and residents will strictly be forbidden from hunting and poaching, and any other kind of illegal activities related to wildlife and indigenous flora. • Overall mitigation specified for air-quality, water management and noise will also cater for biodiversity	BSEZ ltd ESG Manager	BSEZ Ltd ESG Officer	• Ensure implementation of Topsoil handling, storage and re-use plan; Alien plant control and management plan; Conservation area development, management and monitoring plan; Revegetation plan; and Wetland rehabilitation plan • Monthly Inspection Cycle Audit • Annual internal audit • Update of management plans at least every 5 years by an independent suitably qualified entity
O5	Temporary Direct and Indirect Employment Opportunities	Economy and Employment	Both	• A Recruitment and Employment Plan ensuring that the recruitment process is fair and transparent, public and open to all regardless of ethnicity, religion or gender. • A Stakeholder Engagement Plan (SEP) will be implemented to outline how BSEZ Ltd will ensure regular, open and transparent communication with all stakeholders, concretely: • To provide clear information on the number and limited timescales of employment opportunities. • To advertise all openings in ways that are accessible to local communities.	BSEZ Ltd HR Coordinator	BSEZ Ltd HR Manager	• Bi-annual Internal Audit • Ensure implementation of GRM, SEP and Recruitment and Employment Plan

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				• A Community Grievance Management Procedure will be implemented to ensure that individuals who have concerns or complaints about the Project or wish to Report their potential expectations or concerns related to local economy and employment can communicate directly with the Project.			
O6	Regional and National economic development	Economy and Employment	Both	• The maximization measures that will be established in order to manage the "Temporary Direct and Indirect Employment Opportunities" above, will be also used to address this impact, through the Recruitment and Employment Plan (REP), the Stakeholder Engagement Plan (SEP), and the Grievance Mechanism.	BSEZ LTD HR Manager	BSEZ LTD HR Manager	• Weekly Inspection Cycle Audit • Bi-annual Internal Audit • Ensure implementation of GRM, SEP and Recruitment and Employment Plan
O7	Permanent Loss of Livelihoods and/or Household Income due to Permanent loss of access to Land and natural resources related to livelihoods in the Project footprint	Land Use and Livelihoods	Direct	• Implement a Livelihood Restoration Plan (LRP) that provides the foundation for the restoration and compensation process including an entitlement matrix that will ensure adequate compensation, replacement and livelihood restoration options are provided to Project Affected People (PAPs). • Resettlement options provided will ensure that households are able to continue to access the same livelihood resources or otherwise livelihood restoration measures will be provided to adequately manage economic displacement impacts. • Land users will be compensated for the loss of their specific interest in that asset for a period of time and assisted in their re-establishment. • Engagement will be maintained with Affected Communities through the process of stakeholder engagement. A grievance mechanism will be established as early as possible in the Project development phase.	BSEZ LTD ESG Manager	BSEZ LTD ESG Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of LRP
O8	Environmental Health	Community Health, Safety and Security	Both	• Implement a Community Health Management Plan (CHMP) • A Stakeholder Engagement Plan will be implemented to outline how BSEZ LTD will ensure regular, open, and transparent communication with all stakeholders. • A Community Grievance Management Procedure will be implemented to ensure that individuals who have concerns or complaints about the Project or wish to Report their potential expectations or concerns related to local community Health and Safety concerns can communicate directly with the Project. • Mitigations proposed in other related sections (air quality, noise, resources and waste, and hydrology and hydrogeology).	BSEZ LTD QHSE Manager	BSEZ LTD QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of CHMP and SEP
09	Transmission of Communicable Diseases and STDs	Community Health, Safety and Security	Indirect	• BSEZ Ltd will maintain all provisions of the existing HSE management system and its Occupational Health and Safety Management Plan, Community Health Management Plan (CHMP) and Emergency	BSEZ LTD QHSE Manager	BSEZ LTD QHSE Manage	• Bi-annual Internal Audit

