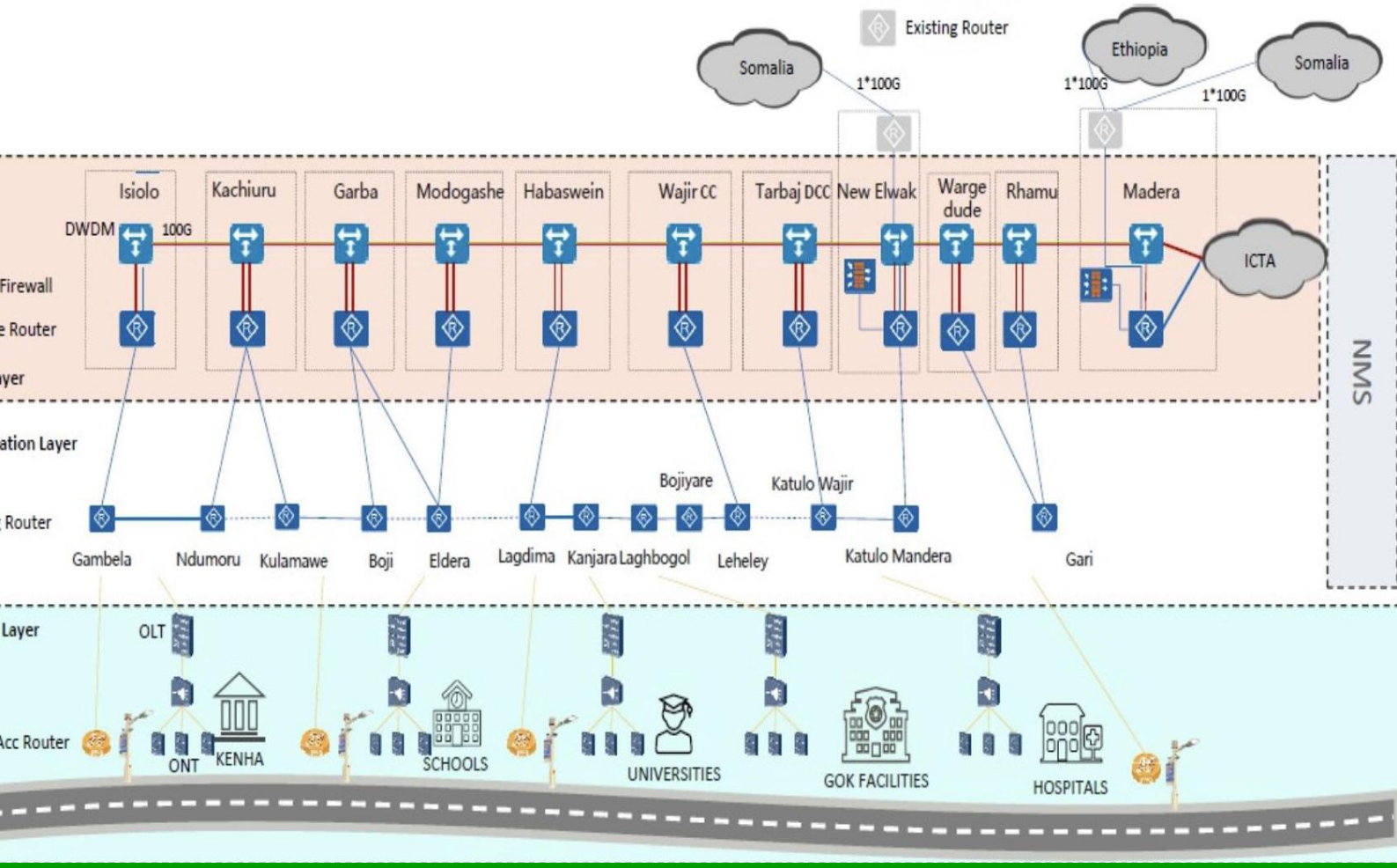


Information, Communication & Technology Authority (ICTA)

Proposed Construction/Installation & Operation of an Optic Fiber Cable (OFC) & Related Services along Isiolo-Mandera Road

ESIA Full Study Report

May 2025

Ambuya John
EIA Lead Expert
NEMA Registration No. 8618

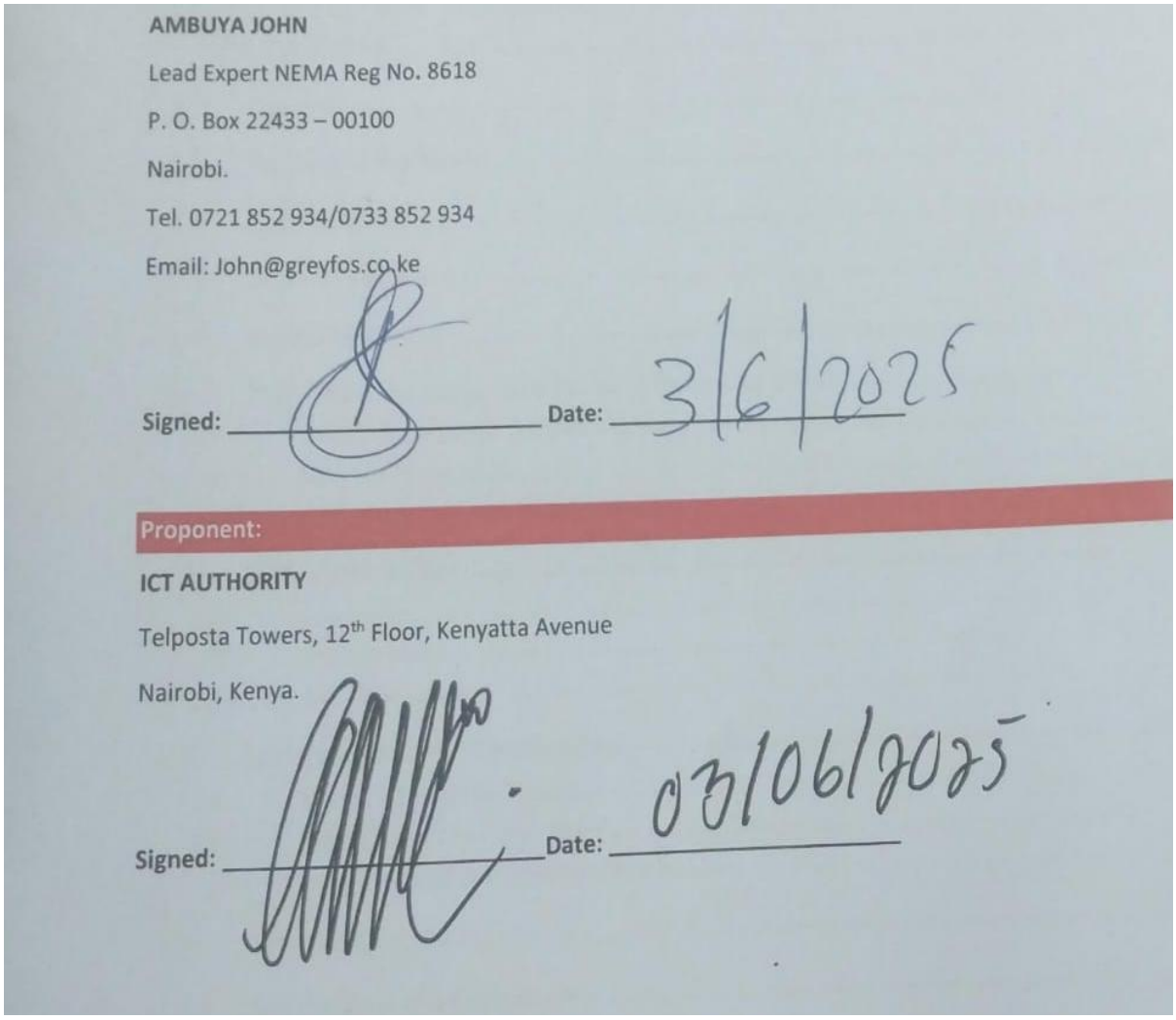
CERTIFICATION

Ambuya John submits the following Environmental and Social Impact Assessment (ESIA) Full Study Report (FSR) for the proposed construction/installation and operation of a high-capacity optic fiber cable (OFC) and related services along the Isiolo-Mandera Road.

We, certify that the information provided is accurate and truthful.

Proponent:	ICT Authority
Assignment:	ESIA for the proposed construction/installation and operation of a high-capacity optic fiber cable (OFC) and related services along the Isiolo-Mandera Road.
Report Title:	Environmental and Social Impact Assessment Full Study Report

ESIA Expert:



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This ESIA was successfully executed through the significant contributions and unwavering support of various experts, institutions, and stakeholders, to whom sincere appreciation is extended.

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Finally, the valuable contributions of ESIA Associate Expert, Mr. Orwe Elly, are acknowledged with great appreciation for his dedicated efforts in data collection, synthesis, and the preparation of this ESIA report.

ACRONYMS

Abbreviation	Full Form
BID	Background Information Document
BoQs	Bills of Quantities
CIDPs	County Integrated Development Plans
DARE	Djibouti Africa Region Express
E&S	Environmental and Social
EARTTDFP	Eastern Africa Regional Transport, and Trade Development Facilitation Programme
EASSy	East Africa Submarine System
ECSMP	Environment Climate and Social Management Plan
EEZ	Kenya's Exclusive Economic Zone
EHS	Environmental, Health and Safety
EHSGs	World Bank Group Environmental Health and Safety Guidelines
EMCA	Environmental Management and Co-ordination Act
ESF	Environmental and Social Framework
ESHS	Environmental, Social, Health and Safety
ESIA	Environment and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESSs	Environmental and Social Standards
FGDs	Focus Group Discussions
FGM	Female Genital Mutilation
FSR	Full Study Report
GBV	Gender-based Violence
GIIP	Good International Industry Practice
GIS	Geographic Information System
GoK	Government of the Republic of Kenya
GPN	Good Practice Note
GPS	Global Positioning Systems
GSM	Global System for Mobile Communications
GVRC	Gender Violence and Recovery Centre
HoAGDP	Horn of Africa Gateway Development Project
ICG	Isiolo County Government
ICTA	ICT Authority
IFC	International Finance Corporation
IPF	Investment Project Financing
IPV	Intimate Partner Violence
KDEAP	Kenya Digital Economy Acceleration Project
KDHS	Kenya Demographic and Health Survey
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KFS	Kenya Forest Service
KIIs	Key Informant Interviews

Abbreviation	Full Form
km^2	Kilometer square
KURA	Kenya Urban Roads Authority
KWS	Kenya Wildlife Service
m/s	Meter per Seconds
MCDA	Ministries, Counties, Departments and Agencies
NCA	National Construction Authority
NEMA	National Environment Management Authority
NGAOs	National Government Administrative Officers
OFC	Optic Fibre Cable
OGN	One Government Network
OHS	Occupational Health and Safety
PAI	Project Area of Influence
PDOs	Project Development Objectives
PEACE	Pakistan and East Africa Connecting Europe
PEP	Post Exposure prophlaxis
POM	Project Operation Manual
PPE	Personal Protective Equipment
PPP	Private Public Partnership
PWDs	People with Disabilities
RAP	Resettlement Action Plan
RDI	Raia Development Initiative
SEA/SH	Sexual Exploitation and Abuse, and Sexual Harassment
SEP	Stakeholder Engagement Plan
SGBV	Sexual and Gender-Based Violence
SRN	Smart Roads Network
SSIs	Semi-Structured Interviews
SWMA	Sustainable Waste Management Act
TORs	Terms of Reference
VMGs	Vulnerable and Marginalized Groups
VOC	Volatile Organic Compounds
WACS	West African Cable System
WB	World Bank
WCE	Wajir Women Council of Elders
WIBA	Work Injury Benefit Act
WRA	Water Resources Authority
$\mu g/m^3$	Micro gram per cubic meter

EXECUTIVE SUMMARY

Today, the Kenyan environment faces numerous challenges, primarily due to unsustainable development projects that have resulted in environmental degradation. To address this issue, the Kenyan Government enacted the Environmental Management and Coordination Act (EMCA), Cap 387. This legislation established the National Environment Management Authority (NEMA) with the statutory mandate to supervise and coordinate all environmental management activities. Under EMCA, Cap 387, it is a mandatory requirement that all new development projects must meet economic viability, social acceptability, and environmental soundness criteria. Consequently, all new development projects are required to undergo an Environmental and Social Impact Assessment (ESIA). ESIA evaluates the environmental and socio-economic impacts of a proposed project before its implementation. This assessment identifies potential environmental and social impacts and proposes mitigation measures for adverse effects.

The Environmental (Impact Assessments and Audit) Regulations, 2003, govern environmental impact assessments (ESIA) and audits (EAs). The second schedule of the EMCA, Cap 387, lists projects requiring ESIA, classifying them as Low, Medium, or High-risk. Low- and medium-risk projects must submit an EIA Summary project Report (SPR) and Comprehensive Study Report (CPR), respectively, while high-risk projects must submit an EIA Full Study Report (FSR) to NEMA. The construction/installation of a high-capacity optical fiber cable (OFC) and related services along Isiolo-Mandera Road is a high-risk project, so an FSR has been prepared for submission to NEMA. The ESIA study complies with World Bank's Environment and Social Framework (ESF), 2017, which includes Environmental and Social Standards (ESSs), Environmental, Health and Safety Guidelines (EHSGs), and Good Practice Notes (GPNs).

Information, Communication and Technology Authority (hereafter referred to as the Project Proponent/ICTA), appointed **Ambuya John**, a registered EIA Lead Expert, Registration number 8618, to carry out the ESIA study for the proposed project. This was to comply with the EMCA, Cap 387. The Project involves the installation and operation of a high-capacity OFC backbone and related services. Specific project components are:

- Backbone Network: 741.75 km (main route);
- Metro Networks: 62.018 km (urban areas); and
- Access Network - 194.517 Km (Connectivity to Institutions). A total of 341 Institutions have been identified for connection, these include Government Institutions, Health Facilities, Schools, Technical and Vocational Education and Training (TVETs) and Community Centers.

Notable environmental and social impacts from the construction phase include employment creation and local economy stimulus, emissions to air, noise, inadequate labour and working conditions includes occupation health and safety (OHS), sexual exploitation and abuse/sexual harassment/gender-based violence (GBV), effluent and waste generation, exclusion of vulnerable and marginalized groups (VMGs) from project benefits. Notable environmental and social impacts from the operations phase are employment creation and local economy stimulus, hazardous waste

generation, inadequate labour and working conditions includes OHS, exclusion of VMGs, community health and safety risks such as unsafe buildings, cybersecurity, digital GBV, etc. For each identified environmental and social risk and impact, mitigation/management measures have been prescribed. Further, an environmental and social management plan (ESMP) has been prepared and details these risks and impacts, their mitigation measures, responsibilities, completion indicators, frequency of monitoring, and budget, as necessary.

Ambuya John, EIA Lead Expert, is confident that every effort will be made by the Project Proponent and Contractor to accommodate the mitigation measures recommended during the ESIA process to the extent that is practically possible, without compromising the economic viability of the Project or having a lasting negative impact on the environment. As such, based on the findings of this assessment, there is no reason why the Project should not be authorized, contingent on the mitigations and monitoring for potential environmental and socio-economic impacts as outlined in the ESMP.

1 INTRODUCTION

1.1 Overview

ICT Authority (hereafter referred to as the Project Proponent/ICTA), appointed Ambuya John to act as independent environmental and social (E&S) consultant to undertake the Environmental and Social Impact Assessment (ESIA) for the construction and operation of the high-capacity optical fiber cable (OFC) and related services along Isiolo-Mandera Road (hereafter referred to as the Project). Ambuya John is a NEMA-registered and practicing lead expert (Registration Number NEMA/EIA/RC/8,618 and 2025 practicing License Number NEMA/EIA/ERPL/23,050) – refer to Appendix A.

The Project Site is 740-kilometer (km) Isiolo-Mandera Road corridor: 741.75 km Backbone Network; 62.018 km Metro Network; and 194.517 km of Access Network along the route. This also covers settlements and towns within 10 km on either side of the Road as spurs along the corridor.

The project aims to improve digital services along the road corridor and within the major towns. To achieve that, ICTA will be installing a new OFC traversing the counties of Isiolo, Meru, Wajir, Garissa and Mandera. The project scope also includes the construction of fiber spurs and rings, provision of connectivity points for selected schools, hospitals and other strategic locations including pastoralist roadside markets, rest stops, community and service centers along the corridor as well as also connecting community information centers along the corridor with fiber optic connections.

A detailed description of the Project components is presented in *Chapter 3* of this report.

This ESIA Full Study Report (FSR) has been compiled as part of the Kenyan Environmental Impact Assessment (EIA) Process in accordance with regulatory requirements stipulated in the Environmental Management and Coordination Act (EMCA), Cap 387, and the Environmental (Impact Assessment and Audit) regulations, 2003. The ESIA has also been undertaken in line with the requirements of World Bank Environmental and Social Standards (ESSs).

1.2 Purpose of the Report

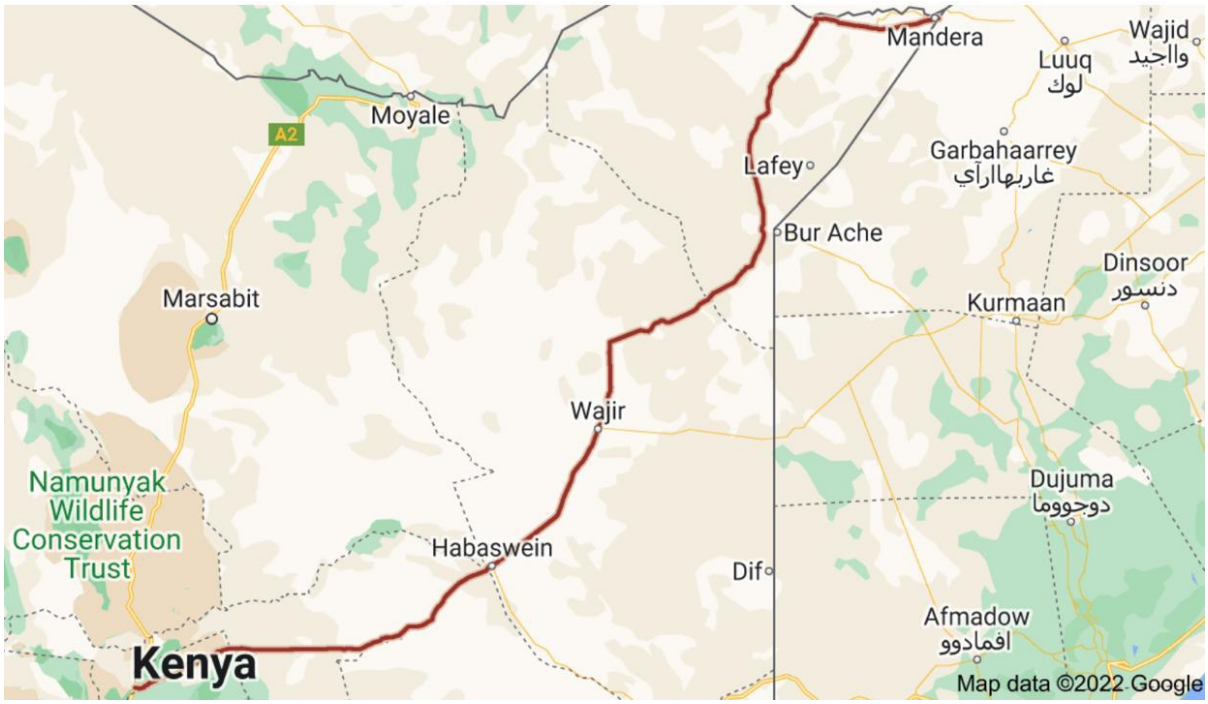
The information contained in this ESIA FSR, along with comments and inputs received from stakeholders and commenting authorities, will assist the competent authority, the National Environment Management Authority (NEMA), in deciding whether to grant environmental authorization for the proposed Project, and to inform the conditions associated with such authorizations.

The ESIA process involves the identification, prediction and evaluation of actual and potential E&S impacts of the Project and outlines the proposed mitigation measures for negative impacts and enhancement measures for positive impacts which the Project Proponent will implement.

The objectives of this document are to:

- Communicate the results of the ESIA process for the proposed Project and alternatives considered;
- Ensure that the impacts identified during the ESIA process are assessed;

- Present the mitigation and enhancement measures which will be implemented by the Project Proponent to manage the impacts identified;
- Provide a record of comments and responses received from stakeholders during the ESIA process; and
- Facilitate an informed decision-making process by the relevant authorities.



Map 1-1 Isiolo-Mandera Road – OFC Backbone Network

1.3 Project Justification

There are limited territorial fiber optic links between Kenya and Ethiopia and none with Somalia. High-capacity submarine cables, such as Djibouti Africa Region Express (DARE) and Pakistan and East Africa Connecting Europe (PEACE), are within the vicinity of Horn of Africa (HoA) and offer opportunities for comprehensive regional digital connectivity. The proposed project will support various investments for the extension of backbone territorial fiber optic cables for improving regional and national digital connectivity.

Northeastern Kenya exhibits high costs of internet access and in some areas, absence of fiber optic cable links. The poor condition of the limited fiber optic cable network in Northeastern Kenya is a major hindrance to effective communication. This poses a challenge as governments in the region continue to embrace the use of ICT in the delivery of public services including customs clearances, vehicle registration and inspection, issuance of driver's licenses, and the like.[1]

[1] HoAGDP Project Appraisal Document (PAD)

1.4 Project Proponent

The Project Proponent, ICTA, is a statutory body within the Ministry of ICT and Digital Economy (MICDE). ICTA was established in 2013 vide Gazette Supplement No. 118, Legal Notice No. 183. ICTA's broad mandate entails enforcing ICT standards in government, establishing, developing and maintaining secure ICT infrastructure systems, supervision of electronic communications, as well as promoting digital literacy, capacity, innovation and enterprise.[2]

1.5 Project Objective

The objective of the Horn of Africa Gateway Development Project (HoAGDP) subcomponent on laying high-capacity OFC is to enhance digital connectivity and improve access to social services for communities along the targeted sections of the Isiolo-Mandera Road Corridor. The project aims to connect at least 341 public institutions, enhancing digital learning and improving access to government services.

1.6 ESIA Objective, Scope, and Terms of Reference (TOR)

1.6.1 Overall Objective of the ESIA Full Study

The overall objective of the ESIA full study is to ensure the proposed OFC project is sustainable, socially and environmentally. The study will also ensure that all positive and adverse E&S risks and impacts associated with the construction and operation of the proposed Project, including associated /ancillary works and linked activities, if any, are assessed, evaluated and addressed as part of the mitigation measures incorporated into the project's full Final Design, as applicable.

The specific objectives of the assignment are to:

1. Carry out and ESIA, for the proposed laying of 740 kilometers OFC and associated works;
2. Prepare Environmental Social Management Plan (ESMP) and Stakeholder Engagement Plan (SEP) based on findings;
3. Ensure that all positive and adverse impacts associated with the implementation of the fiber optic cable works, including all associated works and linked activities are considered; and
4. Propose mitigation measures for the potential significant adverse E&S impacts and safety risks associated with the proposed Project site and activities.

1.6.2 ESIA Full Study Scope

The consultant is expected to undertake the following tasks:

- Provide a detailed description of the proposed OFC project, and delineate its Project Area of Influence (PAI);
- Collect and collate baseline data – physical, biological, socio-economic and cultural;
- Review of policy, regulatory, and institutional framework;
- Conduct stakeholder engagement;
- Identify and analyze project E&S risks and impacts;

[2] https://www.icta.go.ke/page?q=6&type=about_ict_authority#:~:text=The%20Authority's%20broad%20mandate%20entails,%2C%20capacity%2C%20innovation%20and%20enterprise.

- Analysis of alternatives;
- Develop an ESMP to mitigate negative impacts; and
- Prepare an ESIA FSR and submit to NEMA for review, approval and licensing.

1.6.3 Terms of Reference (TOR) for the ESIA

The TORs for the proposed project ESIA are in accordance with the EMCA, Cap 387, and Environmental (Impact Assessment and Audit) regulations of 2013:

1. Describe location/site, objectives, scope, nature of the proposed project;
2. Describe the proposed project activities during the project cycle; pre-construction, construction operation, decommissioning phases;
3. Analyze materials to be used in the construction and implementation of the project, and wastes to be generated proposing alternative/appropriate options/technologies;
4. Establish the suitability of the proposed project in the proposed location;
5. Review and establish all relevant baseline information as will be required by NEMA (physical, biological and social cultural and economic) and identify any information gaps;
6. Describe and analyze the policy, legal and institutional framework including but not limited to Kenyan policies, laws, regulation and guidelines; international guidelines related to the proposed project, which have a bearing on the proposed project and will also serve as benchmarks for monitoring and evaluation, and future environmental audits;
7. Undertake an in-depth description of the proposed project and associated works together with the requirements for carrying out the works;
8. Analyze the efficacy of the designs, technology, procedures and processes to be used, in the implementation of the works;
9. Carry out Consultation and Public Participation (CPP): Identify key stakeholders and affected persons; and hold a public meeting (as need be) and provide /collect written evidence i.e. minutes/questionnaires;
10. Identify and analyze proposed project alternatives including but not limited to Project site alternatives, no project alternatives, design alternatives, material alternatives and technologies alternatives;
11. Identify, predict and carry out in-depth analysis of all actual potential and significant impacts on flora, fauna, soils, air, water, the social, cultural and community settings; the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated to be generated by the proposed project, both positive and negative throughout the project cycle;
12. Analyze occupational health and safety issues associated with the proposed project;
13. Recommend sufficient enhancement and mitigation measures for all the potential positive and negative impacts identified and analyzed;
14. Develop an ESMMP proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures;
15. Prepare a draft Full ESIA study report in accordance with EMCA, Cap 387, and legislation under it and submit a draft report to the client for review;
16. Incorporate comments into the ESIA study report after review by client into a final ESIA study report;
17. Submit 5 hard copies and one soft copy of the ESIA study report to NEMA for the purposes of seeking a NEMA license that will approve the proposed project; and
18. Submit to the client one copy of NEMA referenced ESIA study report, one soft copy of the ESIA study report and acknowledgment letter from NEMA.

1.7 ESIA Methodology

1.7.1 Screening

The Project was screened to determine the need to undertake an ESIA based on:

- Project characteristics;
- PAI characteristics;
- The Second Schedule of EMCA and Environmental (Impact Assessment and Audit) Regulations of 2003, which lists the projects that must undergo an EIA; and
- World Bank Environmental and Social Standards (ESSs).

Based on the above criteria, it was concluded that an ESIA resulting in the preparation of an ESIA FSR would be required for the Project due to the following aspects:

- The EMCA (Impact Assessment and Audit) Regulations of 2003 classifies Telecommunication Infrastructure as Medium Risk;
- The fact that the proposed Project traverses several counties (Isiolo, Meru, Garissa, Wajir, and Mandera) inhabited by vulnerable and marginalized groups (VMGs)[3] and communities; and
- The nature and extent of the potential impacts of the Project plus related services such as construction of fiber spurs and rings, provision of connectivity points for selected schools, hospitals and other strategic locations including pastoralist roadside markets, rest stops, community and service centers along the corridor as well as also connecting community information centers along the corridor with fiber optic connections.

1.7.2 Desk Reviews

A literature review was undertaken based on the findings of the reconnaissance process, which involved reviewing legislation and policies, World Bank ESSs, HoAGDP Project Appraisal Document (PAD), OFC Project Design Document, Kenya Digital Economy Acceleration Project (KDEAP) environmental and social management framework (ESMF) and the County Integrated Development Plans (CIDPs), and previous studies carried out in the area (especially those on road construction) to determine the baseline conditions and establish the legal, institutional, and biophysical/socio-economic environmental setting of the Project area.

The desk-based study also included the development of fieldwork tools, fieldwork schedules as well as the approach to stakeholder engagement as outlined in the Stakeholder Engagement Plan (SEP) (Appendix F of this FSR).

1.7.3 Site Visits

A site investigation was undertaken from March 11, 2025-April 12, 2025, during which detailed E&S baseline data was collected and preliminary stakeholder engagement undertaken. Data was collected through:

- Meeting (Public Baraza with key stakeholders);

[3] Women, youth, People with Disability (PWDs), the elderly and their caregivers.

- Sharing the Project's Background Information Document (BID), and presented as Appendix C to identified formal stakeholders and requesting them to share their views/ comments on the Project;
- Focus Group Discussion (FGD) with VMGs and county government officials; and
- Site walkovers.

Photography and Global Positioning Systems (GPS) were used to record the salient features and baseline conditions at the Project site and surroundings.

1.8 Impact Assessment Methodology

1.8.1 Impact Assessment Process

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 minimize any potential adverse effects and to enhance potential benefits.

The impacts of the Project were identified based on the findings of stakeholder consultation, the existing baseline conditions, the Project activities, and professional knowledge of the consultants. Impacts are first distinguished as either positive or negative. The cross-sectoral issues and aspects are terrestrial habitat alteration, hazardous materials and waste, emission to air, noise and vibration; social aspects particularly employment and economy, labour and working conditions, exclusion of VMGs from project benefits, and partial loss of access to productive assets.

1.8.2 Definition of Key Terminology

Project - The features and activities that are a necessary part of the Project Proponent's development plans without which the Project cannot proceed. The Project is also the collection of features and activities for which authorization is being sought.

Project Site - The (future) primary operational area for the Project activities.

Project Footprint - The area that may reasonably be expected to be directly affected by Project activities, across all phases. The Project footprint includes land used on a temporary basis such as materials yards, or construction haul roads, as well as disturbed areas in transport corridors, both public and private.

PAI -The area where impacts could reasonably be expected.

Project Area - Also referred to as the Study Area is the area that needs to be studied to adequately understand and describe the baseline likely to be affected by the Project. The Project Area encompasses the Project footprint, Project site and the PAI.

1.8.3 Determination of Impact Significance

Table 1-1**Error! Reference source not found.** below shows the four areas of impact significance (Negligible, Minor, Moderate, and Major) and how they are determined based on sensitivity and magnitude. Sensitivity and magnitude values range from 1 to 4 as follows; very low = 1, low = 2,

medium = 3, or high = 4. Environmental and social impact significance is determined by multiplying the sensitivity and magnitude values for each identified impact.

Table 1-2Table 1-2 on the other hand, gives examples of the types of impacts that would be assigned the different grades of significance value shown in Table 1-2.

Table 1-1 Determination of Impact Significance

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

Table 1-2 Illustration of Impact Significance

Aspect	**Impact**	**Significance**
Legislative Compliance	Expected non-compliance with national regulatory standards.	>9 Major
	Potential for non-compliance with national regulatory standards.	6-9 Moderate
	Expected compliance with national regulatory standards or no regulations and standards apply.	<6 Minor
Biophysical	• Long-term (>10 years) and widespread changes to habitat or ecosystem features, structures, or functions that reduce its integrity, affect the ability to sustain valued components, and may require extensive intervention. The habitat/ ecosystem may not recover to its baseline state. • Major change to the visual quality, setting, and feeling associated with the landscape. • Widespread and permanent change to hydrology and hydrogeology.	>9 Major
	• Changes to a habitat or ecosystem ecological features, structures, or functions that reduce its integrity, but recovery to baseline state is expected within 5-10 years.	6-9 Moderate

Aspect	Impact	Significance
	• Disturbance of a sufficient portion of the bio-geographic population of a species to cause a decline in abundance, distribution, or size of genetic pool such that natural recruitment would not return the population of the species, and other species dependent on it, to former levels within several generations. • Major change to the visual quality, setting, and feeling associated with the landscape. • Fundamental change to hydrology and hydrogeology within a catchment resulting in temporal changes to the watershed.	
	• Reduction in ecosystem or habitat integrity, but recovery to baseline state is expected within 2-5 years with minimal intervention. • Disturbance of a bio-geographic population or individuals of a species resulting in a decline in abundance or distribution over one or more generations, but that does not change the integrity of the population of the species or populations of other dependent species. • A noticeable but not fundamental change to hydrology or hydrogeology.	2-4 Minor
	• Some loss of ecosystem or habitat integrity, but recovery to baseline state will occur on completion of reinstatement activities. • Localized short-term disturbance of individuals of a species but does not affect other trophic levels or the integrity of the bio-geographic population. • The development will fit the key characteristics of the existing landscape. • A detectable change amounting to non-material changes to the hydrology and hydrogeology.	1 Negligible
	Change resulting in positive, desirable, or beneficial effects on an ecosystem, such as greater likelihood of maintaining ecosystem integrity, improvement of habitat for rare and endangered species, enhanced natural biodiversity, or increased population of valued species.	Positive

Aspect	Impact	Significance
Social	Incident causing multiple fatalities, extensive property damage, affecting the livelihoods of people over a wide area, and damage to international corporate reputation.	>9 Major
	• Physical resettlement of one or more households/ businesses. • Reduction in community and household assets, or access to assets, such that economic displacement affects five or more individuals, households, or businesses. • Changes likely to prejudice success of an existing policy or plan. • Job losses in small communities with very limited alternative opportunities in near-medium term (within one year of job losses). • Change that differentially adversely affects the livelihoods or life chances (access to health care/medicine) of vulnerable groups (disabled, elderly, female-headed households, and those living below officially defined poverty or subsistence levels). Damage to corporate reputation. • Increased public exposure to health threats that may increase mortality rates. • Unplanned in-migration flows considered sufficient to cause exceedance of the capacity of at least one component of physical or social infrastructure. • Increases of cultural conflict likely not to be contained within existing social control norms. • Increases in rates of serious crimes involving violence and property theft. • Development traffic will travel through very sensitive sites such as several built-up areas and/or areas including schools, pedestrian crossings, clinics, or markets. Additionally, has the potential to add unacceptable or prolonged loading to roads unsuitable for such traffic level increases or proposed vehicles.	6-9 Moderate
	• Job losses in a community able to adapt and provide alternative job opportunities in near/medium term (within one year of job losses). • Reduction in community and household assets, or access to assets, such that economic displacement	2-4 Minor

Aspect	Impact	Significance
	affects 1-4 individuals, households, or businesses. Damage to local corporate reputation. • Damage to a site of local or regional cultural importance. Short-term (<1 year) financial loss to owners of businesses where recovery is likely. • Unplanned in-migration not expected to cause infrastructure capacity exceedance. • Increases in incidences of cultural conflict but expected to be contained within existing social control norms. Increases in rates of non-serious crimes. • Increased public exposure to health threats that may increase morbidity rates. • Decline in access to health care facilities and acquisition of treatment.	
	• Some owners of businesses to experience short-term financial loss. • Temporary (<1 year) or intermittent changes to some aspects of the livelihoods and life chances of a limited number of individuals/households (including job opportunities, health status, income, or access to education and infrastructure), but to which most individuals/households are expected to be able to adapt relatively easily. • Incident causing treatable "Lost Time Incident" injury to a member of the public about their work.	1 Negligible
	• Increased ability of individuals, households, or communities to maintain or improve livelihoods through enhancement of the following: • Financial and physical assets • Quantity, quality, and availability of natural assets • Human and social assets (skills, knowledge, community support networks) • Improvement in health status • Job gains and increase in per capita income. • Increased local business viability	Positive

Note: It is important to note that the positive impacts shall not be rated but merely stated. It is considered sufficient for the purposes of the ESIA to indicate that the Project is expected to result in a positive impact, without characterizing the exact degree of positive change likely to occur. However, positive impacts are presented quantitatively where possible.

1.9 Reporting

As a result of the ESIA process, a comprehensive ESIA FSR (this document) was developed for submission to NEMA for review and consideration for approval.

1.10 Assumptions and Limitations

ESIA is a process that aims to identify and anticipate possible impacts based on past and present baseline information and details of the proposed Project. As the ESIA deals with the future, there is, inevitably, always some uncertainty about what will happen.

Impact predictions have been made based on field surveys and with the best data, methods and scientific knowledge available at this time. However, some uncertainties could not be entirely resolved. Where significant uncertainty remains in the impact assessment, this is acknowledged, and the level of uncertainty is provided.

In line with best practice, this ESIA FSR has adopted a precautionary approach to the identification and assessment of impacts. Where it has not been possible to make direct predictions of the likely level of impact, limits on the maximum likely impact have been reported and the design and implementation of the Project (including the use of appropriate mitigation measures) will ensure that these are not exceeded. Where the magnitude of impacts cannot be predicted with certainty, the team has used professional experience and available scientific research from similar projects worldwide to judge whether a significant impact is likely to occur or not. Throughout the assessment, this conservative approach has been adopted to the allocation of significance.

1.11 Project Estimated Cost

The total proposed project cost is estimated at KSh 3,069,461,779.80, encompassing the following components:

- Backbone Fibre Network Installation;
- Active Equipment, Shelters, and Power Solution;
- Metro and Last Mile Sites Network - 3 Lots; and
- Community Centres.

A comprehensive Bills of Quantities (BoQs) detailing the project's final cost estimates is provided in the report annexure.

2 POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK

2.1 Overview

This Chapter outlines the existing national and international environmental and social legislation, policies and institutions applicable to the Proposed Project that will guide the development of the Project, which is subject to this ESIA Full Study Report. This includes a summary of the World Bank's Environmental and Social Standards (ESSs) and Environmental, Health and Safety Guidelines (EHSGs). As Kenya is a signatory to various international conventions and laws, relevant international conventions are also presented.

2.2 Institutional Framework

The following key administrative institutions regulate environmental and social (E&S) management and ICT in Kenya.

Table 2-1 E&S and ICT Institutional Framework

No	Institution/Ministry	Description of their role	Relevance to the project
1.	Ministry of Environment, Climate Change, and Forestry (MoECCF)	Facilitate good governance in the protection, restoration, conservation, development and management of the environment and natural resources for equitable and sustainable development.	Sets environmental management policy
2.	National Environment Management Authority (NEMA)	Exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment.	• Grants ESIA approval and conditional licenses for projects • Monitors and assesses E&S performance of projects.
3.	National Environmental Complaints Committee (NECC)	Investigates allegations and complaints of suspected cases of environmental degradation. The Committee also prepares and submits to the National Environment Council (NEC) periodic reports of its activities.	Members of the public can register or appeal to this committee regarding any aspects of the project that violates the environmental law and issued licenses.
4.	National Environment Tribunal (NET)	• reviews administrative decisions made by NEMA relating to issuance, revocation or denial of license and conditions of license. • provides legal opinion to NEMA on complex matters where the Authority seeks such advice. • has powers to change or give an order and direction regarding environmental issues in dispute.	Members of the public can register or appeal to this tribunal regarding any aspects of the project that violates the law and its licenses.
5.	Communications Authority (CA)	• regulator of communications sector / digital economy in Kenya. • responsible for facilitating the development of the information and communications sectors including broadcasting, cybersecurity, multimedia, telecommunications, electronic commerce, postal and courier services. • mandate to administer the Universal Service Fund (USF)	Issues **Network Facilities Provider, TIER 1 License** (For deployment of infrastructure nationally)
6.	Ministry of Labour and Social Protection	• The State Department for Social Protection focuses on the welfare of the family, women, Children, older persons and other vulnerable groups with special attention accorded to Persons with Disabilities (PWDs). • formulates and implements the national labour Legislation and policy • Parent to Directorate of Occupational Safety and Health Services (DOSHS).	• The Social Risk Management Unit (SRMU) within the department may support in management of the Project's social risks and impacts through capacity building to counties in the PAI. • DOSHS monitors working conditions at workplaces. • Enforces Work Injury Benefit Act (WIBA) insurance for staff. • Workplace registration for all project sites. • Annual occupational safety and health audits.

No	Institution/Ministry	Description of their role	Relevance to the project
7.	Ministry of Sports, Culture and Heritage	develop, promote, preserve, and disseminate Kenya's diverse cultural, artistic and sports heritage through formulation and implementation of policies which enhance national pride and improve the livelihood of the Kenyan people.	National Museums of Kenya (NMK) must be informed of any chance finds during project implementation.
8.	National Gender and Equality Commission (NGEC)	Monitors, facilitates and advice on mainstreaming of gender issues and inclusion of PWDs, women, children, youth, older members of society, minority and marginalized groups in national development.	Ensure the proposed Project delivers benefits for all stakeholders including VMGs.
9.	Commission on Administrative Justice (CAJ)	Tackles maladministration (improper administration) in the public sector. CAJ is empowered to, et al, investigate complaints of delay, abuse of power, unfair treatment, manifest injustice or discourtesy.	Aggrieved parties not satisfied with the project Grievance Redress Mechanism (GRM) outcome may seek CAJ intervention.
10.	Kenya National Commission of Human Rights (KNCHR)	• Investigates and provides redress for human rights violations, to research and monitor the compliance of human rights norms and standards. • Conduct human rights education • Facilitate training, campaigns and advocacy on human rights as well as collaborate with other stakeholders in Kenya.	Any parties who feel the Project has violated their human rights may approach KNCHR for redress.
11.	National Council for Persons with Disability (NCPWD)	Promotes and protects equalization of opportunities and realization of human rights for PWDs to live decent livelihoods	Ensure project benefits (community ICT center subprojects) also extend to PWDs throughout the Project lifecycle.
12.	Kenya Wildlife Service (KWS)	Facilitates good governance for sustainable development, management and marketing of tourism and wildlife.	Obtain approval for any works within protected areas.
13.	Kenya Urban Roads Authority (KURA)	Responsible for the management, development, rehabilitation, and maintenance of National Trunk Roads in the urban areas.	Obtain permission for road reserve utilization since most of the project activities will be implemented in road corridors owned by these agencies.
14.	Kenya National Highways Authority (KeNHA)		
15.	Kenya Rural Roads Authority (KERRA)		
16.	Water companies	Water utility companies within the project footprint.	Notify them of planned works.
17.	Telcos	Telecommunication companies with fiber networks in the project area.	Notify them of planned works.

2.3 Policy Framework

2.3.1 The National Environment Policy, 2014

The overall goal of this Policy is to ensure better quality of life for present and future generations through sustainable management and use of the environment and natural resources.

Section 5.6 of this Policy focusses on infrastructure development and environment and makes explicit policy statements to ensure sustainable management and use of the environment and natural resources during the construction and operation of infrastructure developments including roads and related services.

These policy statements require the commitment of the government to:

- Ensure Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA), Social Impact Assessment (SIA) and Public Participation in the planning and approval of infrastructural projects;
- Develop and implement an environmentally friendly national infrastructural development strategy and action plan; and
- Ensure that periodic Environmental Audits are carried out for all infrastructural projects. Relevance to this Project.

ICTA has commissioned this ESIA full study process to ensure environmental and social issues are appropriately addressed throughout the project lifecycle.

2.3.2 National Climate Change Framework Policy, 2016

This Policy was developed to facilitate a coordinated, coherent, and effective response to the local, national, and global challenges and opportunities presented by climate change. An overarching mainstreaming approach has been adopted to ensure the integration of climate change considerations into development planning, budgeting, and implementation in all sectors and at all levels of government. This Policy, therefore, aims to enhance adaptive capacity and build resilience to climate variability and change, while promoting a low carbon development pathway.

The project will use renewable energy (solar) to power installed equipment. Proposed project must be protected from climate-related risks e.g., floods, droughts, extreme weather, etc. This will ensure reliability during climate-related disruptions.

2.3.3 The National Land Policy, 2009

The National Land Policy was formulated to provide an overall framework and define the key measures required to address among others, the critical issues on land, land use planning, environmental degradation, conflicts and unplanned proliferation of informal urban settlements, outdated legal framework, institutional framework and information management. The policy further encourages a multisectoral approach to land use, provision of social, economic and other incentives and put in place an enabling environment for investment, agriculture, livestock development and the exploitation of natural resources.

OFC cable will be laid on existing road corridors while community ICT centres will be implemented on land allocated to national government administration. No new land-take is envisaged. Again, aerial, wireless and satellites technologies will be used where excavation is impossible.

2.3.4 National Policy for the Sustainable Development of Northern Kenya and other Arid Lands, 2012

The focus of this policy is on promoting social and economic development and the provision of easily accessible services throughout Kenya, and in the arid and semi-arid Lands. The goal is to ensure that Kenya, and in the arid and semi-arid Lands, develops into regions of opportunity and potential, eliminating historical challenges.

Its key objectives are to; strengthen the integration of Northern Kenya and other arid lands with the rest of the country and mobilize the resources necessary to ensure equity and release the region's potential; improve the enabling environment for development in Northern Kenya and other arid lands by establishing the necessary foundations for development; develop alternative approaches to service delivery, governance and public administration which accommodate the specific realities of Northern Kenya and pastoral areas; and, strengthen the climate resilience of communities in the ASALs and ensure sustainable livelihoods.

In terms of access to Infrastructures like (transport, water, energy, and ICTs), it recognizes that only one county, Isiolo, is currently connected to the national electricity grid with mobile telephone operators expanding their networks, although the coverage is still limited to the major towns. It further states that The ICT infrastructure is inadequate and expensive. Despite, the fiber-optic cable reaching several locations in the north, for the most part communication remains heavily reliant on satellite.

The Proposed Project will extend broadband access to Northern Kenya and other arid lands.

2.3.5 The National Occupational Safety and Health (OSH) Policy, 2012

This Policy establishes National Occupational Safety and Health systems and program geared towards the improvement of the work environment; Seeks to reduce the number of work-related accidents and diseases, and to provide compensation and rehabilitation to those who may be injured at work or contract occupational diseases; and Provides the framework for mandatory use of appropriate personal protective gear, protection of workers against occupational hazards, and workplace provisions for First Aid and emergency medical evacuation.

The Policy is relevant during the construction and installation activities and seeks to reduce the number of work-related accidents and diseases and equitably provide compensation and rehabilitation to those injured at work or who contract occupational diseases. Construction-related subprojects will be required to implement measures to mitigate unforeseen Occupational Safety and Health (OSH) risks such as provision of Personal Protective Equipment (PPEs) to personnel, emergency preparedness, worker and machinery insurance, among others.

2.3.6 The National Social Protection Policy, 2011

The policy is aimed at reducing poverty and the vulnerability of the population to economic, social, and natural shocks and stresses. The main objectives of the policy include; (i) protecting individuals and households from the impact of adverse shocks to their consumption that is capable of pushing them into poverty or deeper poverty; and (ii) cushioning workers and their dependents from the consequences of income-threatening risks such as sickness, poor health, and injuries at work as well as from the threat of poverty in their post-employment life.

One objective of the HoAGDP is to ease the movement of people and goods and digital connectivity and access to social services to communities at designated locations along the targeted sections of the Isiolo-Mandera regional road.

2.3.7 The National Climate Change Action Plan (NCCAP III)

The National Climate Change Action Plan (NCCAP III) 2023-2027 outlines Kenya's strategies for achieving low-carbon, climate-resilient development. The plan emphasizes the importance of restoring degraded landscapes and improving watershed services as key climate adaptation and mitigation strategies. An updated Nationally Determined Contributions (NDC) committed Kenya to reduce greenhouse gas (GHG) emissions by 32 percent by 2030.

HoAGDP OFC Project will contribute towards the realization of this Plan's objectives.

2.3.8 Kenya Vision 2030

The Vision 2030, Kenya's long-term development blueprint aims to create a globally competitive and prosperous nation, transforming Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment. Vision 2030 has three pillars, namely the Economic, Social, and Political are anchored on macroeconomic stability; continuity in governance reforms; enhanced equity, and wealth creation opportunities for the poor. The Economic Pillar captures the expectations of the ICT market seeks to improve the prosperity of all regions of the country and all Kenyans.

HoAGDP OFC increases access to One Government Network (OGN) thereby moving Kenya towards the realization *of a connected and knowledge–based economy.*

2.3.9 National Information, Communications and Technology (ICT) Policy, 2019

This policy is designed to realize the potential of the digital economy by creating an enabling environment for all citizens and stakeholders. The ICT Policy defines the forward-looking position of the government on various areas of the evolving ICT sector landscape in Kenya. Again, the Policy provides guidelines on making available capital-intensive ICT public infrastructure for use by Kenyan private and commercial operators on fair and equitable terms, and this is a welcome move.

HoAGDP OFC should also be utilized by Internet Service Providers (ISPs). Again, public market centers along the road corridor and metros will have public access points.

2.3.10 The Kenya National Digital Master Plan, 2022-2032

The Kenya National Digital Masterplan 2022-2032 is a sequential progression of the Masterplan 2014-2017. A plan for leveraging and deepening the contribution of ICT to acceleration of economic growth. It adopts a conceptual model that espouses the critical elements necessary for a socio-economic growth. The Master Plan has the four pillars namely: Digital Infrastructure; Digital Service & Data Management; Digital Skills and Digital Innovation; and Enterprise and Digital Business.

HoAGDP OFC will extend broadband access through providing and additional internet backbone and fixed broadband.

2.3.11 National Policy on Gender and Development, 2019

The National Policy on Gender and Development seeks to create a just, fair and transformed society free from gender-based discrimination in all spheres of life practices. The National Policy highlights the fact that the patriarchal social order supported by statutory, religious, and customary laws and practices; and the administrative and procedural mechanisms for accessing rights have continued to hamper the goal of attaining gender equality and women's empowerment.

The Policy promotes inclusion of women in ICT through increasing access to STEM education, removing social barriers and fostering opportunities for women in ICT[4]. This also policy specifies the need to "Collect and disseminate gender data on ICT access and use to inform policy and decision making" recognizing these central gaps.

The Project shall support this policy through providing internet broadband for furthering internet access for women (including through supporting public Wi-Fi hotspots, for instance).

2.3.12 The National Biodiversity Strategy and Action Plan, 2019-2030

The overall objective of the National Biodiversity Strategy and Action Plan (NBSAP) is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity (CBD). It is a national framework of action to ensure that the present rate of biodiversity loss is reversed, and the present levels of biological resources are maintained at sustainable levels for posterity. The general objectives of the strategy are to conserve Kenya's biodiversity to sustainably use its components; to share the benefits arising fairly and equitably from the utilization of biological resources among the stakeholders; and to enhance technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation.

The project should not interfere with terrestrial ecosystems.

2.3.13 National Policy for Disaster Management, 2009

National Policy for Disaster management policy provides for disaster risk management which encompasses a full continuum from preparedness, relief, and rehabilitation, mitigation, and prevention. The Policy aims to increase and sustain the resilience of vulnerable communities to hazards through diversification of their livelihoods and coping mechanisms. The policy notes that disasters in Kenya that have occurred over the years are from diverse hazards such as droughts, floods,

[4] http://psyg.go.ke/wp-content/uploads/2019/12/NATIONAL-POLICY-ON-GENDER-AND-DEVELOPMENT.pdf

fires, terrorism, collapsing buildings, accidents in the transport sector, and disease/epidemics. The hazards that lead to disaster are grouped into the following clusters:

- Environmentally triggered (Climate-related – droughts, floods, storms landslides)
- Geologic disasters include volcanic eruptions, tsunamis, earthquakes,
- Human-made disasters such as socio-economic, technologic industrial, human, terrorism
- Biologically triggered (epidemics i.e., disease, pests for human, livestock and crops and wildlife)

The overall goal of Disaster Management policy is to build a safe, resilient, and sustainable society. The policy focuses on the following elements: Disaster Prevention, mitigation, preparedness, response, and recovery.

ICTA should collaborate with other agencies for early warning signs and be informed of any likely disaster e.g., terrorism threat, etc.

2.3.14 Fiber Optic-Backbone, Metro and Last Mile Infrastructure Standard, ICTA.2.001: 2021

Guides the design, development and implementation of both backbone and last mile fiber optic infrastructure this includes constructing a multi-use duct along the cable routes.

OFC installation activities shall be guided by this Standard.

2.3.15 Accessibility — ICT products and services – KS 2952-1:2022 – ICS 33.030; 53.080: 2022

Requires ICT products, services and opportunities are made accessible to all, including Persons with Disabilities (PWDs).

Ensure ICT equipment for community centers caters for needs of PWDs.

2.3.16 The Kenya Kwanza Manifesto

The Kenya Kwanza administration has made the following ICT commitments:

- Universal broadband availability through-out the country within five years. Increase and fast track broadband connectivity across the country by the construction of 100,000km of national fiber optic connectivity network;
- Enhance government service delivery through digitization and automation of all government critical processes and make available 80 percent of government services online; and
- Establish Africa Regional Hub and promote development of software for export.