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				Preparedness and Response Plan in line with Rwanda regulations as well as IFC standards. • Encourage that all industrial units, as well as other contractors and subcontractors, are aligned with environmental, health and safety, and social and governance practices of the national.			• Weekly Inspection Cycle Audit • Ensure implementation of Community Health Management Plan. • Ensure implementation of Emergency Preparedness Plan.
O10	Pressure on Healthcare	Community Health, Safety and Security	Indirect	• BSEZ LTD will maintain all provisions of the existing HSE management system and its Occupational Health and Safety Management Plan, Community Health, and Safety Management Plan (CHSMP) and Emergency Preparedness and Response Plan in line with Rwanda regulations Encourage that all industrial units, as well as other contractors and subcontractors, are aligned with environmental, health and safety, and social and governance practices of the national.	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manage	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of Community Health Management Plan. • Ensure implementation of Emergency Preparedness Plan.
O11	Workers' Rights	Labour and Working Conditions	Both	• Ensure that operations comply with Rwandan regulations. • Maintain a Worker grievance mechanism that will be accessible to all workers, whether permanent or temporary, directly, or indirectly employed. Contractors and sub-contractors will be required to put in place a worker grievance mechanism. The BSEZ Ltd worker grievance mechanism shall be open to the contractor and subcontractor workforce in the event that their grievance is not adequately resolved by their direct employer. BSEZ Ltd will then have the authority to act to resolve this grievance.	BSEZ Ltd QHSE Coordinator	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of LMP and Contractor management Plan • Ensure implementation of GRM
O12	Workers' Health and Safety	Labour and Working Conditions	Both	• Implement an Occupational Health and Safety Management Plan (OHSMP) • Maintain the Grievance Management Plan that will ensure the delivery of grievances and workers concerns.	BSEZ LTD QHSE Coordinator	BSEZ LTD QHSE Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of OHSMP

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
O13	Child Labour and Forced Labour	Labour and Working Conditions	Both	• Implement a Contractor Management Plan which will provision for measures to avoid child and forced labour among contractors and in the supply chain. • Oversee if suppliers, contractors, and subcontractors comply with all applicable child labour laws and only employ workers who meet the applicable minimum legal age requirement in accordance with national standards. • Contracts will specify monitoring to be undertaken by the contractor, establish the right for the Project monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, policies, or clauses in the contract regarding forced and/or child labour. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers. • In all contractor contracts the Project will make explicit reference to the need to abide by Rwandan law and international standards in relation to child labour and forced labour. • Contractors and subcontractors will need to monitor closely the potential existence of irregular forms of child and forced labour in the supply chain. Action measures and notice to BSEZ Ltd will be carried out immediately if this is found.	BSEZ Ltd HR Coordinator	BSEZ Ltd HR Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of LMP and Contractor management Plan • Ensure implementation of GRM
O14	Benefits from improvements to infrastructure and services	Access to infrastructures and services	Both	• Carry out programs and initiatives to promote employment and social benefits to neighbouring communities, specially to the villages in the AoI. • As part of the Stakeholder Engagement Plan conduct awareness sessions to explain the benefits from Project development, the mitigation measures implemented and a point person to contact in case of emergency etc. in order to alleviate potential concerns. • Ensure through Grievance Management Procedure that all concerns or problems regarding the infrastructure operation are being managed and acknowledged	BSEZ Ltd ESG Manager	BSEZ Ltd ESG Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of GRM and SEP
O15	Disturbance from the presence of the workforce	Community Cohesion	Indirect	• Communication will be based on the principle of transparency and clarity, clearly explaining the selection process and criteria. • Ongoing dialogue between the Project and local communities to assist in information sharing with regard to employment practices and the use of non-local staff. • Relevant Project information in particular those related to environmental and socioeconomic impacts, employment and project benefits will be disclosed at the local level in a manner that is accessible, understandable and culturally appropriate for those affected. • A Social Investment and Development Programme will be developed by BSEZ Ltd in consultation with local communities, with active engagement required to determine the location and nature of investments. All stakeholders will be kept informed on the progress of investment activities and opportunities.	BSEZ Ltd ESG Manager	BSEZ LTD ESG Manager	• Bi-annual Internal Audit • Weekly Inspection Cycle Audit • Ensure implementation of SEP and GRM

Item	Activities (source of impact)	Environmental component affected	Nature of impact (D/I)	Recommended mitigation measures (Summary)	Implementation manager	Monitoring manager	Source of verification
				• Information about the Community Grievance Mechanism Procedure will be shared amongst local communities. Ensure proper management of a grievance mechanism that allows communities and employees to raise complaints.			
O16	Operation of the basic infrastructure within BSEZ Ltd	Cumulative Impact	Both	• Engage with the other Contractors/developers in the SEZ to align the implementation of specific management plans (emergency and preparedness, traffic, waste, drainage among others) and to evaluate potential grievances received, analysing causes for those and plan for integrated interventions. • On the areas identified as having high potential for significate severance impacts, detailed analysis should be developed to minimize mobility constraints for the affected populations. • Emergency Preparedness and Response Plans should be aligned, and common drills should be performed. • Engage with local public to better understand impacts on them specially those related to noise and air quality. • Require the tenants in the Project area to conduct proper E&S assessment & Cumulative Impact Assessment (CIA) study prior construction phase as per national requirements applied to this ESIA (including ESMMP).	BSEZ Ltd QHSE Manager	BSEZ Ltd QHSE Manager	• Bi-annual Internal Audit • Ensure implementation of ESMS Plan which includes emergency and preparedness, traffic, waste, drainage among others