The Proposed Project will directly contribute towards realization of these ICT commitments.

2.4 Legal Framework

Table 2-2 shows a summary of key provisions of relevant legal frameworks.

Table 2-2 Relevant Legal Frameworks

Legislation	*Key Provisions*	*Relevance to the Project*
Constitution of Kenya, 2010	The Constitution is the supreme law in Kenya and gives a lot of emphasis on environmental conservation and sustainable development. For instance, in the Preamble, the Constitution states that "We, the people of Kenya will be respectful of the environment, which is our heritage, determined to sustain it for the benefit of future generations". Article 2(5) of the Constitution states that the general rules of international law shall form part of the laws of Kenya. For the purposes of protection of the environment, several principles of international environmental law are incorporated, viz: • the polluter pays principle; • principle of public participation; • principle of sustainability; • principle of inter & intra-generational equity; • principle of prevention; and • precautionary principle. The principle of sustainable development is entrenched in Article 102(d) of the Constitution as one of the national values and principles of governance. The Constitution guarantees the right to a clean and healthy environment in Article 42. Article 42 further guarantees the right to have the environment protected for the benefit of present and future generations through legislative and other measures particularly those contemplated in article 69 and the right to have obligations relating to the environment fulfilled under Article 70. Article 69 imposes obligations on the state. The state is required to; a. ensure sustainable exploitation, utilization, management, and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits; b. work to achieve and maintain a tree cover of at least ten percent of the land area of Kenya;	Project activities shall ensure compliance with the Constitution of Kenya on all aspects related to E&S management. These will include subjecting the proposed project and any subprojects to E&S screening and developing appropriate safeguard instruments to guide E&S risk management (e.g. ESIA, Environmental and social audit, etc.). Additionally, contractors will be required to adopt and implement the E&S management plan (ESMP) in this ESIA report to ensure environmental and social sustainability. The project should put in place mechanism to ensure that VMGs have access to project benefits including using quotas. The project should put in place safeguards measures to protect children from child labor as related to construction activities. Measures should also be put in place to protect children, women, PWDs and youth from Gender-based Violence/Sexual Exploitation and Abuse/Sexual Harassment (GBV/SEA/SH) risks potentially caused by construction or operation activities. Contractors should be compelled to ensure that all their workers sign a code of conduct as a strategy to prevent GBV/SEA/SH and protect children's rights. The project should put in place mechanism to ensure that PWDs have access project benefits including provision of assistive devices and infrastructure with universal access.

Legislation	*Key Provisions*	*Relevance to the Project*
	c. protect and enhance the intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities; d. encourage public participation in the management, protection, and conservation of the environment; e. protect genetic resources and biological diversity; f. establish systems of environmental impact assessment, environmental audit, and monitoring of the environment; g. eliminate processes and activities that are likely to endanger the environment; and h. Utilize the environment and natural resources for the benefit of the people of Kenya. Article (69) (2) imposes obligations on every person to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources. Article 70 provides an avenue for redress for any person who alleges that the right to a clean and healthy environment has been or is likely to be denied, violated, infringed, or threatened. The Court is empowered to issue preventive, cessation, or compensatory orders. Article 70 relaxes the rule on locus standi because of which, there is no need to prove loss or injury by an applicant. Anyone may institute a claim seeking to enforce the environmental rights and obligations stipulated in the Constitution. Enforcement contemplated by Article 70 will be done through the Environment and Land Court established under Article 162 (2) (b). The Court has the same status as the High Court. This effectively denies the High Court jurisdiction over environmental matters under Article 165 (5) (b). Articles 19 and 27 require equality and freedom from discrimination. Article 21 (3) requires all state organs and officers to address the needs of vulnerable groups within society, including women, the elderly, PWDs, children, youth, members of the minority or VMGs.	

Legislation	*Key Provisions*	*Relevance to the Project*
	Provisions on Disability: Chapter 4, Part III, Rights of Persons with Disabilities (Clause 54). Provisions on Social Inclusion including Children, Youth, People Living with Disability and Women: Articles 21 (3), 27 (1 and 4), 53, 55.	
Environmental Management and Coordination Act (EMCA), Cap 387	Requires ESIA for all projects listed in the Second Schedule	This ESIA full study has been conducted in accordance with this Act.
EMCA (Impact Assessment and Audit) Regulations, 2003	requires that the EIA/EA be conducted by a registered lead or firm of experts in accordance with the terms of reference developed during the scoping exercise. Categorizes all telecommunication projects as medium risk and thus a comprehensive project report (CPR) must be prepared submitted to NEMA for licensing.	This ESIA was conducted by a NEMA registered EIA lead expert. The Project must undergo annual environmental audits (EA). Full study report prepared since the project traverses several counties.
EMCA (Air Quality) Regulations, 2024	prohibits any person from causing air pollution either directly or indirectly	Project will create dust during transportation of raw materials by trucks and staff during implementation, and infrequent operation of backup generators for power, if any. Machinery used in project works must be well maintained to minimize exhaust emissions.
EMCA (Waste Management) Regulations 2024	requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal. prohibits any industry from discharging or disposing of any untreated waste in any state into the environment	ICTA should develop and implement an e-waste management plan to manage e-waste from the Project installation and operation activities.
EMCA (Noise and Excessive Vibration Pollution) (Control) Regulations, 2024	prohibits any person to make or cause to be made excessive vibrations which annoy, disturb, injure, or endanger the comfort, repose, health or safety of others and the environment.	Project works should be planned in a way that limits excessive noise and vibration especially near sensitive receptors like schools and health facilities.

Legislation	*Key Provisions*	*Relevance to the Project*
EMCA (Fossil Fuel Emission Control) Regulations, 2024	promotes use of clean fuels, use of catalysts and inspection procedures for engines and generators.	Machinery and equipment in the project will require unleaded fuels in line with the regulations.
Sustainable Waste Management Act (SWMA), 2022	requires preparation of Waste Management Plans (WMPs) by counties, private entities, and individuals. Empowers counties to enforce the requirement.	Waste from the project will require appropriate disposal in line with prepared Waste Management Plan (WMP), by licensed waste handlers, and in coordination with respective county governments. ICTA should prohibit use of plastic bottles by project workers during the construction/installation phase of the project. Plastic waste strewn on the roadsides and near settlements along the corridor.
Wildlife Conservation and Management Act, 2013	requires Kenya Wildlife Service (KWS) approval for any civil works in protected areas.	Obtain KWS approval for any project works within protected areas.
Climate Change Act, Cap 387A	encourages persons to put in place measures for elimination of climate change including reduction of greenhouse emission and use of renewable energy and implementation of measure to mitigate against adverse effects of climate change.	The project should focus on resilience of the investment considering location specific risks and considering relevant mitigation measures for greenhouse gas (GHG) emissions from project e.g. using solar energy to power the various project equipment, etc.
The Access to Information Act, 2016	mandates project proponents to disclose pertinent information to stakeholders during the project lifecycle.	Prepare and implement a Stakeholder Engagement Plan (SEP) to guide information disclosure to varied stakeholders.
The Kenya Information and Communications Act (KICA), Cap 411a	requires telecommunication operator to ensure that as little damage as possible is caused to the land and to the environment and shall pay fair and adequate compensation to the owner or occupier of the land for any damage or loss sustained by reason thereof. requires deployers of national infrastructure to obtain **Network Facilities Provider, TIER 1 License.**	Implement the E&S requirements stipulated in this ESIA. Compensate traders for any temporary loss of livelihoods. OFC Contractor should have a **Network Facilities Provider, TIER 1 License.**
The KICA, Cap 411a ***Guidelines for Installation and Maintenance of ICT Infrastructure, 2018***	requires compliance with the EMCA, Cap 387, World Bank's EHSGs for Telecommunication, for any ICT infrastructure works. requires annual environmental audits (EA) for ICT infrastructure	Implement the E&S requirements stipulated in this ESIA. Conduct annual EA for the projects.

Legislation	*Key Provisions*	*Relevance to the Project*
Public Health Act, Cap 242	prohibits a person/institution to cause nuisance or condition liable to be injurious or dangerous to human health. Empowers county governments to enforce the same.	Implement the E&S requirements stipulated in this ESIA.
The Standards Act, Cap 496	requires that all materials, machines, and equipment meet set standards to safeguard property, project workers and community at large.	Materials, machines, and equipment used in the project should meet set KEBS standards.
The National Construction Authority (NCA) Act, 2012	requires construction works are carried out by NCA registered contractors and supervised by qualified engineers. requires construction sites to have permits.	Only engage NCA registered contractors. Register the project with NCA prior to construction.
The Occupational Health and Safety Act (OSHA), 2007	requires Project sites to be registered by DOSHS. requires workplace and fire safety audits for internal environments. requires examination and testing of plants and equipment. requires accident investigation and reporting to DOSHS within 24 hours (fatal accidents) and 7 days (non-fatal accidents).	Register project as a workplace annually. Conduct annual workplace and fire safety audits for project's internal environment (buildings). Ensure all machines and equipment are serviced and inspected as per manufacturers' specifications. All accidents or incidents should be reported to DOSHS county offices and World Bank within 24 hours and 48 hours respectively.
Work Injury Compensation Benefit Act (WIBA), 2007	requires compensation for employees on work related injuries and diseases. requires employer to report an employee's injury to DOSHS county offices within 24 hours (fatal accidents) and 7 days (non-fatal accidents).	All Project workers should have WIBA insurance. All accidents or incidents should be reported to DOSHS county offices and World Bank within 24 hours and 48 hours respectively.
The Employment Act, 2007	prohibits forced and child labour, discrimination, and sexual harassment in employment. requires employers to provide contracts to all employees and annual leave.	Provide all project workers with contracts. All project workers to sign a CoC. Recruit semi and unskilled labor through the Chief's and ward administrator's office.
Labour Relations Act, 2007	Provides guidance on registration, regulation, and management of workers and employers organizations.	All other project workers should have contracts to guard against violation of their labor rights. Project workers to freely join trade unions and engage in collective bargaining.

Legislation	*Key Provisions*	*Relevance to the Project*
	Promotes sound labour relations through protection and promotion of freedom of association, collective bargaining, and orderly and expeditious dispute resolutions.	
National Gender and Equality Commission (NGEC) Act, 2011	requires projects to offer equal opportunities to women, men, persons with disabilities, the youth, children, the elderly, minorities, and marginalized communities.	Provide equal opportunities in the project to men, women, youth and PWDs.
Persons with Disability Act, Cap 133	Provides for the rights and rehabilitation of PWDs Champions for equal opportunities for PWDs Establishes the National Council for People with Disabilities (NCPWD)	PWDs are among beneficiaries of the project. The project should ensure infrastructure responds to needs of PWDs such as through provision of ramps to ease access to buildings and employment opportunities for PWDs during program implementation.
The Sexual Offences Act, 2006	requires elimination of sexual offences e.g., sexual exploitation and harassment, e.g., everywhere including workplaces.	Prepare and implement a mechanism for reporting on GBV/SEA/SH, etc.
County Government Act, 2012 **Physical and Land Use Planning Act, 2019**	requires project proponents to seek development approval from county governments.	Counties are beneficiaries of the project Project shall seek development approval from respective counties.
Traffic Act, Cap 403	requires licensing of drivers and vehicles. requires drivers to give way to pedestrians. requires all road users to follow traffic rules and regulations.	Only licensed drivers and vehicles should be used in the project. Contractors should develop and implement a driving for work policy.
The National Museums and Heritage Act (2006) And its Revised Edition (2012)	requires project proponents to notify National Museums of Kenya (NMK) of any cultural heritage discovery and sets restrictions on moving objects of archaeological or paleontological interest.	Prepare and implement chance finds procedures. See Appendix E.
HIV/AIDS Prevention and Control Act (Act No.14 of 2006, Revised in 2012)	requires HIV/AIDs education in the workplace.	Implement HIV/AIDs awareness programmes throughout project lifecycle.

Legislation	*Key Provisions*	*Relevance to the Project*
Child Rights Act, 2012	This Act of Parliament makes provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of children. It also makes provision for the administration of children's institutions, gives effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child. Section 15 states that a child shall be protected from sexual exploitation and use in prostitution, inducement, or coercion to engage in any sexual activity, and exposure to obscene materials.	The project should implement measures to protect children from the risk of GBV/SEA/SH associated with project activities including construction. Contractors should ensure that all their workers sign a CoC as a strategy to prevent GBV/SEA/SH and child labour.

2.5 International Conventions

2.5.1 Convention on Biological Diversity (CBD), 1992

International treaty that was adopted at the United Nations Conference on Environment and Development (UNCED) “Earth Summit” in Rio de Janeiro in 1992, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

This ESIA report considers the proposed project’s impact on biodiversity.

2.5.2 United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC is an international environmental treaty adopted on 9 May 1992 and opened for signature at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992. It then entered into force on 21 March 1994, after enough countries had ratified it. The UNFCCC objective is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”. The framework sets non-binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. Instead, the framework outlines how specific international treaties (called "protocols" or "Agreements") may be negotiated to specify further action towards the objective of the UNFCCC.

The proponent should adopt measures to minimize Greenhouse Gas (GHGs) and implement appropriate measures to mitigate and adapt to climate change.

2.5.3 United Nations Convention on the Rights of Persons with Disabilities (CRPD)

The CRPD is an international treaty that sets out the rights of persons with disabilities, including their right to the highest attainable standard of health.

Proposed project should remove barriers in digital and physical access, adopt assistive technologies for PWDs (in community ICT Centers), ensure inclusive employment and customer service, and follow national and international accessibility standards.

2.5.4 International Covenant on Economic, Social and Cultural Rights (ICESCR)

The ICESCR is a multilateral treaty adopted by the United Nations General Assembly in 1966. It recognizes: **Economic Rights** – Fair wages, decent work, trade union rights; **Social Rights** – Healthcare, education, social security; and **Cultural Rights** – Access to cultural life, science, and communication.

HoAGDP OFC should ensure affordable, non-discriminatory access to communication technologies. Also promote digital inclusion for education, work, and cultural participation.

2.5.5 Paris Agreement on Climate Change

While not solely focused on health, the Paris Agreement recognizes that climate change has significant impacts on human health and well-being. The agreement aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels, to prevent the worst impacts of climate change on health and other aspects of human life.

ICTA should use renewable to power the OFC equipment.

2.6 World Bank Environmental and Social Framework

The World Bank Environmental and Social Framework (ESF) sets out the Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards (ESSs) that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity. This Framework comprises:

- **A Vision for Sustainable Development**, which sets out the Bank's aspirations regarding environmental and social sustainability;
- **The World Bank Environmental and Social Policy for Investment Project Financing (IPF)**, which sets out the mandatory requirements that apply to the Bank; and
- **The ESSs**, together with their Annexes, which set out the requirements for Borrowers relating to the identification and management of environmental and social risks and impacts associated with projects supported by the Bank, through means that are appropriate to the nature and scale of the project and proportionate to the level of environmental and social risks and impacts. There are 10 ESSs as listed below:
    - **Environmental and Social Standard 1:** Assessment and Management of Environmental and Social Risks and Impacts;
    - **Environmental and Social Standard 2**: Labor and Working Conditions;
    - **Environmental and Social Standard 3**: Resource Efficiency and Pollution Prevention and Management;
    - **Environmental and Social Standard 4**: Community Health and Safety;
    - **Environmental and Social Standard 5**: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
    - **Environmental and Social Standard 6**: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
    - **Environmental and Social Standard 7**: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities;
    - **Environmental and Social Standard 8**: Cultural Heritage;
    - **Environmental and Social Standard 9:** Financial Intermediaries; and
    - **Environmental and Social Standard 10:** Stakeholder Engagement and Information Disclosure.

2.6.1 World Bank ESSs

Six (6) of the ten (10) ESSs are relevant to the proposed project. Table 2-3 highlights the relevant ESSs.

Table 2-3 World Bank Environmental and Social Standards

ESS No.	ESS Title	Key Requirement	Relevance to the Project
ESS1	Assessment and Management of Environmental and Social Risks and Impacts	Requires the assessment, management and monitoring of E&S risks and impacts of the project using a risk- and outcomes-based approach. Requires stakeholder engagement and adequate information disclosure throughout the project life cycle. Requires the application of the Bank's EHS Guidelines, or other more stringent measures where these exist. Requires the preparation of an ESCP as part of the legal agreement with material measures and actions required for the project to achieve compliance with the ESSs. Requires application of the mitigation hierarchy; anticipate, minimize, mitigate and compensate.	Relevant. ICTA has commissioned this ESIA study to assess, manage and monitor E&S risks and impacts of the proposed project throughout the project lifecycle.
ESS2	Labour and Working Conditions	Requires development and implementation of labor management procedures. Workers to be provided with clear information and documentation on terms and conditions of employment. Prohibits employment of children. Prohibits forced labour. Nondiscrimination of workers in employment and treatment. Requires establishment and maintenance of a safe working environment. Requires establish of an independent and easily accessible GRM to enable all direct and contracted workers to raise their concerns. Prohibits discrimination against workers who participate in workers' organizations or trade unions.	ESS2 is relevant to this project due to different classes of labour working on the project: (i) direct workers, (ii) contracted workers, and (iii) primary supply workers.

ESS No.	ESS Title	Key Requirement	Relevance to the Project
ESS3	Resource Efficiency and Pollution Prevention and Management	Implementation of technically and financially feasible measures for improving efficient consumption of energy, water, and raw materials, as well as other resources. Avoidance of the release of pollutants or, when avoidance is not feasible, minimization and control the concentration and mass flow of their release using the performance levels and measures specified in national law or the EHSGs, whichever is most stringent.	The relevance of ESS3 is mainly related to ensuring energy efficient ICT and electronic equipment are procured and deployed where practical by the Project. During implementation, the Project will generate solid waste and e-waste. For any ICT equipment that may be replaced it will have to be disposed of in an appropriate manner.
ESS4	Community, Health, Safety and Security	Requires the assessment, management and monitoring of E&S risks and impacts of the project on the health and safety of the affected communities (vulnerable) during the project life cycle. Design, construct, and operate the structural elements of the project, taking into consideration the risks to third parties and acting in accordance with national legal requirements and regulations, international best practices, climate change considerations and the principle of "universal access" for all persons. Requires identification and evaluation of the potential traffic and road safety risks to workers, affected communities, and road users, and development of measures and plans to address them. Avoid or minimize exposure to hazardous materials and control the safety of storage, transportation and disposal of hazardous materials. Avoid or minimize community exposure to water-related and vector-borne diseases or other forms of transmission. Training for security personnel should include protocols on the use of force. Their background should be vetted, and a code of conduct should be applied.	ESS4 is relevant to this project given potential risks to the community health and safety that could result from accidents at project sites, the transmission and spread of diseases, and GBV/SEA/SH risks. Moreover, the project may also cause risks to community health stemming from inappropriate disposal of generated e-waste, vehicle traffic, dust, noise and vibrations, generation of hazardous material and conflicts, limited access to residences, businesses and institutions, and security and community conflicts.

ESS No.	ESS Title	Key Requirement	Relevance to the Project
		Identify, document, and implement measures to address emergency events, and train the community.	
ESS6	Biodiversity Conservation and Sustainable Management of Living Resource	Identification project-related risks and impacts to habitats and biodiversity. Management of risks and impacts in accordance with the mitigation hierarchy. Avoid intentionally introducing new alien species E&S assessment of the systems and verification practices used by the primary suppliers.	Relevant. The Project will finance the expansion and upgrading of the OGN and the last mile OFC connections to approximately 341 government institutions, this activities will be done within the existing road reserve. Waste generated from the project activities if not properly managed, may pollute the environment negatively impacting biodiversity.
ESS10	Stakeholder Engagement and Information Disclosure	Identify project-related concerns and priorities, including those applicable to VMGs. Stakeholder Engagement Plan (SEP) proportionate to the nature and scale of the project and its potential risks and impacts. Information disclosure in local languages. Accessible and culturally appropriate. Provides opportunities for stakeholders to express their views on the project and to have these views considered. Grievance redress mechanism – public, accessible and inclusive. Organizational capacity and commitment.	Relevant. Different stakeholders should be engaged during both the ESIA process and throughout implementation. A SEP has been prepared as part of this ESIA report. Project information should be disclosed, as necessary, on the ICTA website.

2.6.2 World Bank EHSGs

The EHSGs are technical reference documents that address the Bank's expectations regarding the Environmental, Health and Safety (EHS) performance of its projects. They are designed to assist managers and decision makers with relevant industry background and technical information. This information supports actions aimed at **avoiding, minimizing**, **and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility**. The EHS Guidelines serve as a technical reference source to support the implementation of the ESSs.

2.6.2.1 General EHSGs

General EHS Guidelines exist which contain information on cross-cutting EHS issues potentially applicable to all industry sectors; these are listed in Table 2-4.

Table 2-4 World Bank General EHS Guidelines

Environmental	**Occupational Health and Safety**
• Air Emissions and Ambient Air Quality • Energy Conservation • Wastewater and Ambient Water Quality • Water Conservation • Hazardous Materials Management • Waste Management • Noise • Contaminated Land	• General Facility Design and Operation • Communication and Training • Physical Hazards • Chemical Hazards • Biological Hazards • Radiological Hazards • Personal Protective Equipment (PPE) • Special Hazard Environments • Monitoring
Community Health and Safety	**Construction and Decommissioning**
• Water Quality and Availability • Structural Safety of Project Infrastructure • Life and Fire Safety (L&FS) • Traffic Safety • Transport of Hazardous Materials • Disease Prevention • Emergency Preparedness and Response	• Environment • Occupational Health and Safety • Community Health and Safety

2.6.2.2 Telecommunication EHSGs

The EHS Guidelines for Telecommunications are applicable to telecommunications infrastructure such as fixed line and wireless voice and data transmission infrastructure, including long distance terrestrial and submarine cables (e.g., fiber optic cables, etc.), as well as radio and television broadcasting, and associated telecommunications and broadcasting installations and equipment.[5]

These telecommunication sector-specific EHS Guidelines contain information on cross-cutting EHS issues in the industry, these are listed in Table 2-5.

[5] Associated installations and equipment include cellular, microwave, and other radio-based systems; satellite receivers; wire line and wireless receiving, transmitting, and switching stations, and related equipment such as masts and towers, cables and connectors, equipment housing such as shelters and cabinets, backup batteries, and auxiliary power units (generators).

Table 2-5 World Bank Telecommunication EHS Guidelines

Environmental	**Occupational Health and Safety**
• Terrestrial habitat alteration • Aquatic habitat alteration • Visual impacts • Hazardous materials and waste • Electric and magnetic fields • Emissions to air • Noise	• Electrical safety • Electromagnetic fields (occupational) • Optical fiber safety • Elevated and overhead work • Fall protection • Confined space entry • Motor vehicle safety
Community Health and Safety	**Construction and Decommissioning**
• Structural and site access issues • Aircraft navigation safety • Driver safety and cellular phones	Environment Occupational Health and Safety Community Health and Safety

Where applicable, the above-mentioned EHSGs will be applied to the Project.

2.6.2.3 Parameter Specific EHS Guidelines

Air Emissions and Ambient Air Quality

The World Bank recommends that the air quality guidelines as set out by the World Health Organization (WHO) be utilized in such an assessment. The WHO standards are divided into several stages, which have interim targets and a final guideline target. The WHO guidelines are recognized 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. Based on the above, Table 2-6 sets out the Kenyan Air Quality Emission Standards for industrial areas, which will be used for construction phase of the project.

Table 2-7, on the other hand, shows WHO ambient air quality guidelines.

Table 2-6 Kenya's Ambient Air Quality Tolerance Limits for Industrial Areas

Pollutant	**Time Weighted Average**	**Tolerance Limit**
SOx	Annual average	80 µg/m^3
SOx	24 Hours	125 µg/m^3
NOx	Annual average	80 µg/m^3
NOx	24 Hours	150 µg/m^3
NO_2	Annual Average	150 µg/m^3

Pollutant	Time Weighted Average	Tolerance Limit
NO_2	24 Hours	100 µg/m^3
Suspended Particulate Matter (SPM)	Annual average	360 µg/m^3
Suspended Particulate Matter (SPM)	24 Hours	500 µg/m^3
Respirable Particulate Matter (<10µm) (RPM)	Annual average	70 µg/m^3
Respirable Particulate Matter (<10µm) (RPM)	24 Hours	150 µg/m^3
$PM_{2.5}$	Annual average	35 µg/m^3
$PM_{2.5}$	24 Hours Maximum	75 µg/m^3
Lead	Annual average	1.0 g/Nm^3
Lead	24 Hours	1.5 g/m^3
Carbon monoxide (CO)/ Carbon dioxide (CO2)	8 Hours	5.0 mg/m^3
Carbon monoxide (CO)/ Carbon dioxide (CO2)	1 Hour	10.0 mg/m^3
Hydrogen Sulphide	24 Hours	150 µg/m^3
Non-methane hydrocarbons	Instant peak	700 ppb
Total Volatile organic Compounds (VOC)	24 Hours	600 µg/m^3
Ozone	1 Hour	200 µg/m^3
Ozone	8 hour (instant Peak)	120 µg/m^3

Table 2-7 WHO Ambient Air Quality Guidelines

Pollutant	Averaging Period	Guideline Value in µ g/m3
Sulfur dioxide (SO2)	24-hour	125 (Interim target-1) 50 (Interim target-2)
Sulfur dioxide (SO2)	10 minute	20 (guideline) 500 (guideline)
Nitrogen dioxide (NO2)	1-year	40 (guideline)
Nitrogen dioxide (NO2)	1-hour	200 (guideline)
Particulate Matter (PM_{10})	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
Particulate Matter (PM_{10})	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter ($PM_{2.5}$)	1-year	35 (Interim target-1)

Pollutant	Averaging Period	Guideline Value in µ g/m3
		25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
Particulate Matter ($PM_{2.5}$)	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Since Kenya's air quality standards are more specific, they shall be applied to the proposed project.

Noise

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

Table 2-8 presents the World Bank noise guidelines that should not be exceeded at the nearest Noise Sensitive receptor (NSR) locations offsite. In addition to the absolute values provided in Table 2-9, the WBG also requires that noise increase above existing (background) levels should not exceed 3 dB.

Table 2-8 World Bank Noise Level Guidelines

Receptor	One Hour LAeq (dB(A))	
	Daytime (07:00 – 22:00)	**Night (22:00 – 07:00)**
Residential; institutional; educational	55	45
Industrial; commercial	70	70

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

Table 2-9 Maximum Permissible Noise for Construction Sites in Kenya

	Facility	Maximum Permissible Noise Level in dB(A)	
		Day (0601-1800, LAeq 12 hour)	**Night (1801-0600, LAeq 12 hour)**
(i)	Health facilities, educational institutions, homes for disabled, etc.	60	35
(ii)	Residential	60	35

	Facility	Maximum Permissible Noise Level in dB(A)	
		Day (0601-1800, LAeq 12 hour)	Night (1801-0600, LAeq 12 hour)
(iii)	Areas other than those prescribe in (i) and (ii) (and of applicability to this Project).	75	65

World Bank 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 Kenyan standard (Table 2-9Table 2-9); hence the Kenyan noise standard of 75 dB(A) and 65 dB(A) for day and night time at the property boundary will apply to this Project.

2.6.3 Good Practice Note (GPN) on Addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) in Investment Project Financing Involving Major Civil Works

The World Bank's GPN on Addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) provides guidelines to prevent SEA/SH risks in large infrastructure projects funded by Investment Project Financing (IPF). Recognizing that major projects like roads, dams, and energy works can foster SEA/SH due to transient labor forces, gender imbalances, and power disparities, the note offers actionable measures for borrowers and implementing agencies. Significantly, the GPN aligns with the World Bank's ESF, specifically ESS1 and ESS4, aiming to protect vulnerable groups—especially women, children, and marginalized communities—and promote equitable development. Construction of the new OFC Backbone Network is part of the larger Isiolo-Mandera Road construct which involves major civil works. Though SEA/SH aspects are covered in separate ESIAs for the road, it is important to mention this GPN as a matter of emphasis.

Key components of the GPN are summarized in Table

Key Components of the GPN

1. **Risk Assessment & Mitigation**
    - Requires **gender-sensitive risk assessments** during project design to identify SEA/SH vulnerabilities linked to labor camps, community-worker interactions, and supply chains.
    - Recommends **mitigation strategies**, such as secure housing, gender-balanced hiring, and community grievance mechanisms.
2. **Contractual & Enforcement Measures**
    - Mandates **SEA/SH clauses in procurement contracts**, holding firms accountable for misconduct by staff, subcontractors, or workers.
    - Advocates for **third-party monitoring** and unannounced site inspections to ensure compliance.
3. **Survivor Support & Reporting**

- Promotes **confidential reporting channels** (e.g., hotlines, ombudspersons) accessible to affected communities and workers.
- Emphasizes **survivor-centered responses**, including medical care, legal aid, and psychosocial support, while safeguarding against retaliation.

4. **Stakeholder Engagement & Capacity Building**
    - Calls for **training programs** for contractors, supervisors, and workers on SEA/SH policies and codes of conduct.
    - Encourages partnerships with **local NGOs and women's groups** to enhance community oversight.
5. **Monitoring & Transparency**
    - Requires **disaggregated data collection** on SEA/SH incidents to track trends and measure intervention effectiveness.
    - Supports **public disclosure** of SEA/SH policies and outcomes to foster accountability.

Table 2-10 Key Requirements of World Bank's GPN on SEA/SH and Relevance to the Project

Key Component	Key Requirements	Relevance to the Project
Risk assessment and mitigation	Requires gender-sensitive risk assessments during project design to identify SEA/SH vulnerabilities linked to labor camps, community-worker interactions, and supply chains. Recommends mitigation strategies, such as secure housing, gender-balanced hiring, and community grievance mechanisms.	Conduct gender-sensitive mapping of subproject sites (e.g., identify unsafe areas near schools or hospitals, etc.). Establish secured labor camps with gender-segregated facilities to reduce harassment risks, as necessary.
Contractual and enforcement measures	Mandates SEA/SH clauses in procurement contracts, holding firms accountable for misconduct by staff, subcontractors, or workers. Advocates for third-party monitoring and unannounced site inspections to ensure compliance.	Include SEA/SH clauses in contracts with OFC providers, contractors, and local labor providers, mandating training and zero tolerance. Project workers to sign a code of conduct (CoC). The CoC should have sanctions for any violation. Deploy third-party auditors to audit remote subproject sites (e.g., rural OFC routes, facililty construction sites, etc.).
Survivor support and reporting	Promotes confidential reporting channels (e.g., hotlines, ombudspersons) accessible to affected communities and workers.	Set up multilingual hotlines (e.g., SMS-based for low-literacy areas, WhatsApp, etc.) linked to community health networks.

Key Component	Key Requirements	Relevance to the Project
	Emphasizes survivor-centered responses, including medical care, legal aid, and psychosocial support, while safeguarding against retaliation.	Partner with local women's groups to serve as trusted reporters.
Stakeholder engagement and capacity building	Calls for training programs for contractors, supervisors, and workers on SEA/SH policies and codes of conduct. Encourages partnerships with local NGOs and women's groups to enhance community oversight.	Train OFC contractors and supervisors on SEA/SH (e.g., how to respond to complaints, etc.). Engage e.g. CA, NEMA, Counties, etc. and local chiefs to endorse anti-SEA/SH messaging.
Monitoring and transparency	Requires disaggregated data collection on SEA/SH incidents to track trends and measure intervention effectiveness. Supports public disclosure of SEA/SH policies and outcomes to foster accountability.	Use customized applications to log SEA/SH incidents (anonymously) for real-time tracking. Publish quartely SEA/SH reports (e.g., number of reported cases, % of resolved cases, etc.) to build trust.

3 PROJECT DESCRIPTION

3.1 Introduction

This Chapter provides an overview of the Project location, the design and the activities that will be undertaken during the different Project phases including construction, operation and maintenance (O&M) and decommissioning.

The information contained in this chapter is sourced from:

- The Project Design Report (Multicom, 2025);
- Various ESIA study reports by KeNHA for the road project that forms the OFC Network Backbone; and
- The experience of the ICTA standards and programs team in constructing and operating similar OFC nationally.

3.2 Proposed Location

The proposed project route corridor extends in a north-easterly direction from Isiolo Town (Isiolo County), passing through Meru, Garissa, Wajir, and Mandera counties in Northeastern, Kenya. However, Isiolo, Meru, Wajir, and Mandera have a substantial proposed project footprint as shown in the Map 3-1. The total length of the road is 740 kilometers (km), with connecting spurs estimated at 200 km. The main project route will include:

- Backbone Network: 741.75 km (main route);
- Metro Networks: 62.018 km (urban areas); and
- Access Network - 194.517 Km (Connectivity to Institutions). A total of 341 Institutions have been identified for connection (Table 3-1), these include Government Institutions, Health Facilities, Schools, Technical and Vocational Education and Training (TVETs) and Community Centers.

Network typology route is shown in Figure 3-1.

3.3 Project Overview and Layout

The core activities of the proposed project will include the installation of high-speed OFC infrastructure and related services. The proposed civil works relating to laying of OFC ducts are integrated in the road (alongside the carriageway) by the KeNHA except for incomplete road sections. Therefore, ICTA shall undertake the following activities:

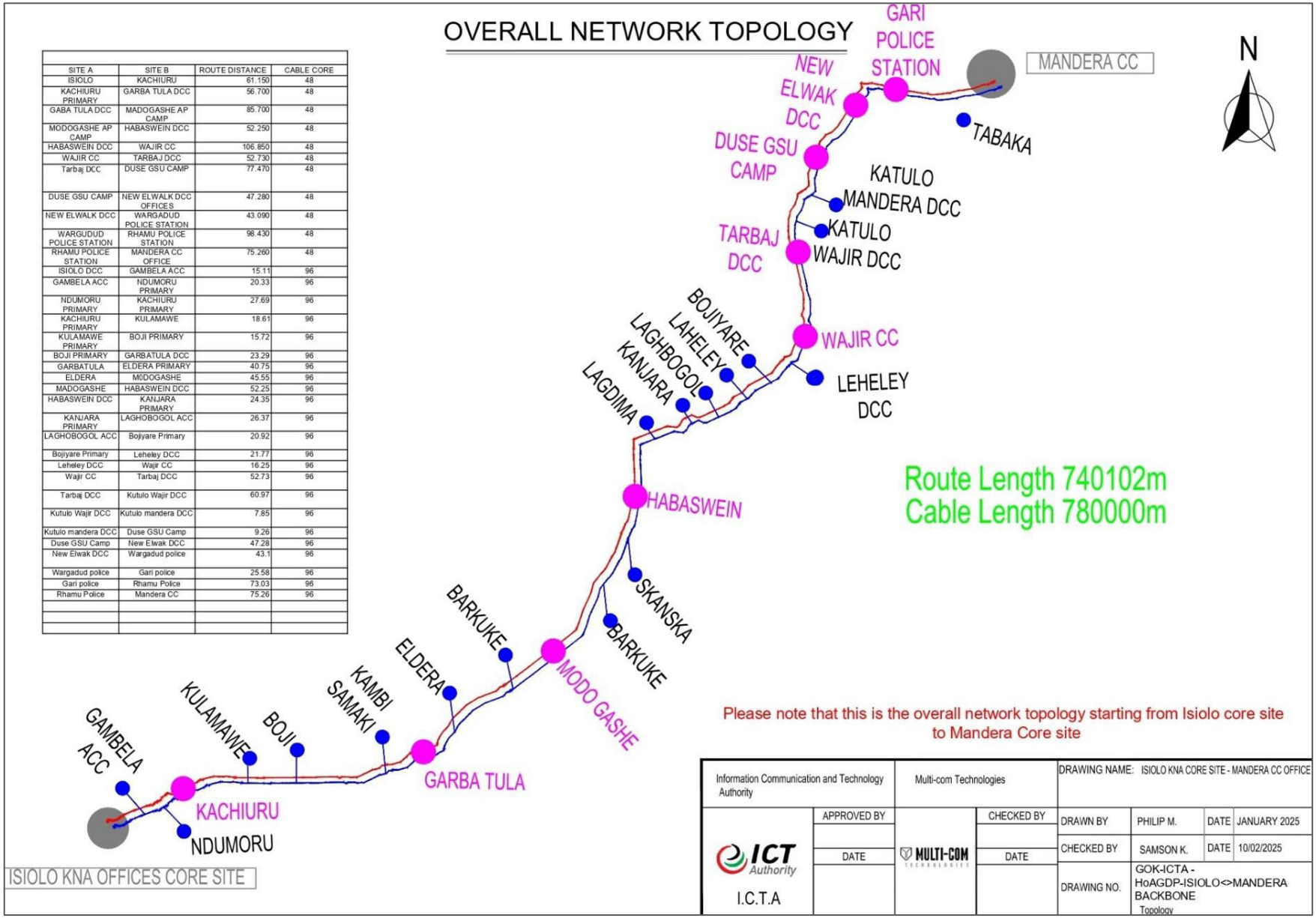
- Design the OFC network;
- Relocation and rehabilitation of existing One Government Network (OGN) OFC;
- Installation of OFC network via fiber blowing and related active equipment; and
- Connections to schools, hospitals, other strategic locations including pastoralist roadside markets, export processing zones (EPZ), rest stops, community centers and service centers

Several institutions have been earmarked for connection, as outlined in the table below. These institutions will be equipped with outdoor Wi-Fi hotspots, allowing surrounding communities to benefit from the service. The project includes the installation of various components such as equipment, site shelters, civil works, OFC, conduits, Manholes, and splicing boxes, as outlined in the design drawings attached as an annexure.

Table 3-1 Identified Beneficiary Institutions

No.	Institution Category	Quantity
1.	Government Offices	108
2.	Schools	145
3.	Health Facilities	45
4.	Community Centers	27
5.	Polytechnics and Colleges	12
6.	Airstrips	1
7.	Network Towers	3
	Total	**341**

Map 3-1 Isiolo-Mandera Road Corridor



SITE A	SITE B	ROUTE DISTANCE	CABLE CORE
ISIOLO	KACHIURU	61.150	48
KACHIURU PRIMARY	GARBA TULA DCC	56.700	48
GABA TULA DCC	MADOGASHE AP CAMP	85.700	48
MODOGASHE AP CAMP	HABASWEIN DCC	52.250	48
HABASWEIN DCC	WAJIR CC	106.850	48
WAJIR CC	TARBAJ DCC	52.730	48
Tarbaj DCC	DUSE GSU CAMP	77.470	48
DUSE GSU CAMP	NEW ELWALK DCC OFFICES	47.280	48
NEW ELWALK DCC	WARGADUD POLICE STATION	43.090	48
WARGUDUD POLICE STATION	RHAMU POLICE STATION	98.430	48
RHAMU POLICE STATION	MANDERA CC OFFICE	75.260	48
ISIOLO DCC	GAMBELA ACC	15.11	96
GAMBELA ACC	NDUMORU PRIMARY	20.33	96
NDUMORU PRIMARY	KACHIURU PRIMARY	27.69	96
KACHIURU PRIMARY	KULAMAWE	18.61	96
KULAMAWE PRIMARY	BOJI PRIMARY	15.72	96
BOJI PRIMARY	GARBATULA DCC	23.29	96
GARBATULA	ELDERA PRIMARY	40.75	96
ELDERA	MODOGASHE	45.55	96
MADOGASHE	HABASWEIN DCC	52.25	96
HABASWEIN DCC	KANJARA PRIMARY	24.35	96
KANJARA PRIMARY	LAGHOBOGOL ACC	26.37	96
LAGHOBOGOL ACC	Bojiyare Primary	20.92	96
Bojiyare Primary	Leheley DCC	21.77	96
Leheley DCC	Wajir CC	16.25	96
Wajir CC	Tarbaj DCC	52.73	96
Tarbaj DCC	Kutulo Wajir DCC	60.97	96
Kutulo Wajir DCC	Kutulo mandera DCC	7.85	96
Kutulo mandera DCC	Duse GSU Camp	9.26	96
Duse GSU Camp	New Elwak DCC	47.28	96
New Elwak DCC	Wargadud police	43.1	96
Wargadud police	Gari police	25.58	96
Gari police	Rhamu Police	73.03	96
Rhamu Police	Mandera CC	75.26	96

Figure 3-1 Network Topology Route

3.4 Key Project Components

3.4.1 Relocation Rehabilitation of Existing National Optic Fiber Backbone Infrastructure

Laying of OFC (redundancy cable)- the general scope of this portion of the HoAGDP is to rehabilitate the existing OGN fiber optic route from Isiolo to Mandera. The rehabilitation activities shall involve:

- Relocation of the OGN OFC – the construction of the new road will present a high risk of cable damage in several areas of the route. In these areas, the cable will be relocated to align with a new KeNHA road design. In all instances, the work, equipment, new and repaired cable will be integrated to the existing OFC network; and
- Construction of new shelters (where identified-containerized telecommunications rooms) and refurbishing the existing equipment to working conditions.

3.4.2 Construction/ Installation of the New OFC Backbone Network – 741.75 Km (Main route)

The high-capacity OFC backbone network comprises a total of 11 Core sites and 13 Aggregation sites were identified along the corridor.

Table 3-2 below show the identified core sites along the Isiolo-Mandera road corridor.

Table 3-2 Identified Core Sites and GPS Coordinates

CORE SITES			
S. No	Site Name	latitude	longitude
1	Isiolo KNA	0.354973	37.585993
2	Kachiuru Primary	0.560918	38.041530
3	Garba Tula DCC	0.529515	38.518983
4	Modogashe AP Camp	0.727757	39.175691
5	Habaswein DCC	1.014386	39.490302
6	Wajir CC	1.756305	40.060099
7	Tarbaj DCC	2.207691	40.117793
8	New Elwak DCC Offices	2.807000	40.928400
9	Wargedud police station	3.179669	40.866684
10	Rhamu Police Station	3.934100	41.215300
11	Mandera CC Office	3.939860	41.862549

Table 3-3 below show the identified aggregation sites along the Isiolo-Mandera road corridor.

Table 3-3 Identified Aggregation Sites and GPS Coordinates

AGGREGATION SITES			
S. No	Site Name	latitude	longitude
1	Gambela ACC	0.403222	37.685105
2	Ndumoru Primary	0.458454	37.843736
3	Kulamawe Primary	0.570845	38.202605
4	Boji Primary	0.570702	38.335926
5	Eldera Primary	0.596346	38.832905
6	Lagdima Primary	1.065831	39.551594
7	Kanjara Primary	1.144566	39.657197
8	Laghbogol ACC	1.287889	39.839715
9	Bojiyare Primary	1.458284	39.905514
10	Leheley DCC	1.619550	40.003499
11	Kutulo Wajir DCC	2.407800	40.597000
12	Kutulo Mandera DCC	*2.407591*	*40.596817*
13	Gari police station	3.397326	40.911536

3.4.2.1 Network Design Principle

The design of the Network was based on the following considerations:

- Build an end-to-end 4*100G backbone Dense Wavelength Division Multiplexing (DWDM) network from Isiolo-Mandera;
- 100G dedicated to users along the corridor;
- 200G dedicated to Cross-border capacity to Somalia;
- 100G dedicated to Cross-border capacity to Ethiopia;
- 11 core sites along the road from Isiolo to Mandera were selected as DWDM sites;
- System capacity is designed with DWDM 40 channels (C-band), and each channel can carry 400G bandwidth (16QAM, 75GHz); and
- All the core sites from Isiolo to Mandera are based on Reconfigurable Optical Add-Drop Multiplexer (ROADM).

The proposed OFC Backbone Network topology is shown in Figure 3-2 and Network Structure in Figure 3-3.

3.4.3 Metro Networks

The following metro networks will be constructed or installed as part of the proposed project:

Table 3-4 Metros, GPS Coordinates, and Distances

No.	Name	Longitude	Latitude	Distance (m)
1.	Isiolo	0.356667	37.5881	13,050.00
2.	Modogashe	0.714285	39.185076	12,120.00
3.	Habaswein	1.015039	39.494909	12,097.00
4.	Wajir	1.756305	40.060099	18,650.00
5.	Elwak	2.811324	40.930365	5,201.00
6.	Rhamu	3.934405	41.227126	6,800.00
7.	Mandera	3.93938	41.862965	24,427.00

Isiolo Metro Network is shown in Figure 3-4, Wajir Metro Network in Figure 3-5, and Mandera Metro Network in Figure 3-6.