11 CONCLUSIONS AND RECOMMENDATIONS

The ESIA process undertaken identified and assessed a range of potential impacts to the physical, biological, and social environment. Where impacts have been identified, appropriate mitigation measures have been provided in the ESIA. It should be noted that for many of the impacts identified, the proposed mitigation measures will reduce the significance of the impacts to a minor or negligible level. However, for some impacts, even with mitigation, residual impacts will remain. Those impacts that have a moderate to major post-mitigation (residual) significance, and which will require careful and consistent ongoing management, include:

- Ground disturbance and clearing of vegetation, as well as the movement of large machinery may contribute to the further distribution and/or establishment of alien invasive flora, leading to further degradation of natural and modified habitats.
- Cultural heritage impacts associated with ground disturbance through earthworks would lead to loss of umibirizi indigenous medicinal plant. Direct impacts may not be reduced unless the principle of avoidance is adopted in the first instance by way of re-design. Given the plants straddles the Project boundaries, establishment of exclusion zones with adequate buffer in these areas would minimize anticipated impacts.
- Permanent Loss of Livelihoods and/or household income due to Permanent loss of access to land in the Project footprint. Impacts originally triggered during the construction phase will lead to loss of space used for growing edible crop.

The ESIA process should not stop with the submission of this ESIA report and associated Environmental and Social Management and Monitoring Plan (ESMMP) to the RDB. Upon submission, there will be need for continued work to address anticipated impacts highlighted in the ESIA Report. Monitoring will be conducted (by internal and/or external auditors) to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts. Where any changes are proposed in the future, these will be assessed in terms of their potential to alter the ESIA findings and if necessary, mitigation / management measures included in the ESMMP will be amended to ensure negative impacts are mitigated and positive impacts enhanced.

To provide the vehicle for the integrated management of the potential impacts identified in the ESIA (both positive and negative) the existing Environmental and Social Management System (ESMS) will need to be updated to reflect the findings of this ESIA. The updated ESMS will provide a mechanism for ensuring that mitigation measures identified in the ESIA and associated ESMMP are adequately implemented. Moreover, the ESMS provides a framework for monitoring, compliance auditing and inspection programmes, which assist the Project in meeting its commitments, as stipulated in Rwandan regulations, lender standards (primarily the IFC PSs), and as required by the Contractor.

As the primary title holder to BSEZ, it is understood that investors will acquire plots within BSEZ for the purpose of development of industrial units/logistics facilities. These

facilities will be required to undertake site specific ESIA and submit to RDB for authorization prior to commencement of construction and operation activities. As these facilities and activities will not be under the direct control of BSEZ Ltd, BSEZ Ltd cannot reasonably be liable for the assessment and management of environmental and social risks and impacts at these sites. However, BSEZ Ltd should accept a duty of care to ensure that investors manage their environmental and social risks to a level that:

a) Meets the legal requirements in terms of the Environment organic law No. 48/2018; and

b) Achieves a level of management that is consistent with BSEZ Ltd's own environmental and social commitments.

In order to effect duty of care, it is recommended that BSEZ Ltd contractually imposes BSEZ Ltd's Environment, Health and Safety (EHS) code of conduct of investors and Units that guides the general environment, social health and safety operations of BSEZ. The specific content of these obligations is outside the scope of the current ESIA mandate.

Provided that all the social and environmental mitigation / management measures provided in this ESIA and associated ESMMP are implemented, potential negative impacts from the project will be reduced and positive impacts enhanced.

12 REFERENCES

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APPENDIX A EARTH SYSTEMS RWANDA CONSULTANCY REGISTRATION AND PRACTICING LICENCES

APPENDIX B LAND TITLE DEED OF THE PROJECT SITE

APPENDIX C MINUTES OF MEETING BETWEEN RDB, ARISE & ERM ON ESIA APPROACH

APPENDIX D STAKEHOLDER ENGAGEMENT PLAN (SEP)

APPENDIX E DETAILED MINUTES OF STAKEHOLDER ENGAGEMENT MEETINGS CONDUCTED DURING THE ESIA PROCESS, INCLUDING ATTENDANCE REGISTERS/ STAKEHOLDERS' COMMENTS

APPENDIX F 2011 EIA LICENSE

APPENDIX G TRAFFIC ASSESSMENT

APPENDIX H BSEZ CLIMATE CHANGE RISK ASSESSMENT

APPENDIX I GREENHOUSE GAS ASSESSMENT

APPENDIX J LIST OF AVIFAUNA SPECIES RECORDED

APPENDIX K CULTURAL HERITAGE BASELINE GAZETTEER

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