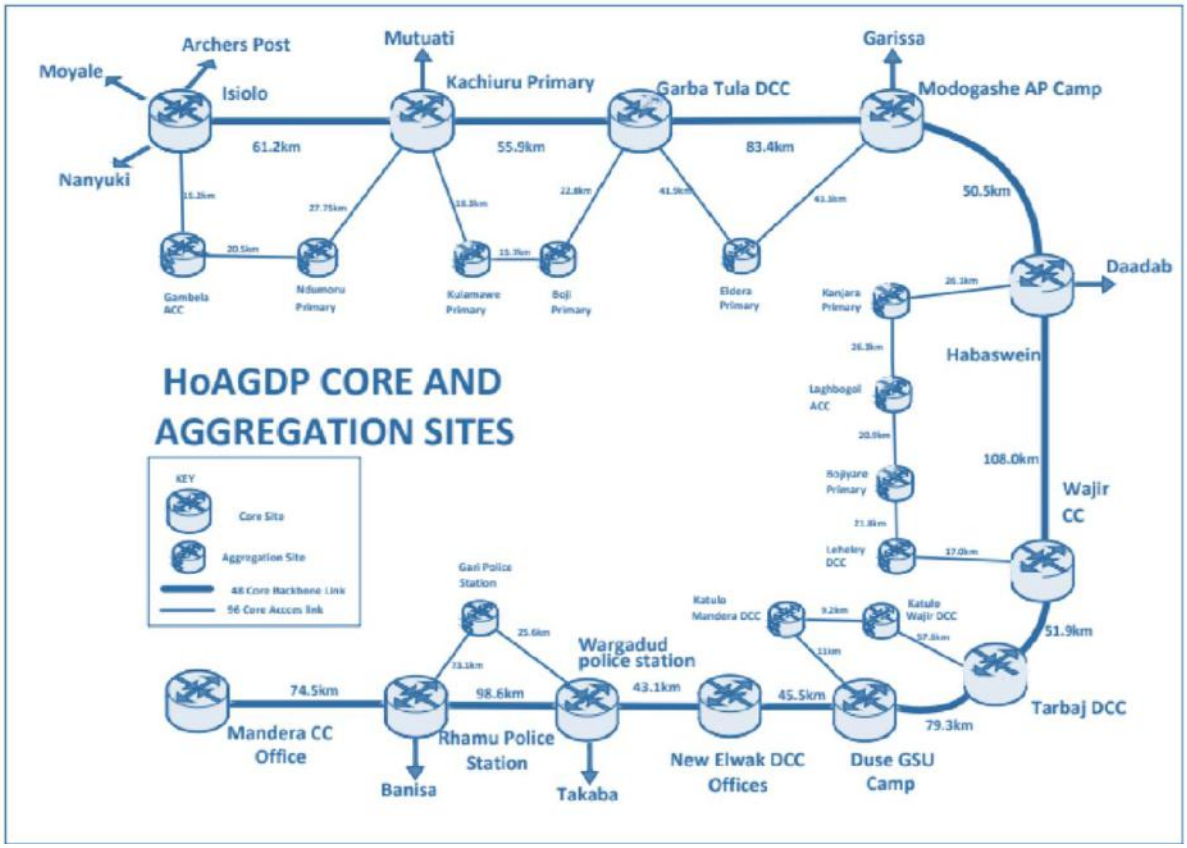


Figure 3-2 Proposed OFC Backbone Network Topology

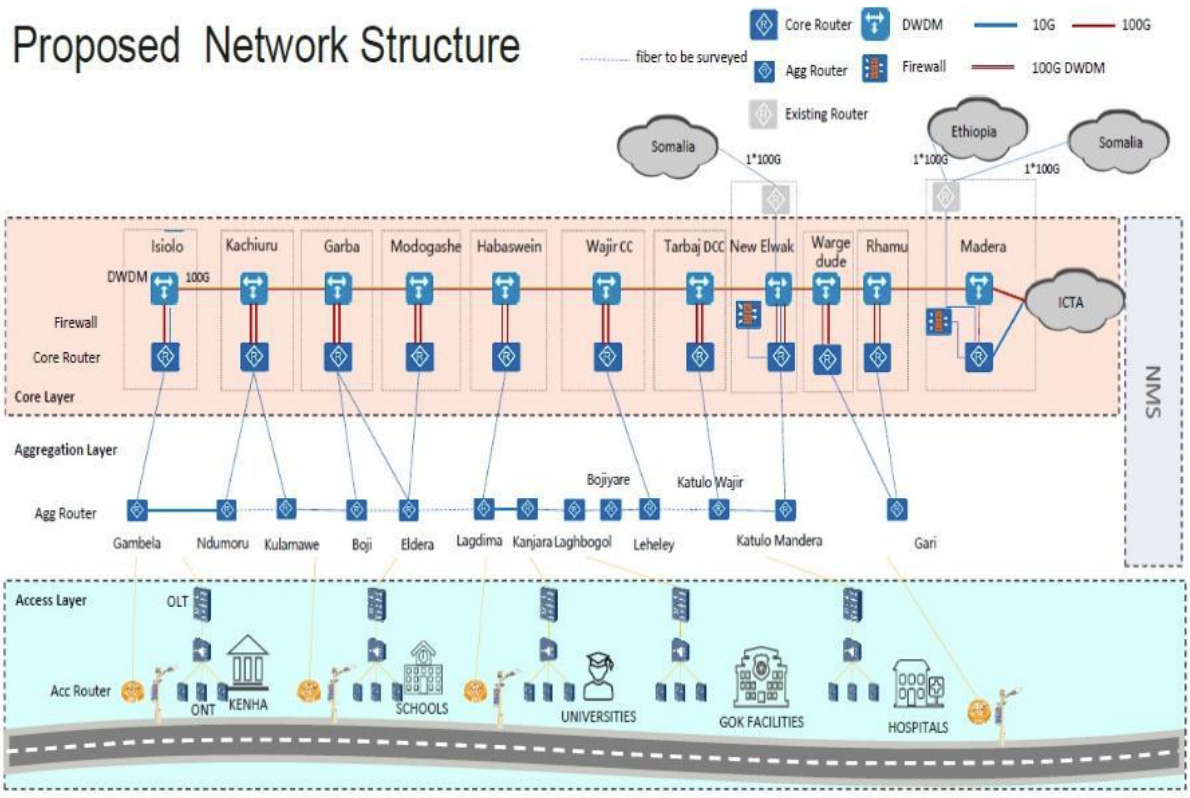


Figure 3-3 Network Structure

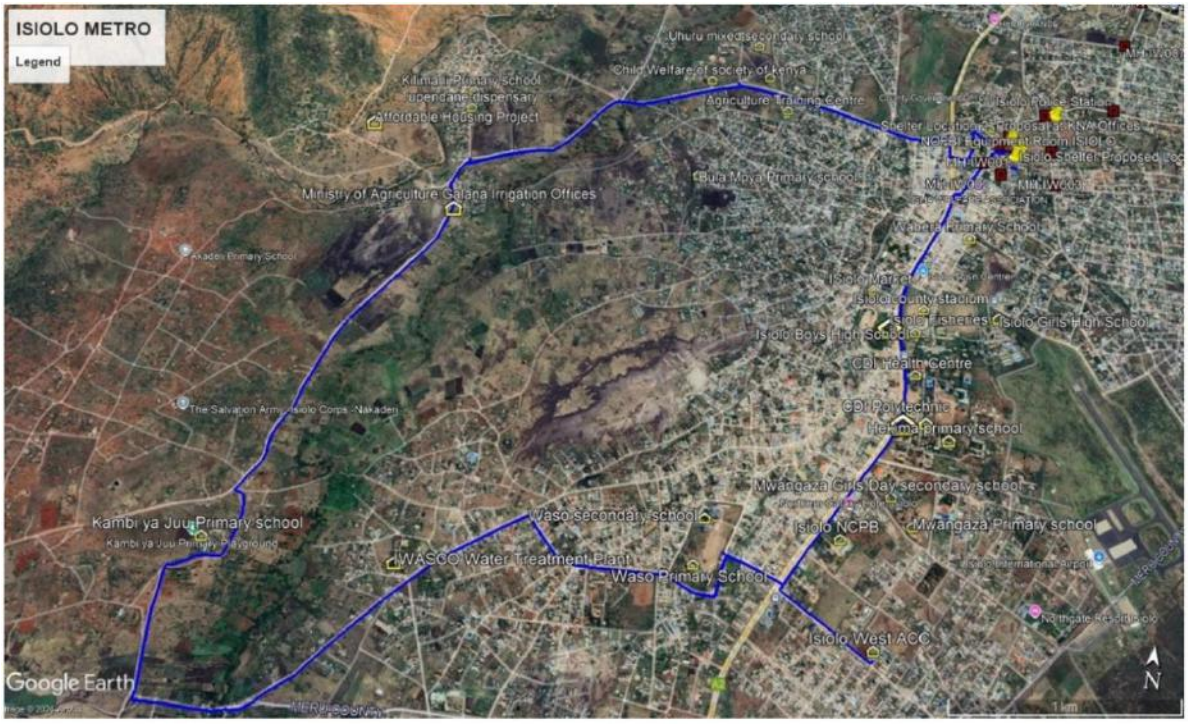


Figure 3-4 Isiolo Metro Network

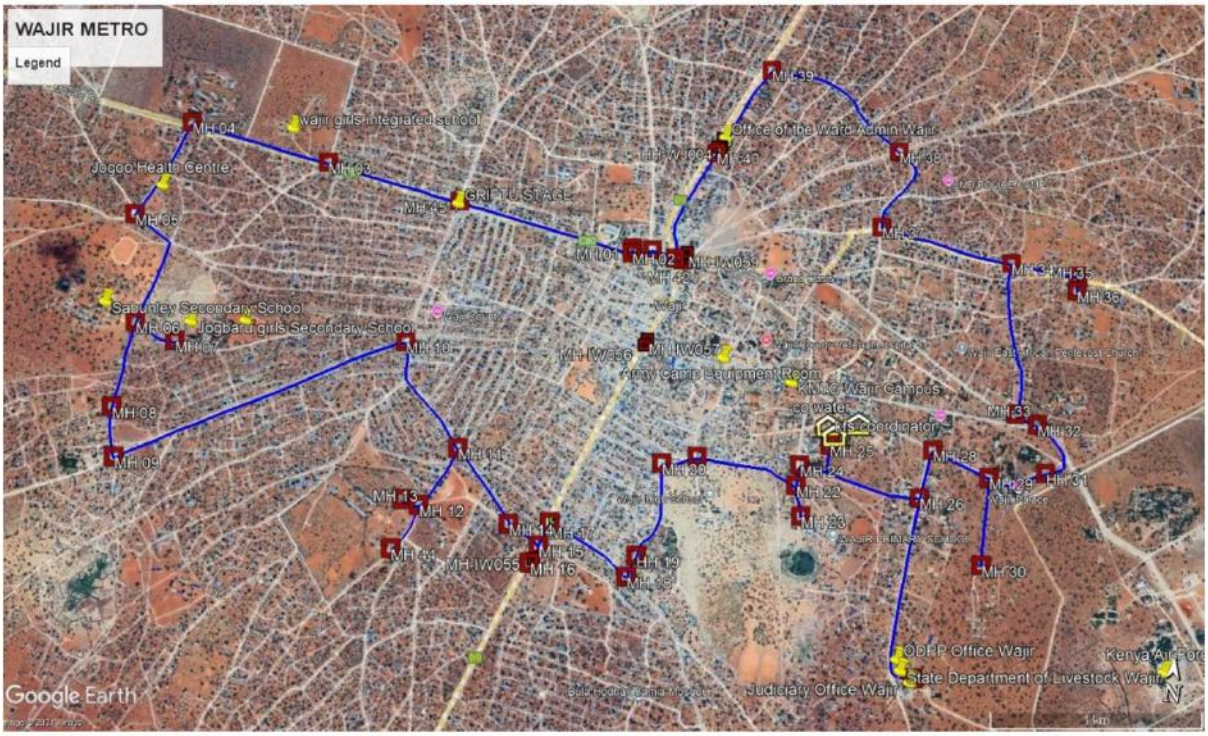


Figure 3-5 Wajir Metro Network

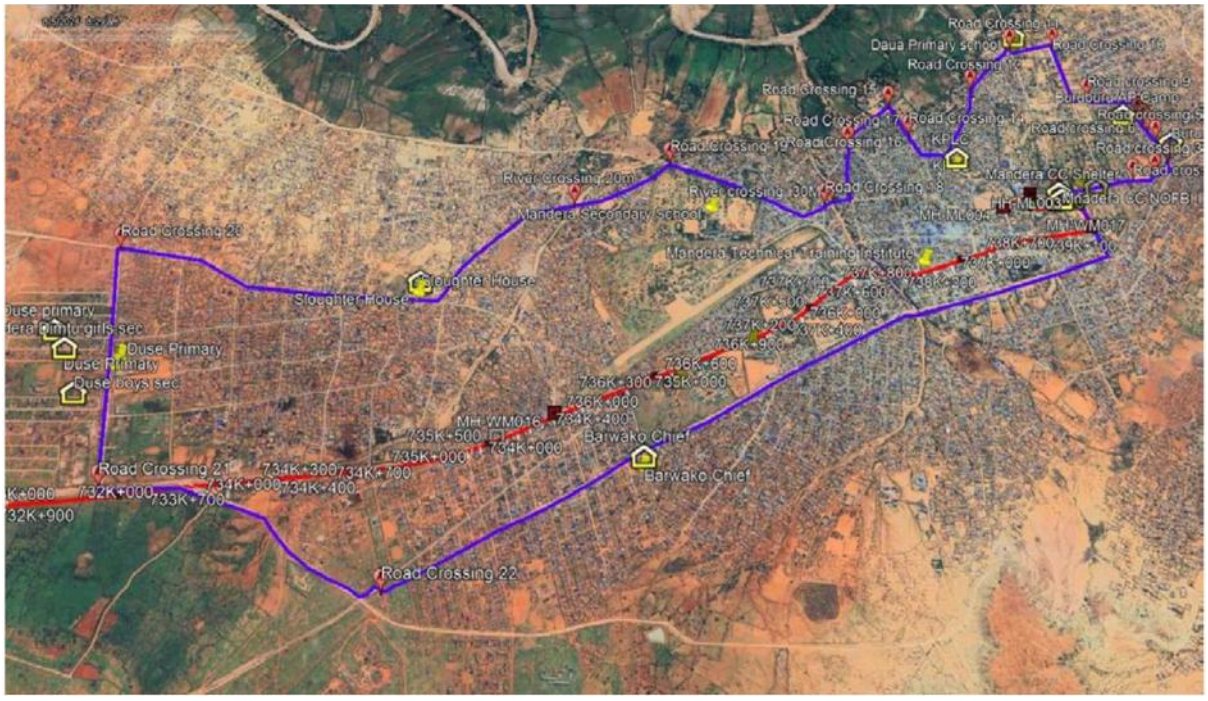


Figure 3-6 Mandera Metro Network

3.4.4 Access Network

Three hundred forty-one (341) access sites across the Isiolo-Mandera corridor have been identified. They cover a total distance of 194,517 meters. See project design report for access site details.

3.4.5 OFC Network Power Supply

Out of the total 11 Core sites and 13 Aggregation sites identified along the road corridor, one (1) Core site and five (5) Aggregation sites are not connected to the National power grid. The sites connected to National Grid have power rationing and intermittent outages.

Proposed solution product components for the 6 sites and backup for the entire core and aggregation sites are:

- High efficiency Solar Panels – 500-700W Range;
- Lithium Batteries – 48V100AH/48V200AH;
- Power supply cabinets with rectifiers, solar controllers, Maximum Power Point Tracking (MPPT) controllers, inverter and air conditioning;
- Battery cabinets with air conditioning; and
- Outdoor fully Integrated ESS cabinet with MPPT controller, inverter, PCS.

3.4.5.1 High Load/Core Sites key factors

The sites power requirements are 2KW-5 KW.

- Uptime critical.
- Off grid/Intermittent grid supply situations
- Space Efficient
- High Availability
- Energy Efficient – Air Cooled
- High Performance
- Easily Scalable – Can support higher loads easily without additional equipment purchase.
- Uptime can be increased simply by adding solar and battery modules.

Key Equipment/Structures

- Site Fence
- Solar Panels
- Solar Support Structure
- Equipment cabinet.
- Hybrid ESS Cabinet incorporating solar controllers, MPPT controllers, inverters, PCS and STS.

3.4.5.2 Light Load/Aggregation Sites

The sites don't require much power – Max. 1KW to power the load.

Key Equipment/Structure for aggregation sites

- Site Fence
- Solar Panels
- Solar Support Structure
- Solar Control equipment – controller and inverters
- Equipment cabinet.
- Battery cabinet/rack with lithium batteries.

- Equipment and batteries can be housed in same cabinet.

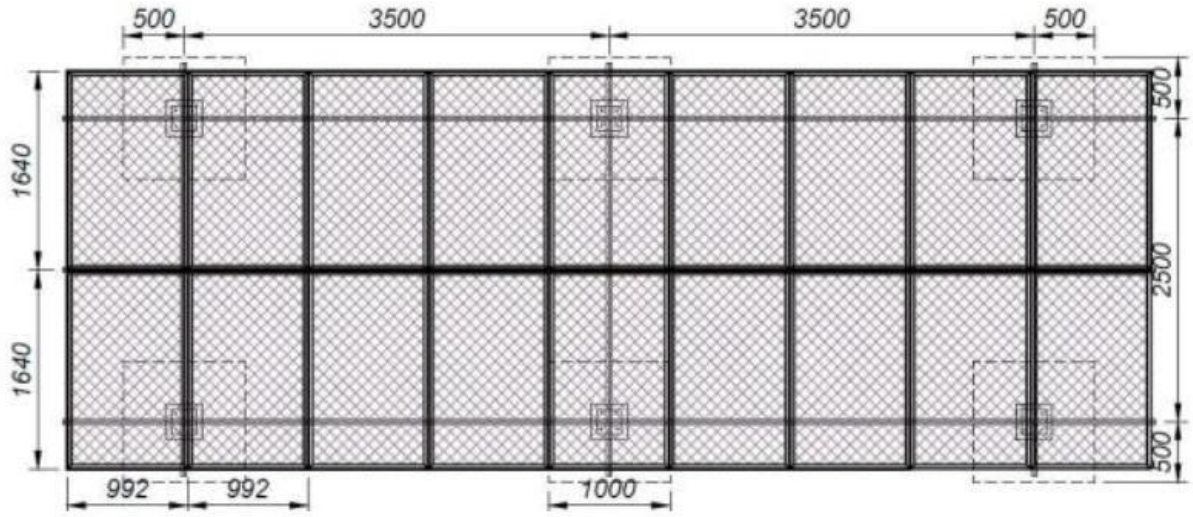


Figure 3-7 Solar Panel Layout

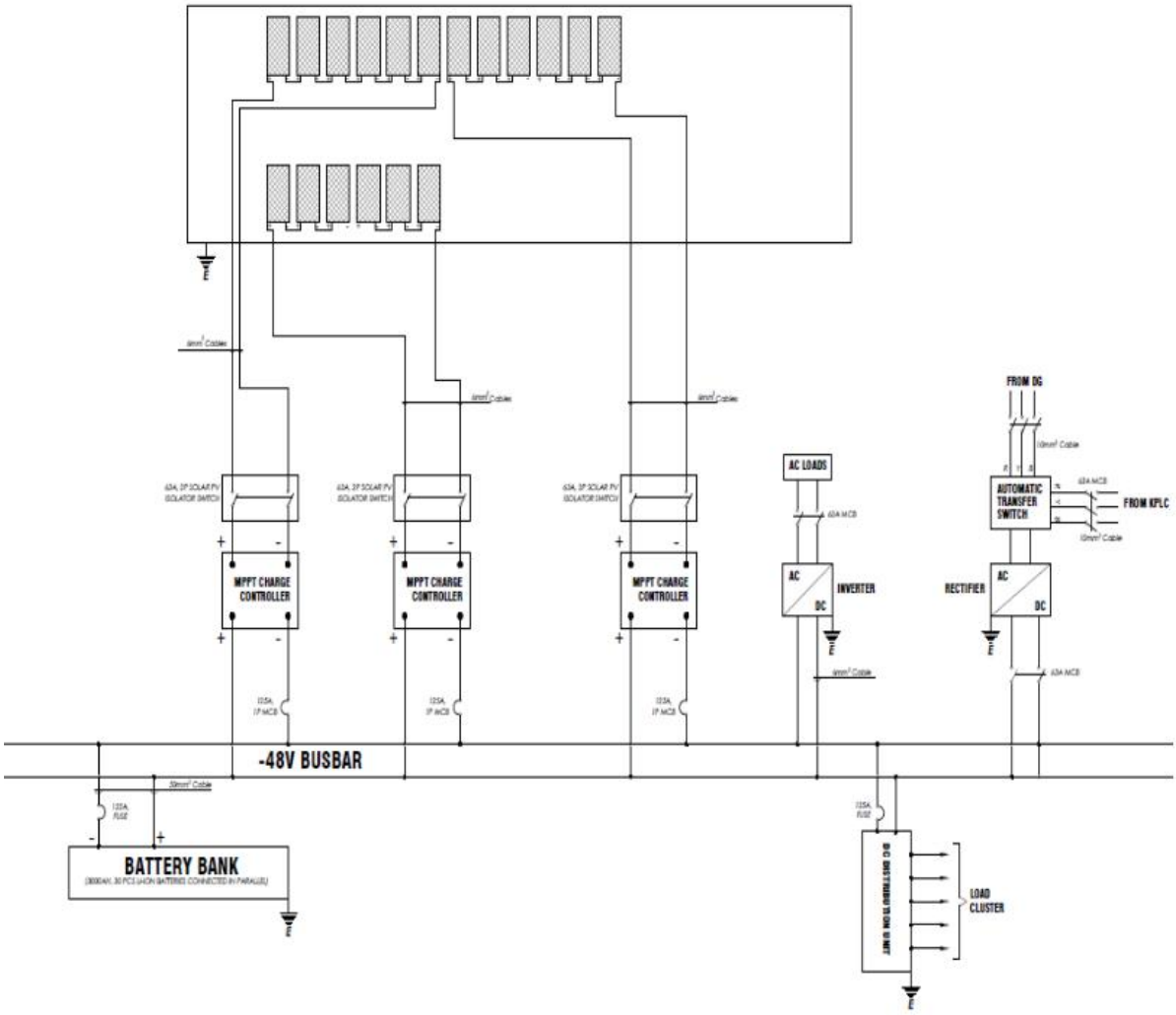


Figure 3-8 Core Site Electrical Schematic Diagram

3.4.6 Shelter Designs

3.4.6.1 Core Sites – Shelter Design

Below are key considerations when designing for Core site shelter:

- Space Efficient – Easy to add additional equipment/battery cabinets;
- High Availability – Easy to add PV modules and battery cabinets;
- Cooling – Air Cooled. Outdoor cabinets come with Air Conditioners in-built; and
- Uptime can be increased simply by adding solar and battery modules.

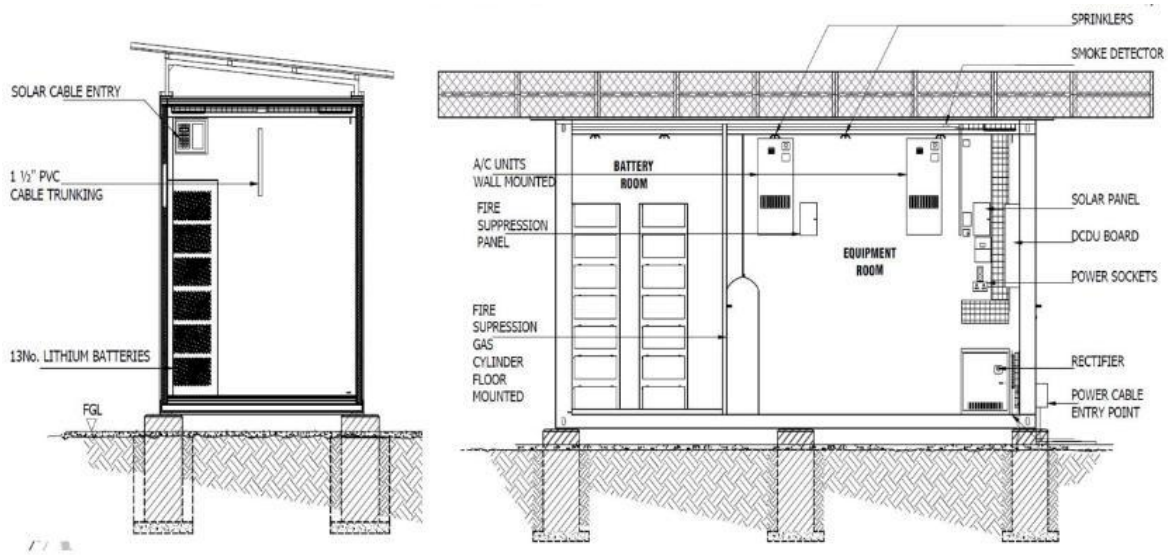


Figure 3-9 Core Site Shelter Design Cross-section

Plate 3-1 Core Site Shelter Design

3.4.6.2 Aggregation Sites – Open Sites Design

- Space Efficient – Easy to add additional equipment/battery cabinets. Small site footprint.
- Cooling – Air Cooled. Outdoor cabinets come with Air Conditioners in-built.
- Uptime can be increased simply by adding solar and battery modules.
- Fence – can be solid concrete wall or clear-view anti-climb fence with razor wire and
- electric fence.

Plate 3-2 Aggregation Site – Open Design

3.4.6.3 Access Sites Design

- Space Efficient - Small site footprint.
- Cooling – Air Cooled.
- Uptime can be increased by adding battery modules.

Plate 3-3 Wall and Roof Mounted Solution

3.4.7 Community ICT Centers – Last Miles

Several community centers shall also be constructed and equipped as part of the proposed project. Figure 3-10 shows a drawing for the center which comprises the following components:

1. Hall – 90 persons capacity;
2. Prayer room;
3. Kitchen;
4. Cultural centers;
5. Offices;
6. Studio; and
7. Computer lab – 30 capacity.

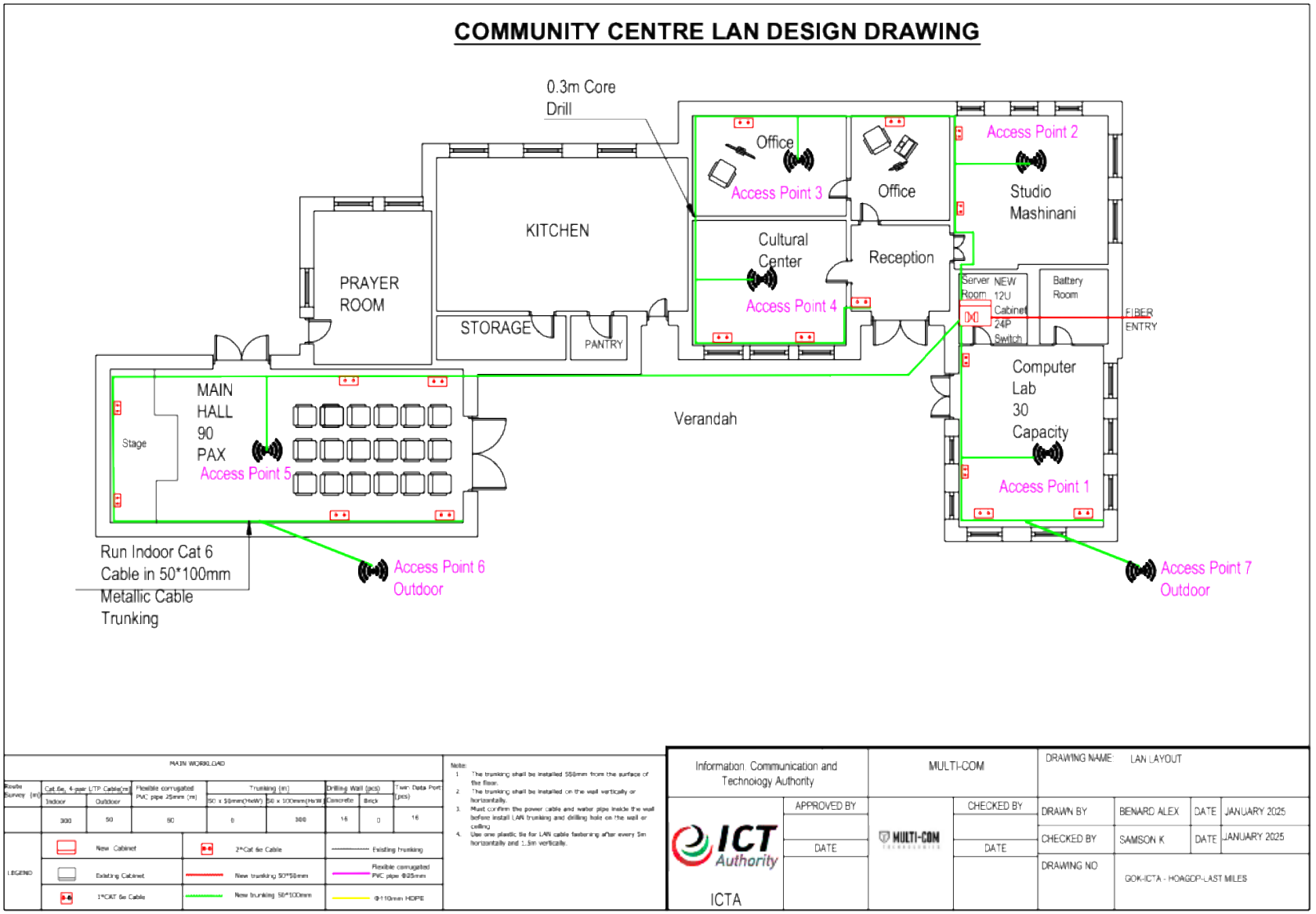


Figure 3-10 Proposed Community Center Drawing

3.5 Project Development Programme

The main Project development milestones are outlined in Table 3-5. The construction phase is expected to be up to 12 months with operations commencing in Q1 2027.

Table 3-5 Project Development Programme

Development Milestone	Timeline
Project Design and Construction Permits	Q1 2024 – Q2 2025
Procurement and Construction Phase	Q3 2025 – Q4 2026
Start of Operations Date	Q1 2027

3.6 Project Preparation and Construction Phase Overview

3.6.1 Construction Phase

Table 3-6 presents the activities that will take place during the Project preparation and construction phases of the Project. These are illustrated in Figure 3-11.

Table 3-6 Construction Phase Activities

Phase	Activity	Description
Project Preparation	Project Design	• Site survey • Concept and detailed design of the Project to feed into the ESIA • Acquiring permits and clearance e.g. ESIA license, rights of way (ROW) permit, etc.
Construction Phase	Site preparation	Site clearing
	Below ground works	Civil works associated with the installation of the OFC networks and related services i.e. excavation/trenching of hard soils and rocks for laying of ducts (0.3m and 1-1.5m deep); Directional drilling for River crossing sections.
	Foundations and concrete slab	Installation of concrete foundation with uniform distributed loading capacity at e.g. Core and Aggregation Sites, Community ICT Centers, etc. Installation of concrete precast manholes.
	Outside Service Plant (OSP) Structures	Construction of structures including steel framework, roof cladding, and external walls.
	Internal structures	Erecting cabinets and wall-mounted boxes.
	Electrical and mechanical	Installation of network transmission equipment, access network, power solution, Installation of core joint boxes. Installation or laying of cables through pulling and blowing. OFC Cable splicing (joints) and testing; and Installation of solid plastic directional marker.

Phase	Activity	Description
	Finishing works	Installation of windows, doors and finishing activities such as painting and landscaping, as necessary.

Site Preparation

Civil Works

Figure 3-11 Illustrative Images

Civil works

Installation

Figure 3-12 Illustrative Images 2

3.6.2 Material, Wastes and Emissions

The materials required and waste streams associated with the construction of the proposed Project are outlined in Table 3-7.

Table 3-7 Construction – Materials, Waste and Emissions

Item	Local/Imported	Description
Materials		
Fill	Local	Lots of fill will be required to backfill the OFC trenches, taken from excavated materials during trenching.
Concrete (cement)	Local	Concrete foundation for the core site shelters community ICT centers and aggregation sites.
Steel	Local	For the framework of the core site shelter and mounting of solar panels
Roof cladding	Local	Steel sheets for roof cladding capable of supporting the solar PV installation.
Masonry stone	Local	For walling the community ICT centers
Iron sheets	Local	For roofing
Wood	Local	Scaffold during construction of core site shelters and community centers (roofing too).
OFC Transmission Equipment	Imported	Fiber optic cables, Optical Network Terminal (ONT), Optical Line Termination (OLT), Routers, Ethernet cables, Network Interface Cards (NICs), Optical Power Meters, and Fiber Optic Splicers
Computer Lab Equipment	Imported/Local	Computers, Keyboards, Routers, Modems, Headphones, Microphones, Cables, Switches**,** Chairs, Air conditioning, Lights, CCTV, Battery storage, Access Point.

Item	Local/Imported	Description
Access Network Equipment	Imported	Routers, Switches, Wireless access points
Power supply system	Imported	Solar PV based power solution with option of battery storage.
Finishing items	Local	Paints, office furniture, landscaping materials.
Waste and Emissions		
Vegetation	n/a	Grass and shrubs from OFC installation site clearing.
Packaging	n/a	General construction packaging waste includes cable sheaths, jackets, and cores, as well as the spools, reels, and boxes that are used for packaging and transportation. Other wastes include pallets and plastics.
General household waste	n/a	From presence of construction workforce onsite.
Soil	n/a	From trenching and excavation activities
Liquid waste	n/a	From temporary ablution facilities
Hazardous waste	n/a	Paints/lubricants/solvents used for finishing. Again, hazardous substances that may be present in some fiber optic cable components, such as lead, mercury, arsenic, or fluorine.
Emissions	n/a	Emissions to air from the transportation of construction materials including NOx[6], CO2[7], CO[8] and PM[9]/dust. Dust from site clearance and excavation activities. These are expected to be short in duration and localized. There will also be short periods of dust generation associated with site preparation and civil works.

3.6.3 Utilities Demand during Construction

Demand for energy and water during construction is expected to be low based on the construction activities outlined in **3.6.1**. These will be serviced as follows:

1. Power demand associated primarily with mechanical tools, will be serviced by small generators and batteries;
2. Water demand, used for dust suppression, cleaning and drinking water for workers, will be availed through the road contractors, as necessary. In sections where the road contractor is yet to be appointed, the OFC contractor will source its own supply; and

[6] Nitrogen Oxides
[7] Carbon Dioxide
[8] Carbon Monoxide
[9] Particulate Matter

3. An onsite toilet will be constructed for ablution in road sections where the road contractor is yet to be appointed. In sections where a road contractor is available, project workers will use available facilities.

3.6.4 Construction Equipment

Below are types of equipment that will be present on site during the construction phase. It does not include vehicles and equipment used to transport materials to and from the site (e.g. and trailers, etc.).

- Horizontal directional driller
- Chain trencher
- Tractor Loader Backhoe (TLB)
- Fiber optic cleaver
- Fiber optic stripper
- Fiber optic fusion splicer
- Fiber optic test equipment
- Fiber optic cabling and connectors

3.6.5 Construction Workforce and accommodation

The construction workforce will vary at different times during construction phase but will have a peak on site presence of approximately 10 people during the construction phase. Except for construction project manager, technicians and engineers, most positions will be filled through the local workforce.

Since most of the workforce is drawn from the local labour pool, only skilled, who will be few (if any), will require accommodation. In these instances, they will be accommodated at nearby hotels.

3.6.6 Construction Methodology

3.6.6.1 Excavation /Trenching

The OFC cabling will primarily be installed underground using a combination of trenching and Horizontal Directional Drilling (HDD). Where the cabling needs to traverse sensitive environments, such as rivers, HDD techniques will be employed. Most activities related to the proposed OFC will occur during the construction phase.

Trenches will be dug to a depth of approx. 1–1.5 Meters and a width of 200–300 mm. A combination of two types of machinery will be used for trenching. A Tractor Loader Backhoe (TLB) will be used for more challenging terrain, while a Chain Trencher will be utilized for standard trenching as outlined in the Plates below:

- Backbone Network: 741.75 km (main route);
- Metro Networks: 62.018 km (urban areas); and
- Access Network - 194.517 Km (Connectivity to Institutions). A total of 341 Institutions have been identified for connection, these include Government Institutions, Health Facilities, Schools, Technical and Vocational Education and Training (TVETs) and Community Centers.

Plate 3-4 Horizontal Directional Drilling

Plate 3-5 Tractor Loader Backhoe (TLB)

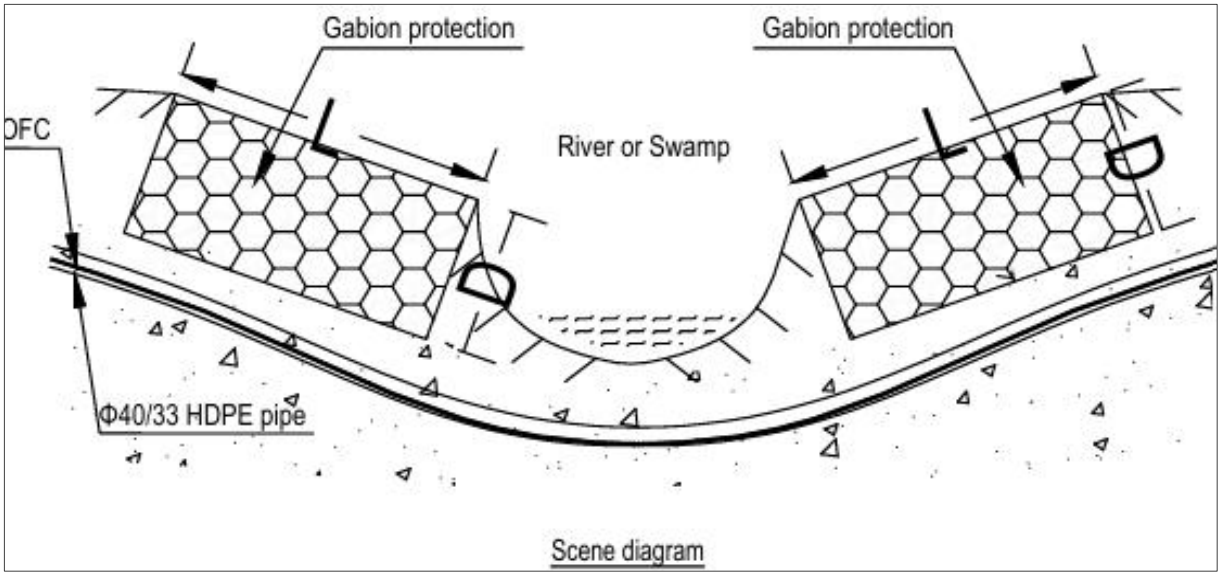


Figure 3-13 Schematic HDD Technique

3.6.6.2 Manholes

Manholes are essential for accessing cable during maintenance. They will be installed along all underground routes, spaced approximately 1km apart or as dictated by the terrain. In urban and town areas, all manholes will be surface manholes, while in rural or along the remote project corridor, surface manholes will be installed approximately every 4 kilometers or as dictated by the design to facilitate maintenance and repair activities. The design of the manhole is illustrated in the figure below. Manhole external dimension shall be 1312mm×1230mm (L×W) and cover diameter of approx. 660mm.

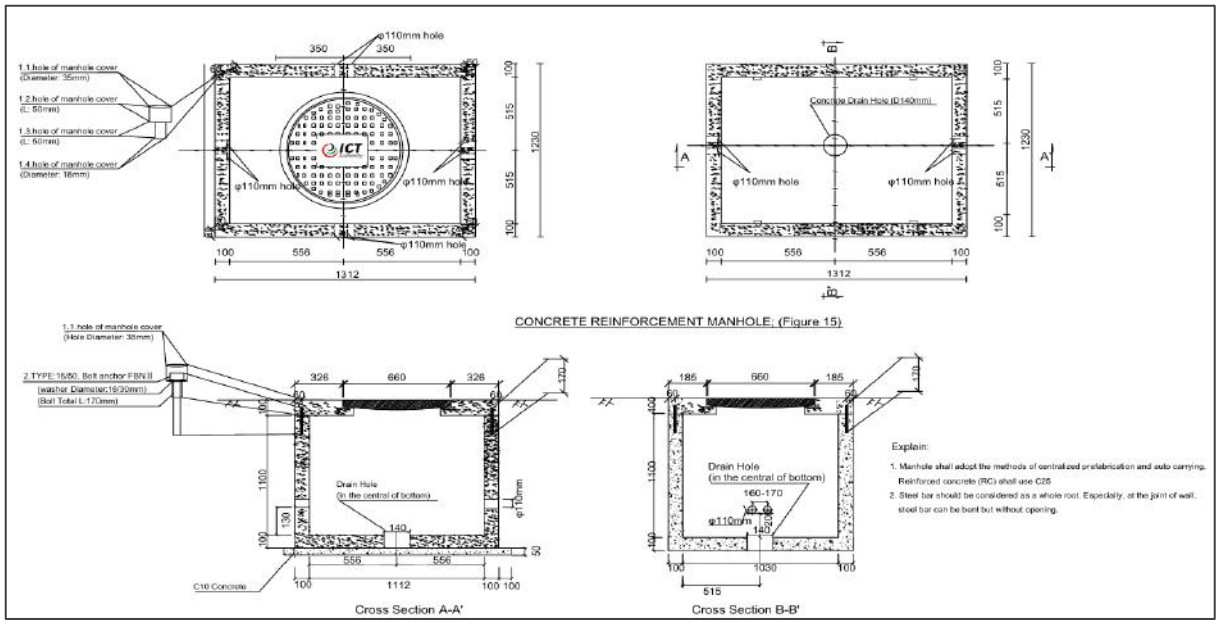


Figure 3-14 Manhole Design

3.6.6.3 Installation Technology and Equipment

ICTA will utilize fiber blowing to install optical fiber cable along the proposed project corridor. This method combines high-speed airflow with a mechanical pushing force to facilitate installation, a process known as blowing or jetting. It is the preferred technique for deploying fiber optic cables through pre-installed conduits. During the installation, several hundred meters of cable are initially pushed into the duct before compressed air is introduced at the duct inlet. The fiber optic cable is securely attached to a blowing head equipped with two seals that grip it tightly. As air pressure builds up, the jetting motion propels the cable smoothly through the conduit. This stage will commence once all civil work has been fully completed.

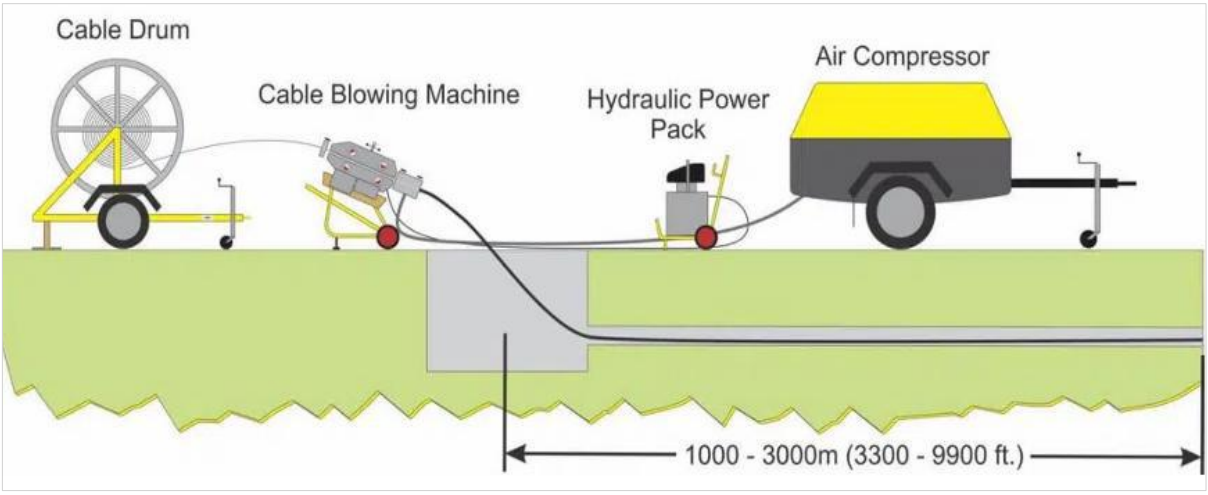


Figure 3-15 Single Length Cable Blowing Technique

3.7 Operations and Maintenance Phase Overview

The operations phase is concerned with the optimal performance of the installed OFC and related services especially access networks and points. It is typically low impacting with the main environmental and social impacts associated with the energy demand, waste management from discarded optical disks, and occupational health and safety as assessed in Chapter 7.

3.7.1 Operations Phase Activities

Table 3-8 outlines the activities performed during this phase.

Table 3-8 Operation Phase Activities

Activity	Description
Maintenance of transmission equipment	General maintenance of OFC network and related services. This will be done through Regular Inspection and Cleaning, Repairing Damaged Fiber Cables, Repairing or replacing damaged access networks and points.
Awareness creation	Awareness will be created among communities living along the road corridor and those in metros and at public access points.
Office administration	Office based administration activities including accounts and client administration.

3.7.2 Materials, Waste and Emissions

The materials required and waste streams associated with the operation of the proposed Project are outlined in Table 3-9.

Table 3-9 Operations – Materials, Waste and Emissions

Item	Local/Imported	Description
Materials		
Fiber cables, routers, Ethernet cables, NICs	Imported	Fiber optic networks, like all network infrastructures, require consistent maintenance and problem-solving measures to maintain peak functionality.
Energy	Local	Electric power is required to operate various equipment and electrical appliances, and lighting purposes. Main supply will be from Kenya Power and Lighting Company. Solar energy utilisation to supplement power from the grid.
Fuel	Local	Transport for project staff during inspection and maintenance of the project.
Waste and Emissions		
General household type	n/a	From office and workforce.
Packaging	n/a	General construction packaging waste including cable sheaths, jackets, and cores, as well as the spools, reels, and boxes that are used for packaging and transportation.
Oils and lubricants	n/a	From vehicle and equipment maintenance activities – small quantities expected.
Emissions	n/a	NOx, CO2, CO and particulates from vehicle movements and use of diesel-generated power from local grids from e.g. Habaswein, Wajir, Mandera, etc. Local emissions are expected to be minimal due to deployment of solar power as main power source.

3.7.3 Power and Waste

The demand for utilities during the operations phase will be as below:

1. Power supply for the high-capacity OFC and related services will be provided through the project-installed solar and local grids operated by KPLC; and
2. Project proponent/ICTA should put in place mechanisms to manage waste generate during operations. Poor waste management is rampant within the PAI. Waste management services are not available.

3.7.4 Decommissioning Phase Overview

It is expected that the fiber optic cables will have a lifespan of between 20 to 25 years, but some cables can last much longer. Solar panels will last between 25 to 30 years and storage batteries between 5 to 15 years. Wi-Fi access point (WAP) should last for 3 to 5 years. Therefore, two decommissioning options are considered:

- Components that have a shorter lifespan such as the solar batteries and WAP will be replaced, and the project will continue to operate; and
- On the basis that the high-capacity OFC and related services are no longer required it will be exhumed, dismantled, and demolished and the sites returned to their original state.

Should option 2 materialize then the decommissioning phase will be like the construction phase in terms of environmental and social impacts. Most project structures are made of steel and recyclable components. Concrete foundations and other non-recyclable components will be disposed to landfills. Given that the lifespan is over 20 years, provisions will be made in the ESMP for a decommissioning plan to be developed one year prior to decommissioning.

4 PROJECT ALTERNATIVES

4.1 Overview

Regulation 16 (b) of Environmental (Impacts assessment and Audit) Regulations, 2003, requires identification and analysis of project alternatives when undertaking an ESIA. An ESIA should identify and assesses alternatives to the proposed project. Only the best feasible alternative should be selected based on less negative impacts and cost-benefit analysis. An important alternative to be analyzed is the "no project" alternative. This is a fundamental analysis because it helps the proponents measure the impacts of the project against those which would have taken place without the project.

4.2 Project Alternatives

4.2.1 Installation Configuration Alternative

Different installation configurations for OFC, which include the aerial and satellite installations:

4.2.1.1 Aerial installation configurations

Considering the magnitude of the proposed project, utilizing Kenya Power and Lighting Company (KPLC) transmission poles option was considered. Most optical fiber cables are intrinsically lightweight; they are subject to stresses caused by environmental and weather factors they are installed in. Aerial run cable can be affected by wind and storms, creating a situation that can cause the cable to stretch or sag, pulling on the fibers. Under most conditions aerial optical fiber cables needs to be supported by an external support member, suspension strand, or "messenger". Unlike direct burial installations, aerial installations will often be executed by utility companies with specialized equipment for long haul runs. This making the process more expensive to install and maintain. This option of installation was considered and prioritized for areas devoid on trenching space (or land take is required) and where KPLC mini-grid transmission lines are available along the road corridor.

4.2.1.2 Underground Cable Installation Configurations – Proposed Project

The underground cable installation configuration is designed to provide extra protection for the cables but can also offer certain installation advantages. The cables are plowed in or buried in a trench when buried directly and the installation process can be very quick. Duct or conduit for underground burial is manufactured using rigid, very rugged, abrasion resistant material. Underground cable installation is a series of ducts placed under the streets, accessible by utility vaults or Manholes. Installed conduit is advantageous because it offers a route for new cable installation or old removal without damage to streets, pavements, edifices, etc. Considering the challenges that comes with aerial installation like weather challenges and destruction of cable from external forces, the underground conduit was considered to the most optimal installation configuration.

4.2.2 Technology Alternatives

Several technological alternatives that either did not fulfill the purpose of the project or did not meet the agreed criteria were evaluated. The major factors that affected the acceptability of those options

were potentially adverse environmental effects and problems related to technical feasibility. The following alternative technologies were considered as alternative to the OFC.

4.2.2.1 Wireless Local Area Network (WLAN) Alternative

WLAN is used to provide connectivity within a building or a limited outdoor area. WLAN enables connectivity to a variety of devices that use radio waves, including laptops, smartphones, tablets and internet of things (IoT) devices. Since WLANs rely on radio transmissions instead of wired connections, their range is limited to a single business or campus. WLANs operate using radio frequency (RF) waves and various wireless protocols. The most common protocol is 802.11 standard, also known as Wi-Fi.

In this HoAGDP OFC project, WLAN has been adopted as a technology that will enable end users (internet users) access internet services using their mobile devices. Both indoor and outdoor WLAN connectivity devices known as access points (APs) have been identified and adopted to be used as per the network design proposal submitted by the design consultant.

4.2.2.2 Radio

Radio waves carry information over the air from one point to another. Along the way, the waves encounter various obstacles or obstructions that can impact range and performance, depending on the characteristics of the radio wave. In addition, regulatory rules govern the use and limitations of radio waves. Signals using these radio frequencies are generally limited to a two to five-kilometer radius, or five to 45 square miles, which makes application in less densely populated areas less economical. These frequencies are inherently more susceptible to weather and environmental interferences which made this option not meet the purpose of the project.

4.2.2.3 Telephony

The telephone industry predominantly uses copper twisted pair for the delivery of communications services to commercial and residential customers. Plain old telephone systems have been the primary means of communicating both locally and long distance. The problem is that it was designed for the transmission of voice communications. It's a mature technology, but inadequate by design, the amount of bandwidth that can be delivered is restricted by the characteristics of the copper twisted pairs installed between the customer and central office.

Services such as Digital Subscriber Line (DSL) delivered across a local exchange carrier's existing copper wire system can deliver very high speeds. However, DSL suffers performance limitations based on the distance from the customer premises to the serving central office. Distances are limited to about six to eight kilometers from a central office for the lowest speed solutions and approximately three kilometers or less for the fastest. Additionally, much of the plant is physically incapable of providing broadband service. The option does not meet the purpose of the project.

4.2.2.4 Satellite Internet Technology

This involves the use of satellites to provide internet access. It is a wireless broadband internet service whereby geostationary satellites beam data signals directly to ground-based receivers (dishes). This connectivity technology is applicable and suitable in remote areas where other forms of internet connections, for example optical fiber cable, are unavailable or impractical. For specific applications, Starlink® currently is a typical example of satellite internet service that uses low Earth orbit (LEO)

satellite constellation to deliver high-speed broadband. The main advantage of this technology is fast deployment and cheaper initial installation cost. However, its main disadvantage is limited bandwidth capacity, therefore not suitable for large enterprises.

This option may be deployed under this project in instances where fast deployment is required and some critical sites that are outside the targeted optic fiber connectivity corridor of 10Km radius.

4.2.2.5 Laser Radio Transmission

A laser radio transmitter transmits data via a semiconductor laser, opening the door to ultra-high-speed WI-FI. The laser that can emit microwaves wirelessly, modulate them, and receive external radio frequency signals, enabling it to function as a laser radio transmitter. Unlike conventional lasers that emit a single frequency of light, laser frequency combs emit multiple frequencies simultaneously — evenly spaced to resemble the teeth of a comb. Inside the laser, the different frequencies of light beat together to generate microwave radiation. The light inside the cavity of the laser causes electrons to oscillate at microwave frequencies that are within the communications spectrum.

The first thing the device needed to transmit microwave signals was an antenna. To create the antenna, a gap is etched into the top electrode of the device, creating a dipole antenna (like the rabbit ears on the top of an old TV). The frequency comb was modulated to encode information on the microwave radiation created by the beating light of the comb. Using the antenna, the microwaves are radiated out from the device, containing the encoded information. The radio signal is received by a horn antenna, filtered, and sent to a computer.[10]

This technology is still nascent and under development, therefore, not available for consideration in this Project.

4.2.3 Fiber Optic Cable Alternatives

The growing need for fast broadband 'connectivity' in society and the economy requires a reliable, affordable, and scalable state-of-the art communications infrastructure network. Internet Protocol (IP) traffic has been growing exponentially for years, as human activities are increasingly going online, and there is no let-up in this trend. Services such as HDTV, 3D TV, 4K, video on demand, video conferencing, and new online applications in every profession and business imaginable are all driving further growth in data traffic. The following details the advantages of incorporating a high-speed data fiber-optic cable for the proposed project, when compared with other technologies are outlined in Table 4-1.

[10] The TechBriefs website: https://www.techbriefs.com/component/content/article/tb/pub/techbriefs/communications/36378 Accessed on 4/3/2021

Table 4-1 Optical Fiber Cable (OFC) Advantages

Speed:	Fibre optic networks operate at high speeds - up into the gigabits
Bandwidth:	large carrying capacity and Low attenuation (data loss)
Distance:	Signals can be transmitted further without needing to be "refreshed" or strengthened.
Resistance:	Greater resistance to electromagnetic noise such as radios, motors or other nearby cables.
Maintenance:	Fibre optic cables costs much less to maintain
Durability:	Longer life expectancy than copper or coaxial cable

Additionally, the quality of sound received over fiber optic cables is extremely clear and it does not vary with atmospheric conditions. Cables offer excellent confidentiality, light weight, and reliability. The fact that the optic cable system will lead to increased speeds and reduced internet costs is a welcome idea for the government offices and community centers in Northeastern Kenya. This is the most optimal option in terms of technology and reduction of redundancies and uses mostly existing wayleaves of mostly road infrastructures remains the most optimal option.

4.2.4 The "No-Action (No Project)" Alternative

Under the '**No Action'** alternative, the proponent would not carry out the intended proposed installation of the optic fiber cable and the anticipated negative impacts resulting from commissioning and operation of the development as proposed, would not occur. Additionally, the resultant socio-economic benefits that would be created by the proposed installation of the OFC project would also be foregone. This decision is not favorable if the Kenya vision 2030 and proposed project objectives are to be achieved.

While the "**No Action"** alternative may ensure non-interference in the biodiversity, social conditions, the resultant implication is that there will be no improvement to the Kenya telecommunication status hence no growth will be experience as a result in improved internet connectivity. Additionally, this project is anticipated to create employment in the participating countries. The enhancement of communications and global connectivity through this project will directly affect access to government services, government operations, local businesses, education, and employment opportunities within the country. The high-capacity OFC project is a priority project for improving the socio-economic outcomes of an isolated and underdeveloped parts of member countries that are inhabited by disadvantaged communities manifesting comparatively high levels of poverty. Thus, improving connectivity, supporting livelihoods, and building resilience will contribute towards creating a sense of belonging, inclusion, sharing of benefits, and greater peace and security.[11] Therefore, this alternative was excluded from further consideration.

[11] HoAGDP PAD

4.2.5 The Proposed Development

This report has identified social, physical, and economic impacts for this proposed OFC installation and related services. This alternative will have minimal impacts on the physical and social environment and has considered the necessary mitigation measures to either eliminate completely or reduce the impacts to negligible. Since the proposed project will not interfere with any sensitive environment and negative impacts are very minimal and when mitigated they are reduced to negligible levels. Maximum benefits shall be realized with the implementation of the project in one of the poorest regions of the country.

5 ENVIRONMENTAL AND SOCIAL BASELINE

5.1 Isiolo County

Isiolo County borders Marsabit County to the North, Samburu and Laikipia counties to the West, Garissa and Wajir Counties to the East, and Tana, Kitui and Meru Counties to the South. The county covers an area of approximately 24,880 km². The County has two constituencies, three sub-counties and ten (10) wards.

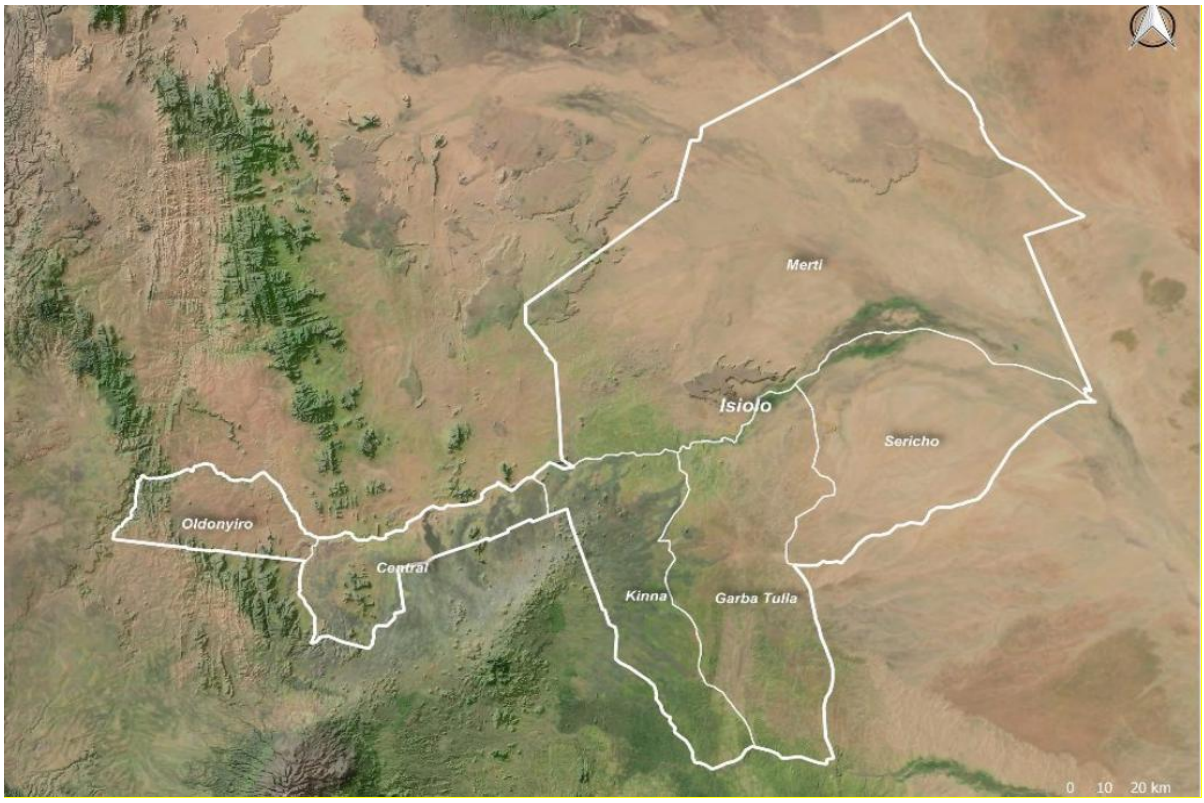


Figure 5-1 Isiolo County Administrative Units (Source: Resource Atlas of Isiolo County, Kenya 2015)

5.1.1 Biophysical Environment

5.1.1.1 Topography

Isiolo County is in northern Kenya. The eastern part of the county lies within a vast valley between Ethiopia and southern Kenya, with altitudes ranging from 200 to 700 meters above sea level. In contrast, the western region extends along the slopes of Mount Kenya, where elevations rise above 1,800 meters, reaching their highest points at Lewa Conservancy in the southwest. The Nyambeni volcanic range is elongated in a north-east to south-west direction from the foothills of Mt. Kenya and rises to an elevation of 7,000 feet.

The entire road section along which the fiber optic will pass is characterized by low-lying hills, valleys, and expansive plains. Other features include rock outcrops, such as the massive rock formation at Waso Trading Centre and the Kulamawe Hills. As one travels further East along the road corridor, expansive plains become more prominent, with minimal undulations towards Eldera and Modogashe towns.

Plate 5-1 Nyambene Hills at the Background as Viewed from Kachuru Market Centre

5.1.1.2 Climate

Isiolo County is generally an arid and semi-arid area with low-lying plains on most parts of the region. Isiolo is classified as 100% arid and semi-arid, covering three agro-ecological zones (AEZs): Semi-arid (5 percent of the total land in the County), arid (30%), and very arid (65%) (*Herlocker et al. 1993; Sombroeket al. 1982*). The semi-arid zone (**Zone V**) covers part of Wabera Ward, Bulla Pesa Ward, and some parts of Burat Ward in Isiolo North Constituency, and southern parts of Kinna Ward in Isiolo South Constituency. This zone receives between 400 and 650 mm of rainfall annually[12]. The arid zone (**Zone VI**) covers Oldonyiro, Ngaremara, some parts of Burat Wards in Isiolo North Constituency, the entire Garbatulla Ward, and northern parts of Kinna Ward in Isiolo South Constituency. Rainfall ranges between 300 and 350 mm annually, and the severe arid zone (**Zone VII**) covers Chari, Cherab, parts of Oldonyiro Ward in Isiolo North Constituency, and Sericho Ward in Isiolo South Constituency. The area is barren, very hot, and dry most of the year, with annual rainfall averaging 150-250 mm.

Isiolo County experiences a generally hot and dry climate throughout the year. Most areas have a mean annual temperature exceeding 25°C. However, in the western extremities, temperatures can drop to as low as 21°C due to variations in altitude. During fieldwork, extreme temperatures of up to 37°C were recorded in some areas, such as Garbatulla.

5.1.1.3 Geology and Soil

Geology

According to Faillace (1986), the geology of Isiolo County consists of two major geological and lithological systems: the Pre-Cambrian Basement System and the younger Tertiary basaltic lavas. The Basement System rocks, the oldest in the area, date back to the Precambrian era and underlie the entire county. These rocks include migmatites, various groups of paragneiss's, and a range of intrusive formations. The paragneiss's are interpreted as meta-sediments, transitioning from arkoses and sandstones to muddy sandstones, carbonaceous mudstones, and limestones. The younger volcanic

[12] This relatively high amount of precipitation is due to influence of Mount Kenya and Nyambene Hills in the neighboring Meru County

rocks found in the Isiolo, are all associated with Mt. Kenya volcanic activity. The oldest of these rocks are the Miocene phonolites. The volcanics especially those in the south are dominated by the contemporary suites of lava and pyroclastics making up the Mt. Kenya shield and Nyambene Hills.

Soils

Most of the northern half of Isiolo County, particularly Oldonyiro Ward, is covered by older riverine sedimentary plains. These plains are the in-filled wide valley systems of both LaghBogul and the joint Milgis/Ewaso Ngi'ro rivers. The region features higher-elevation, moderately well-drained sandy soils, which contrast with the lower-lying, extensive flat clay plains that have poorer drainage. The higher-elevation areas consist of fine sandy loams interspersed with numerous wide, round, and shallow depressions containing more clay-rich soils. The entire stretch of the road up to the border of Isiolo County and Wajir County comprises different soil units. Areas around Kulamawe, which consist of non-dissected erosional plains, are dominated by soil units **PnV** and **PnC**, derived from volcanic rocks and Quaternary basalts (marble). These soils are imperfectly drained. Further east, towards Garbatulla and its environs, **PnF**, also known as Lavisols, becomes the dominant soil unit.

Towards Eldera, the landscape transitions into a bottomland area composed of marine-origin sediments, where **Bm** soil is prominent. This soil type is poorly drained. In the Modogashe region, **PsM2**, a soil unit associated with Plio-Pleistocene Bay sediments, is more pronounced and is moderately drained. As one moves towards the border of Isiolo and Wajir counties, particularly in the Malka Ade area, **PsA4**, also known as undifferentiated alluvial sediments, becomes more prominent as outlined in the map.

5.1.1.4 Drainage Pattern

The drainage system of the County is generally broad and shallow, and many are ill defined. A few of the major drainage courses are extensive and form well-integrated systems that extend entirely across or nearly across the entire County. There are six perennial rivers in the county namely, Ewaso Ngi'ro North, Isiolo River, Bisan-gurach, Bisanadi, Likiundu and Liliaba rivers. Other drainage systems are intermittent streams known by local names as (*luggas*) which generally flow for only a few hours at a time, once or twice a year when rainfall is adequate.

The entire road section or proposed fiber optic cable route within Isiolo County is not drained by permanent rivers, except for seasonal watercourses known as *luggas*. The drainage pattern is primarily influenced by the topography, particularly the Nyambene Ranges. Several tributaries and *luggas* traverse the region, draining toward the Ewaso Ng'iro River, which runs along the periphery of Isiolo and Samburu counties to the north.

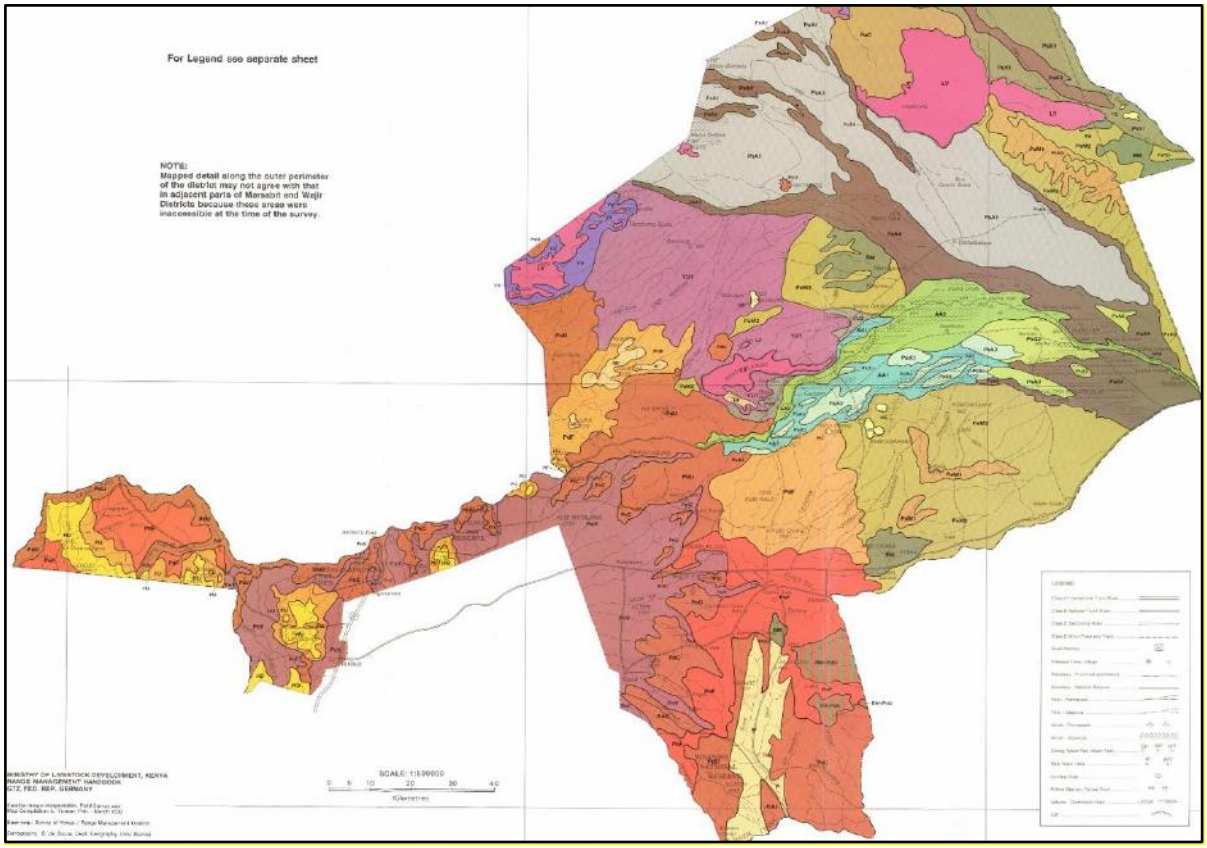
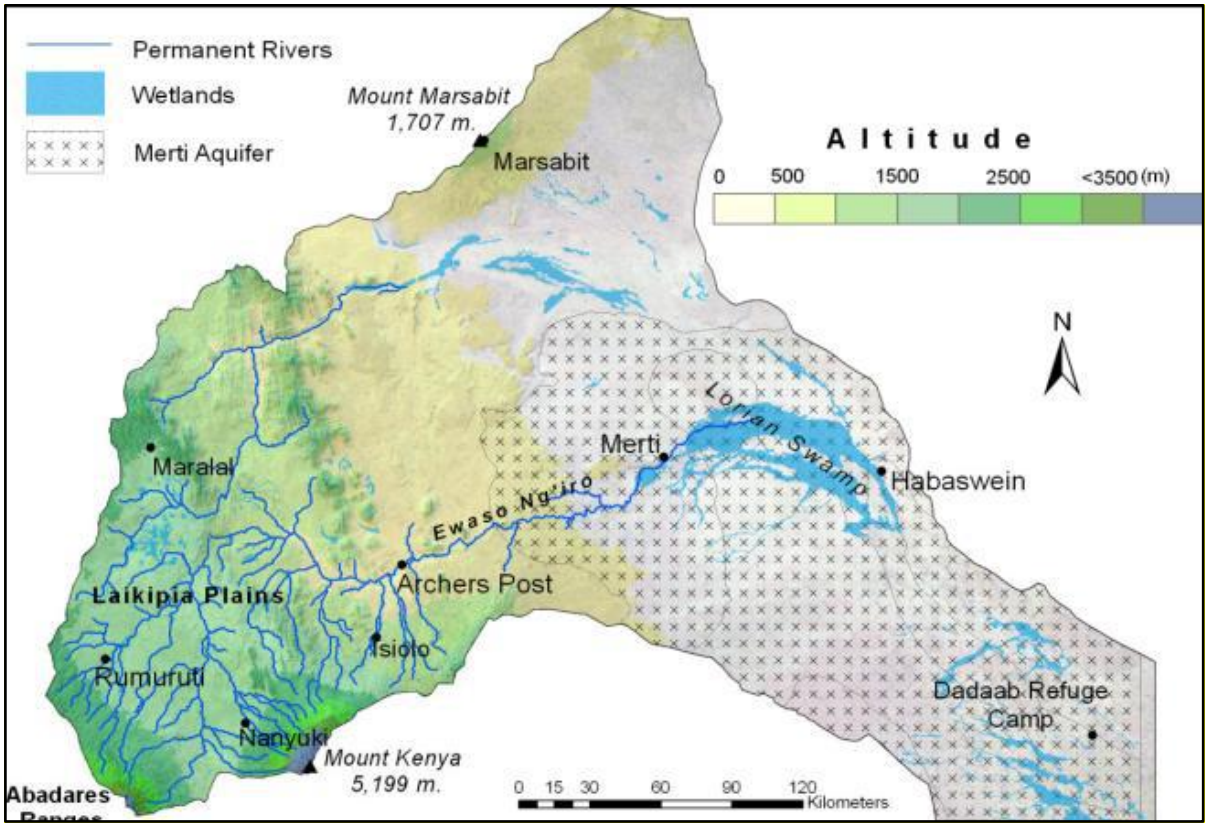


Figure 5-2 Isiolo County Landforms and Soil (Source: Sombroek et, al 1980



Map 5-1 Drainage Pattern (Source: Leeuw et al., 2012)

Biodiversity – Flora

The proposed project is in the Northeastern section of the Arid and Semi-Arid Lands (ASALs). Within this region, the proposed fiber optic cable route intersects and interacts with the following ecoregions:

- Isiolo-Kulamawe – Acacia Bushland;
- Garbatulla-Eldera – Thicket Shrubland; and
- Modogashe- Habaswein bridge – Woodland and shrubland.

Acacia Bushland

This ecoregion is characterized by scattered to dense stands of Acacia species, often interspersed with shrubs, grasses, and other drought-resistant vegetation. Types of vegetation are mainly *Acacia tortilis (only found a*long Riverbanks), *Acacia senegal*, and *Acacia mellifera*, which have deep root systems and small, drought-resistant leaves (often modified into thorns) to reduce transpiration. This vegetation is highly valued by the host community as it serves as an essential forage resource for livestock. Other important vegetation includes thorny undergrowth, like *Commiphora* and *Grewia* species.

Thicket Shrubland

This ecoregion is characterized by woody vegetation, consisting of interlocking shrubs, small trees, and climbers that often form impenetrable thickets. It thrives in areas with moderate to low rainfall and well-drained soil, such as the regions around Boji and Garbatulla. The dominant vegetation includes shrubs and small trees, many of which have thorny or spiny adaptations to withstand arid conditions. Common species found in this ecoregion include *Acacia mellifera, Grewia species*, and *Commiphora species* which provides essential forage for livestock and herbivores.

Scrubland

This section of the proposed project (Garbatulla-Eldera-Modogashe-Malka-Ade) is characterized by scrubland ecosystems, dominated by low-growing, drought-resistant shrubs, scattered small trees, and patches of grasses. This ecoregion serves as a transitional zone between grasslands and woodlands, adapting to the semi-arid conditions of the region. Vegetation is composed of hardy, drought-adapted plants such as *Acacia, Commiphora* and *Salvadora* species.

5.1.1.5 Biodiversity – Fauna

The entire proposed route corridor from Isiolo town to the border of Isiolo and Wajir County supports diverse wildlife habitats. Roaming elephants are commonly found in areas around Gambela and Waso, while the Lorian Swamp ecoregion hosts a rich concentration of wildlife. Commonly observed wild animals include warthogs (*Phacochoerus africanus*), dik-diks, Grant Gazelle, Gerenuk, and ostriches, among others. Additionally, the Lorian Swamp provides an important habitat for various bird species, enhancing the region's ecological significance.

Plate 5-2 Acacia tortilis (Kachuru Habitat)

Plate 5-3 Ostriches Along the Project Corridor

Plate 5-4 Bird Nests (Lorian Swamp Ecoregion)

5.1.2 Socio-Economic Environment

5.1.2.1 Demographics

According to the 2019 Kenya Housing Population Census (KPHC) report, the population of Isiolo County was 268,002 comprising of 139,510 males (52.1%) and 128,483 females (47.9%). Isiolo County is inhabited by multiple ethnic groups, including the predominant Borana, the Somali, the Meru, the Turkana, and the Samburu. Apart from the Big Five, the population also includes indigenous marginalized communities such as the Wata, Ndorobo, and Nubians, along with a significant number of immigrant communities from other parts of the country, most of whom reside in Isiolo Central, engaging in business and small-scale farming. Isiolo town and its environs had the highest population at 121,066, attributed to its cosmopolitan nature and status as the county's administrative headquarters. Garbatulla followed with a population of 99,730, while Merti Sub-County was the least populated, with 47,206 residents (KPHC 2019). The average Household size is 4.6 persons, and the county has a population density of 11 persons per square Kilometer, against a national average of 97 persons per square Kilometer. The population is concentrated in the area around the Isiolo T-junction and other market centres along the corridor namely, Gambella, Ndumuru, Waso, Kachuru and Kulamawe, Garbatulla and Modogashe.

Human settlements along the project area are largely influenced by the availability of water sources. All the market centers are situated near seasonal rivers, streams, or water points such as boreholes. The entire project corridor is extremely dry, making water availability essential for a settled lifestyle. Kachuru Market is positioned between two streams, while Ndumuru Market lies adjacent to the Ndumuru/Ngathu River.

5.1.2.2 Infrastructure

While Isiolo's urban infrastructure is improving, significant challenges remain. The county's transportation network includes a few paved and feeder roads, yet many rural areas remain

underserved. The proposed route follows the B9 road, which is being upgraded to bitumen standard by KeNHA, with most sections already at advanced stages. Poor road infrastructure has not only hindered development but has also left some areas effectively landlocked.

5.1.2.3 Education

The County has a total of 377 educational facilities, both public and private. Along the project area, educational institutions are primarily concentrated in market centers such as Kulamawe, Boji, Garbatulla, Eldera, and Modogashe. These institutions mainly consist of public and private schools. The road traverses' territories inhabited by Borana, Somali, and Turkana pastoralists, as well as sections of the Meru community engaged in livestock keeping. As a result, herding remains a major factor contributing to school dropout rates, particularly among boys. Many find herding more attractive and rewarding than attending school. Except for Isiolo T-Junction, Kulamawe, and Garbatulla, all other market centers in Isiolo County lack secondary schools. On average, students in the county travel approximately 5 km to reach school (GoK, 2013).

Plate 5-5 Section of the Road in Kachuru Market Centre

Plate 5-6 Kulamawe Primary School

5.1.2.4 Health and Sanitation

At the T-Junction, the starting point of the project area, residents have adequate access to health services due to its proximity to Isiolo town, where both public and private health facilities are available. Along the project corridor, residents for instance Kulamawe and its surrounding areas still travels to either Garbatulla or Laare for healthcare services. At the county level, according to the Isiolo County Integrated Development Plan (2013-2017), over 70% of the population lives in rural areas where health facilities are inadequate, inaccessible, and unaffordable. The county has two Level 4 hospitals (Isiolo and Garbatulla), five Level 2 health facilities, and 34 Level 1 health facilities.

5.1.2.5 Land Tenure and Land Use

Approximately 80% of the land in Isiolo County is communally owned and held in trust by the county government. Government land accounts for 10% of the total area and includes land designated for schools, administrative offices, army barracks, and health facilities. The remaining 10% is privately owned, having been allocated for housing, industrial, and commercial investments. On average, each household holds about 0.4 hectares of land.

5.1.2.6 Isiolo County Economics

Isiolo County has a predominantly arid climate, with some semi-arid areas. The county faces economic challenges and remains economically marginalized. Pastoralism is the dominant livelihood, with 80% of the land communally owned and held in trust by the county government. Agro-pastoralism is practiced in select areas, such as Kinna. Other key economic activities include small-scale businesses and tourism. While intensive dairy farming is less common, it is gradually gaining traction.

Most of the population depends on livestock farming, yet the county lacks livestock-related industries. Small-scale businesses encompass trade in farm produce, miraa, and livestock products such as milk, beef, and skins. Additionally, many residents engage in Jua Kali (informal outdoor work) and artisan crafts[13]. Nomadic pastoralism is the economic activity at the sections of Isiolo County traversed by the project area. Meat and milk form the staple diet of the people, majority of them, who are Borana's. Livestock movements and grazing are not controlled since the land is community owned with small portions privately owned especially at the market centers.

Plate 5-7 Livestock along the Section of the Proposed Project Route

[13] Isiolo County CIPD 2022

5.1.2.7 Socio-Cultural Characteristics

Isiolo County is culturally diverse and is best known as the ancestral homeland of the Somali and Borana communities. It is also home to a rich mix of other ethnic groups, including the Turkana, Samburu, Gabra, Garre, and Meru. In terms of religion, both Islam and Christianity are practiced, though most of the population is Muslim.

Inter-ethnic Relations

The project area is home to several ethnic groups, including the Borana, Meru, Turkana, and Somali, with the Samburu occasionally making forays into the region. However, interethnic tensions and conflicts are frequent and sporadic (Saferworld, 2015). The main causes of these conflicts include disputes over county boundaries, cattle rustling, competition for administrative dominance, Land/boundary disputes, and conflicts over pasture.

Vulnerable Marginalized Groups

Along the project corridor, three ethnically marginalized groups are present: the Borana, Somali, and Turkana. The Somali, part of the Cushitic group, primarily reside in Isiolo Central and extend into major towns such as Garbatulla, Merti, and Sericho. The Turkana, an immigrant community, are mainly found in Ngaremara Isiolo North Constituency. The Borana are a sub-ethnic group of the Oromo people and Cushitic speakers of the Afro-Asiatic language family. They predominantly inhabit Isiolo County, with settlements in Isiolo Central, Merti, Sericho, and Garbatulla regions.

5.2 Meru County

5.2.1 Physical Environment

5.2.1.1 Location and Administration

The County is located east of Mount Kenya, with its peak forming part of the county's southern boundary. It shares borders with Laikipia County to the west, Nyeri to the southwest, Tharaka Nithi to the Southwest, and Isiolo to the north. The county straddles the equator, lying between 0°6' North and approximately 0°1' South, and between longitudes 37° West and 38° East. It covers a total area of 6,936.2 km², of which 1,776.1 km² is gazetted forest. The county consists of nine administrative sub-counties, which are also equivalent to constituencies: Tigania East, Tigania West, Igembe North, Igembe South, North Imenti, South Imenti, Buuri, Igembe Central, and Central Imenti.

Kachuru, which the proposed project traverses is in Igembe North Constituency, Mutuati Sub County.

5.2.1.2 Topography

The topography of the project corridor from Gambella to Kachuru is shaped by the prominent Nyambene Range, which contributes to the area's diverse physical landscape, influencing both its physiography and broader environment. The Mutuati sub-county lies at an altitude ranging from 965 meters above sea level to 2,514 meters at the summit of the Nyambene Range. Stretching from the southeast to the northeast, the Nyambene Range rises sharply above the surrounding plateau, with Itiene Peak marking its highest elevation at 2,514 meters above sea level. The eastern slopes are particularly steep and rocky, whereas the crest areas are relatively lower, with limited land exceeding

1,829 meters above sea level. Altitude ranges has influenced the atmospheric conditions leading to a wide variety of microclimates and agro-ecological zones along the proposed project corridor.

Plate 5-8 Nyambene Ranges as Viewed from Ndumuru Shopping Center

5.2.1.3 Climatic Conditions

The climate of the project corridor between Gambella and Kachuru is largely influenced by its topography, shaped by the Nyambene Ranges and nearby Mount Kenya. The highlands help moderate temperatures and reduce evaporation rates. The region experiences a range of climatic conditions, from cool and humid in higher elevations to hot and dry in lower areas. Annual mean temperatures vary from 13.7°C in the high-altitude western slopes of the Nyambene Range to 24.7°C in lower altitudes (610–700 meters).

Due to its position on the leeward side of the range, the lowlands receive less rainfall. The area has a bi-modal rainfall pattern, with long rain occurring between March and May and short rains between October and December. Rainfall amounts range from 1,250 mm to 2,514 mm on the eastern and southern slopes of the Nyambene Range, while the leeward side receives only 380 mm to 1,000 mm annually. Because the project corridor lies in the lowland windward areas, temperatures can be extremely high.

During fieldwork at Kachuru Market Centre, a temperature of 37°C was recorded.

5.2.1.4 Geology and Soil

The soils in the region varies significantly, largely influenced by the Nyambene Range and the underlying bedrock. In the upper areas of Mutuati Sub-County, the soils are predominantly friable clay, of medium depth, with moderately high fertility, making them well-suited for coffee and tea cultivation. In contrast, the lower areas feature sandy, shallow, and generally poor-quality soils, which are primarily suitable for cotton farming and livestock ranching. The landscape is also characterized by rocky outcrops, which further limit extensive agricultural activities. The region's soils are mainly volcanic, with specific derivatives from the parent rock. These derivatives include:

- Cambisols (clay loam to clay) which occupy about 40% of the sub county;

- Friable clays which occupy about 30 % of the sub county; and
- Lithosols, xerosols, ferrosols and aeronosols cover the rest 30% of the sub county.

5.2.2 Biological Environment

5.2.2.1 Ecological Conditions

The major land potential classifications in the Sub-County are categorized as follows: high potential, medium potential, low potential, semi-arid, and arid. In Meru County, the proposed project primarily traverses a relatively drier zone near the Isiolo County border. While this lowland region receives limited rainfall, it experiences excessive floodwater from the upper highlands. The proposed project corridor is primarily composed of both open and closed savannah woodland habitats. In some sections, open plains dominated by grasses with scattered trees are also present. Additionally, riparian habitats are found along streams and luggas that cross the project area. These diverse habitats provide shelter for a wide variety of plant and animal species.

5.2.2.2 Flora

The wooded bushland habitat serves as a transitional zone (ecotone) between the closed woodland and open plain (grassland). Riverine habitats are confined to streams and rivers within the project area. Three key plant formations—*Acacia tortilis and Acacia mellifera*, predominantly found along Kulamawe and Kachuru; *Commiphora species*; and *Balanites aegyptica* as well as *Prosopis juliflora*, located around Ndumuru market towards Ngathu River. Another prominent habitat along the project corridor in Meru County consists of closed woodland gradually transitioning into open plains (grasslands) or vice versa. Ecologically, the wooded bushland functions as an ecotone. In ecology, ecosystem boundaries rarely form abrupt edges; instead, they are defined by ecosystems and mosaic habitats. As a typical ecotone, the wooded bushland in the project area contains species from both the closed woodland and open plain. Other species along the proposed Fibre optic corridor include *Adansonia digitata, Salvadora persica, Boscia spp., Boswelia microphylla, Cordia sinensis, Acacia Senegal, Grewia villosa, Grewia tembensis, Capparis tomentose*.

Plate 5-9 Commiphora holtiziana interspersed with Balanites aegyptica

5.2.2.3 Threat to Project Corridor Habitat

Along the project corridor, an invasive plant species known locally as Mathenge (Prosopis juliflora) is present. This dryland species was introduced to Kenya in the 1980s to combat desertification in arid regions such as North-Eastern Kenya, Baringo, and Tana River, among others. However, it has since become highly invasive, rapidly colonizing open spaces and disturbed environments while outcompeting native vegetation over time. Fieldwork investigations confirmed the presence of Prosopis juliflora in several locations along the project corridor. To prevent its further spread into fragile ecosystems, due diligence must be exercised during project activities.

5.2.2.4 Wildlife Resources

The proposed project area falls within the greater Ewaso Ecosystem, a savannah landscape that supports diverse wildlife populations. Many animal species inhabit both protected areas and free-ranging habitats. However, in regions outside protected areas, human activities have led to habitat degradation, resulting in lower wildlife populations. In these areas, birds are the most observed species. The ecosystem is home to a variety of wildlife which are primarily found in gazetted game parks and forests such as Meru National Park, Mt. Kenya National Park, and Imenti Forest. The region's wildlife includes mammals, birds, reptiles, insects, and amphibians, with mammals and birds being particularly significant.

During fieldwork along the stretch of the proposed project corridor within Meru County, no wild animals were observed.

5.2.3 Socioeconomic Environment

5.2.3.1 Demographics

According to the 2019 population census, Kachuru had a population of 1,089, of which 602 were male. Number of households were 234 with 4 persons living per square kilometer.

5.2.3.2 Economy

Agriculture is the backbone of the people of Mutuati Sub-County. The region’s climate and vegetation can be categorized into two major zones, divided roughly by the Meru-Kangeta-Laare road. To the south of the road, the landscape is heavily influenced by the Nyambene Range, which rises over 2,400 meters above sea level. This zone receives adequate rainfall in two seasons—from April to June and September to December—supporting the cultivation of high-value cash crops such as coffee and miraa. Food crops like maize are also widely grown. In contrast, the northern side of the road, including Kachuru market centre, consists of drier, semi-arid areas characterized by savanna grasslands, low population density, and pastoralist activities. This is the poorest zone and marginalized groups in Meru County, Mutuati Sub-County, with no significant cash crop production.

5.3 Wajir County

5.3.1 Physical Environment

5.3.1.1 Location

Wajir County is in the Northeastern region of Kenya. It borders Somalia to the East, Ethiopia to the North, and the counties Mandera to the Northeast, Marsabit to the West Isiolo the Southwest and Garissa to the South. Wajir County is approximately 56,000 km² in size, whilst the topography is featureless and flat with altitudes ranging between 150m and 460m asl.

5.3.1.2 Topography

Wajir County is divided into two physiographic regions namely:

- Undulating plains of Pleistocene sediments; and
- The North-central portion underlain by limestones of Jurassic age.

The landscape of Wajir County along the proposed project corridor is primarily defined by an extensive plain, punctuated by a few isolated hills. This plain is most prominent in the Northwest, Southwest, and Southeast regions, gradually sloping southward from approximately 548 meters in the North to around 300 meters above sea level near the southern boundary with Somalia and Garissa County. Moving from Wajir town toward Tarbaj, the otherwise monotonous plains are interrupted by Tarbaj Hill, located 50km North of Wajir town at Tarbaj town. Rising about 100 meters above the thornbush-covered plain, this feature is an outlier of the Mensa Guda conglomerate formation.

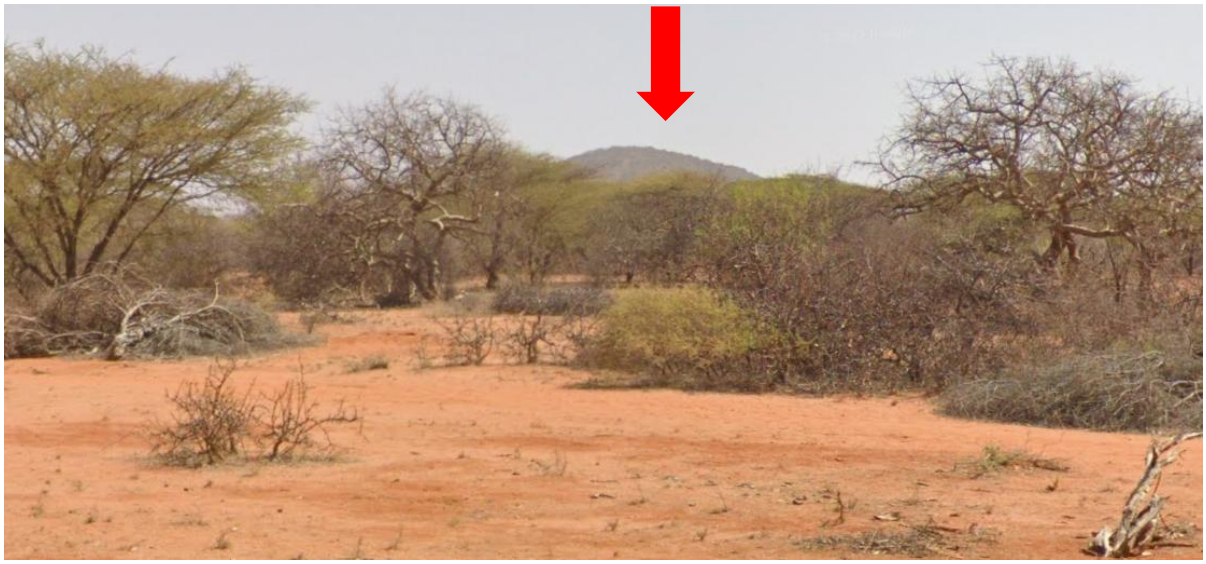


Plate 5-10 Tarbaj Hill as observed from the Main Wajir-Mandera Road

5.3.1.3 Climate

Wajir is a semi-arid area with a hot climate. The annual average temperature is 27.9°C while the humidity is around 62%. With a mean annual rainfall of around 270mm (based on NOAA Arc-2 daily precipitation data, 1983 – 2013). The higher areas of Bute and Gurar in the North, and the southeastern areas close to Somalia receive higher rainfall of around 350mm. June until August are the driest months with no significant rain, while April is the wettest month with an average of 85mm.

The precipitation variability graphs as captured in the Figure below show that rainfall is bimodal with huge annual variability and intense events creating flashfloods flowing through seasonal rivers, worsening the prevailing drought and food insecurity in Wajir County.

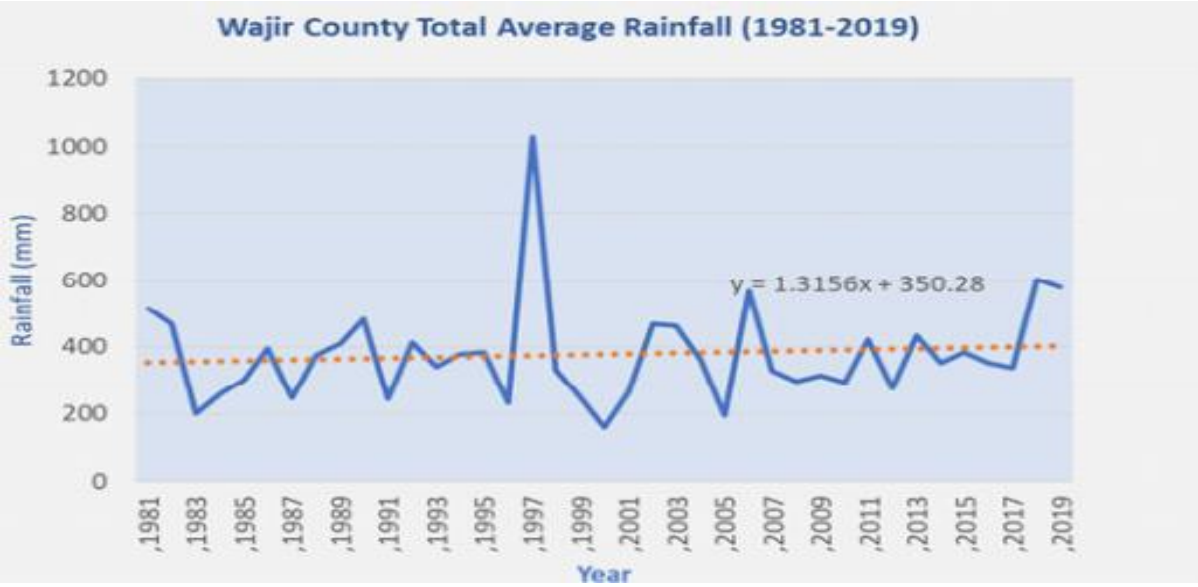


Figure 5-3 Wajir Rainfall Pattern

Seasonal distribution of rainfall is largely determined by the convergence zone of the northeasterly and southerly monsoons, shifting in response to the movement of high-pressure air masses to the north and south. Analysis of rains from 1981 to 2019 by Regional Center for Mapping Resources for Development (RCMRD) shows that there has been a gradual increase in the amount of rain received during the short rains in Wajir County but a decline in the amount of rain during the long rains period. Generally, the rain has become erratic. The welfare of the workers who will be implementing the project needs to be considered by the contractor to reduce the impacts of high temperature by ensuring sufficient provision of drinking water to avoid cases of dehydration.

5.3.1.4 Geology and Soil

Geology

The area comprises sedimentary rock units exhibiting continuous flow of water from one point to another in the subsurface. These are mainly Mio-Pliocene sediments that include fine and medium, as well as coarse sandstones. The sandstones, gravels, grits, and weathered limestone storing juvenile water in the subsurface appears to have enjoyed subsequent replenishment from the flow inferred as originating from the River Ewaso/Laghdera course. There may also be some carbonates which are fractured and possess water at shallow depths, though mineralized, via the fractures and karstification veins. Water also forms at the contact points between the carbonates and the coarse siliciferous sediments. However, the massive subsurface laminar flow of the Merti aquifer (through the Laghdera seasonal stream) dilutes any salinity that may be carbonate-derived in the aquifers.

The rocks in the County are all sedimentary origin. The oldest rocks consisting of the Metasediments of the Triassic age. These rocks include grits and sandstones, and red sandy soils. These rocks exhibit considerable variation in thickness, extent and lithologic characteristics that suggest rapid deposition

of detritus materials derived from the erosion of adjacent areas of older sandstones or limestone. The soil structure of Wajir County is uniform and predominantly characterized by sedimentary sandstone (Zone 4B) and variable sedimentary (Zone 4C) formations.

Soils

Along the proposed project corridor, various soil types are evident, distinguished by texture and color. North of Wajir town, toward Tarbaj, hard red sandy and clayey soils predominantly cover the Precambrian crystalline rocks. In contrast, some valleys and broad low-lying plains feature gray or brown clayey soils. West and south of Wajir town, the soils overlying alluvial deposits generally fall into two categories: well-drained sandy soils, ranging in color from white to red, and poorly drained silty and clayey soils, which appear gray to black especially between Habaswein and Lagbogol town centres.

5.3.2 Biological Environment

5.3.2.1 Vegetation Cover (Flora)

The proposed project corridor between Habaswein, Lagbogol, Wajir, Tarbaj, and Kotulo are characterized by open or moderately dense bushland, interspersed with open grassy plains. Large trees, primarily Acacia species, are found mainly along drainageways. The low to medium bushland is primarily composed of *Acacia tortils, Acacia zanzibarica* interspersed with *Salvadora persica and Commiphora* species, with varying amounts of grass as undergrowth. *Prosopis juliflora* (Mathenge) an invasive is becoming prominent in the proposed project corridor.

Plate 5-11 Acacia zanzibarica in areas around Lagbogol

5.3.2.2 Wildlife (Fauna)

Wajir County lies within the semi-arid pastoral rangelands of Northern Kenya, where livestock and wildlife populations show an inverse correlation. Livestock tend to concentrate around permanent water sources, while wildlife density and diversity increase further from these points. This pattern has been attributed to indirect interference associated with livestock, likely due to poaching and

harassment rather than direct competition for forage[14]. Along the proposed project corridor, various wildlife species were observed, including Grant's gazelle, reticulated giraffe, warthog, and dik-dik, among others. In addition, there are no designated conservation areas along the project corridor, with all wildlife concentrated outside protected zones.

Plate 5-12 Reticulated Giraffe as Observed along the Road Corridor

5.3.3 Socioeconomic Environment

5.3.3.1 Population and Demography

According to the Kenya Population and Housing census conducted by the Kenya National Bureau of Statistics (KNBS) in 2019, there were 781,263 people residing in Wajir County with a population density of 14 persons per square kilometer. This represents an 18% growth over the 2009 KNBS census. Based on the 2019 KNBS census, the gender diversity of Wajir is 53.2% and 46.8% for males and females respectively. The rural population accounts for 77.3%, while 22.7% of the population resides in urban areas such as Wajir, Tarbaj and Habaswein towns. Wajir County's population is concentrated in the age groups of 0-9 and 10-19 years, accounting for approximately 62.9% of the total population.

5.3.3.2 Education

Wajir County has a range of educational facilities, from early childhood development centers to tertiary institutions. The county has 264 Early Childhood Development (ECD) centers, serving a total of 15,075 children, with a teacher-pupil ratio of 1:25 and a transition rate of 90% (Wajir CIDP, 2018). According to the Wajir County government, there are 218 primary schools with a total enrollment of 63,912 pupils, comprising 38,584 boys and 25,328 girls. The primary school retention rate stands at 51%, while the transition rate is 94%. Wajir County has several tertiary institutions, including one Medical Training College, one Livestock Training Centre (GPTC-Griftu), two Teacher Training Colleges, and two other tertiary institutions. Several public institutions are located along the proposed corridor,

[14] National Wildlife Census Report 2021, KWS.

some of which will benefit from fiber optic connections. There are 9 youth polytechnics out of which only 5 are operational i.e. Wajir, Habaswein, Khorof Harar, Tarbaj and Griftu polytechnics.

5.3.3.3 Health Access

Arid and semi-arid regions in Kenya are known for having inadequate healthcare systems. Poor infrastructure limits the number of hospitals, resulting in a healthcare worker-to-patient ratio that falls short of the required standards for the population. Wajir County has a total of 115 public health facilities, 29 private facilities, and 2 NGO-operated facilities. The county's healthcare infrastructure includes 27 clinics, 10 level 4 hospitals, 26 level 3 health centers, 79 level 2 dispensaries, 1 nursing home, and 3 private hospitals. At least 95 per cent of the population cover more than 5 kilometres to get access to a health facility while approximately 4 per cent of the population can get access to a health facility within 1 kilometer.

Plate 5-13 Wajir County Referral Hospital

5.3.3.4 Economic Activities

Wajir County is predominantly inhabited by pastoral communities whose livelihoods are closely tied to livestock husbandry, primarily cattle, goats, and camels. Livestock rearing is both the county's main economic activity and its most valuable economic asset. The area residents carry out other forms of economic activities such as hotel, retail shops, butcheries and miraa (Khat) stalls.

Plate 5-14 Grazing Livestock

5.3.3.5 Conflicts

Conflicts in Wajir County primarily stem from natural resource disputes, which are becoming increasingly common among pastoral communities in Kenya. These conflicts are driven by land-use changes, population growth, and rising urbanization. It is believed that recurring droughts lead to inadequate pasture, forcing pastoralist communities to migrate to neighboring counties, often resulting in conflicts. Other conflicts within the County are related to among:

- Inter/intra-clan disputes;
- Inter/Intra County boundary Conflicts;
- Gender-Based Violence (GBV);
- Violent extremism; and
- Human-Wildlife Conflict

Areas with a high occurrence of conflicts include Habaswein in Wajir South Sub-County, Wajir North Sub-County, and regions around Elben, Wargadud, and Khorof/Harar in Wajir East. Efforts are underway to strengthen inter- and intra-county, as well as cross-border, peace structures to promote harmony among communities and clans. These initiatives focus particularly on boundary regions and other dispute-prone areas.

5.4 Mandera County

5.4.1 Physical Environment

5.4.1.1 Location and Administration

Mandera County is in the Northeastern part of Kenya. It borders Ethiopia to the North, Somalia to the East and Wajir County to the South-West. The county lies between Latitudes 2^0 11` North, and $4^0$ 17` North, and Longitudes 39^0 47` East and $41^0$ 4.8` East. It covers an area of 25,991.5km^2. Mandera County is divided into twelve sub-counties: Mandera East, Lafey, Mandera North, Banisa, Mandera West, Mandera South, Kutulo, Arabia, Kiliwehiri, Ashabito, Dandu, and Khalalio. It is also divided into

six parliamentary constituencies; Mandera East, Lafey, Mandera North, Banisa, Mandera West, and Mandera South—which are further subdivided into 30 electoral wards, locations, sublocations, and villages.

5.4.1.2 Topography

The topography of Mandera County along the proposed project corridor is relatively flat to gently undulating, rising from the Northeastern plains toward the southwestern zones. However, a few rocky hills, ranging from 400 to 700 meters above sea level, are found in areas around Koromey, Neboi, and Jirma. According to Mandera County Integrated Development plan, the County is generally characterized by low lying rocky hills located on the plains that rise gradually from 400 meters above sea level in the south at Elwak to 970 meters above sea level on the border with Ethiopia.

5.4.1.3 Climate

Mandera has a hot, dry climate, with most of the County classified as semi-arid. Mean annual temperatures are often above 25°C in most parts of the county. However, in the Northwestern part of the county, mean annual temperatures range from 23°- 24°C. Annual average rainfall is 255mm, with the eastern part of the country receiving an annual average below 250mm. Analysis of historical temperature trends in the county over 25 years (1981 to 2005), indicate that mean first season temperatures have increased by approximately 1°C, while second season temperatures have moderately increased by 0.2°C.

5.4.1.4 Geology and Soils

Geology

Geological studies by Joubert (1959, 1960), Thompson and Dodson (1960), Miller (1955), and Baker (1958) indicate that the geology along the proposed project corridor (the road) is primarily composed of the following rock types:

- Triassic rocks represented by the Mansa Guda Formation mainly unfossiliferous sedimentary sequence of sandstones, quartzite and conglomerates;
- Jurassic rocks mainly limestone with intercalated shales, ranging in age from Lias to Tithonian;
- Cretaceous rocks represented by Maheran series mainly siltstones and flaggy fine-grained sandstones overlain by a thick formation of cross bedded sandstones;
- Basement System rocks, primarily composed of sandstones, shale, and limestone, have undergone metamorphism due to heat, pressure, or fluid impregnation; and
- Quaternary sediments from the Pleistocene and recent periods are widely represented in the area.

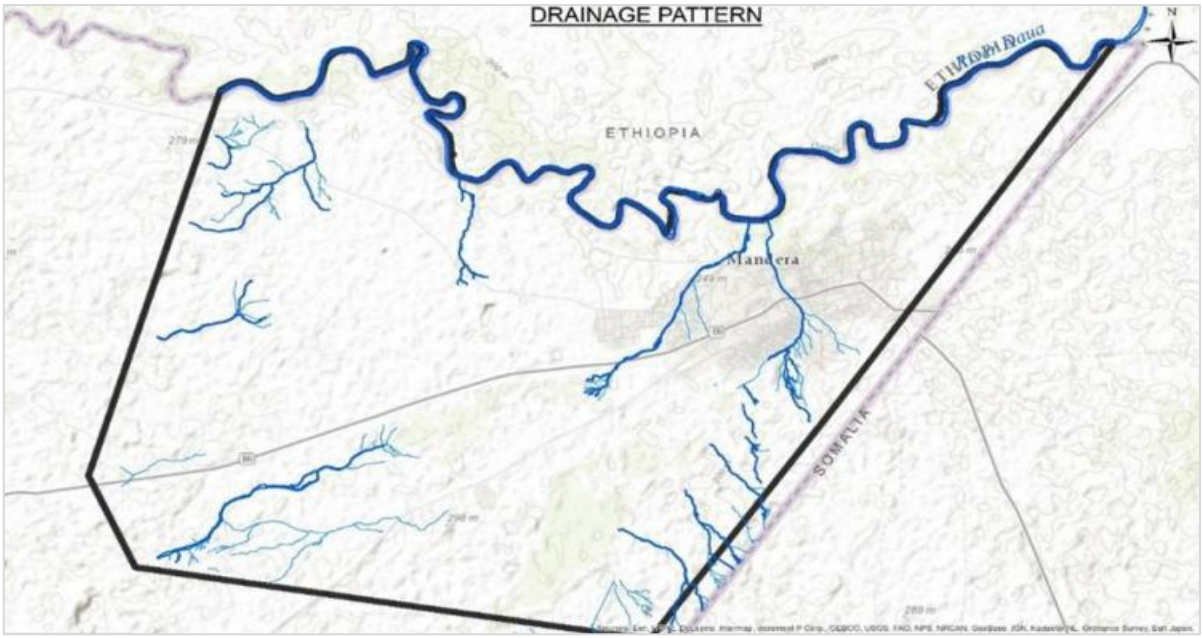
Soil

The land is composed of Mesozoic sandstone and mudstone. The soils are well-drained and range from very deep to shallow, with colors varying from dark reddish-brown to yellowish-brown. They are typically friable, with textures ranging from loamy fine sand to fine sandy loam. However, the topsoil is degraded due to sealing and sheet erosion. Strong sheets and gully erosion are common in the area, driven by undulating topography, friable soils, and low infiltration capacity. The soil's physical

properties are only moderately favorable, primarily due to its shallowness and limited infiltration ability. The soils along the Rhamu–Mandera proposed project corridor are primarily sandy loam to sandy clay loam, influenced by the region's geological formation.

5.4.1.5 Hydrology and Drainage

River Daua, a transboundary perennial river originating from the Ethiopian highlands, forms the largest drainage basin in Mandera County. It flows eastward along the Kenya-Ethiopia border, passing through Malkamari, Rhamu Dimtu, Rhamu, Libehia, Khalalio, and Mandera township before entering Somalia at Border Point One. The river has attracted irrigation farms along its banks, including Mandera BP1 and Neboi Farms. It serves as a vital economic catalyst, and a fragile ecosystem. Other drainage channels in the region include seasonal streams, locally known as Luggas, as shown in the map below. During the rainy season, several seasonal swamps and temporary wetlands form in areas such as Didima, Gudediye, Gingro, Hafadi, Jirma, Shafshafe, and Handadu. These swamps and drainage areas serve as grazing zones during the dry season.



Map 5-2 Mandera County Drainage Pattern (Source: Mandera County Government Digital Topographical Mapping and Preparation 2015-2035)

The Daua River experiences extremely high flows during the rainy season, occasionally overflowing its banks. In dry seasons, it maintains moderate to low base flows, sometimes drying up in September and February. The river has a vast catchment area with an extensive stream network, consisting of major and minor seasonal streams originating from hilltops in the Ethiopian highlands. Between Rhamu and Mandera towns, more than 10 seasonal streams cross the proposed project corridor which sometimes makes the road section impassible.

5.4.2 Biological Environment

5.4.2.1 Vegetation (Flora)

Mandera County's vegetation primarily consists of indigenous savannah woodland, characterized by natural dryland trees and bushland species. Although the vegetation is primarily savannah woodland,

the dominant species vary along the proposed project corridor and the entire County in general. Along seasonal streams, the predominant species is the invasive *Prosopis juliflora* locally known as (Mathenge). The vegetation transitions from *Prosopis*-dominated woodland to a mix of *Acacia tortilis* and *Acacia mellifera* woodlands. Other notable transitions include woodland formation dominated by *Terminalia orbi* (Bissik), intermixed with *Acacia xanthophloea*, particularly along streams and floodplains. Some dominant species in different sections of the woodland are typical dryland climax species found in mature dryland forests. As one moves along the Rhamu-Mandera road, *Prosopis juliflora* becomes more prominent forming dense, impenetrable thickets. In Qumbiso village along the proposed project corridor, *Terminalia orbi* is more pronounced.

Plate 5-15 Terminalia orbi

5.4.2.2 Wildlife (Fauna)

Malka Mari National Park (876 km²) is the only gazetted conservation area in Mandera County, located approximately 40 km from northeast of Rhamu town. The park is situated along the Daua River, on the Kenya-Ethiopia border, in the extreme northeast of Kenya on the Mandera Plateau. The park once had a high population of wild animals, including elephants, various antelope species, lions, hippos, Reticulated giraffes, crocodiles, and cheetahs. While elephants are no longer present, the other species still exist, though their numbers have declined due to rampant human activities.

Wildlife is present along the proposed project corridor, though sightings during the daytime are occasional. Among the large game, only giraffes roam the project area. Smaller wildlife, including dik-diks, antelopes, foxes, hyenas, and rabbits, are also found in the region.

5.4.3 Socioeconomic Environment

5.4.3.1 Demographic Profile

According to the Kenya Population and Housing Census (KPHC) 2019 reported that Mandera County had a population of 867,457 people, comprising 434,976 males (50.14%), 432,444 females (49.85%), and 37 intersex individuals.

Mandera town is the most urbanized area in the county, experiencing a higher-than-average growth rate. Between the 2009 and 2019 census, the town's population increased from 58,000 to 115,000, reflecting an average annual growth rate of 7%. Despite the overall decline in the County's population, the town's population grew significantly over the period 2009-2019. The population growth in Mandera town (Municipality) can be attributed to several factors.

- **Rural-urban migration within the County** – As infrastructure development progresses in Mandera town, more people are drawn to urban areas in search of job opportunities. Rural residents increasingly abandon agro-pastoralism in favor of urban livelihoods, attracted by improved access to markets, hospitals, and schools, and
- **Migration from Ethiopia and Somalia** – Many migrants from Somalia and Ethiopia move to Mandera Municipality for job opportunities or education. Due to better prospects in the area, many choose to settle permanently.

5.4.3.2 Population of Persons with Disability

According to the 2019 Kenya National Population and Housing Census, Mandera County had 6,190 persons with disabilities (PWDs). The county's disability prevalence stands at 0.9%, compared to the national prevalence of 2.2%. Out of these, 3,912 were male and 2,998 were female representing a percentage of 51.1 and 49.9 of the total population of persons living with disabilities.

5.4.3.3 Land Tenure and Ownership

Most of the land in Mandera County is communally owned. Communal land use refers to a system where land is collectively owned by a community rather than individuals, allowing community members to use it independently. This land is primarily used for grazing and includes shared resources such as water pans and wells. Private landownership is minimal, with titled parcels making up less than one percent of the county's total land area, mostly concentrated in Mandera town. Along the proposed project corridor, approximately 85% of the land is communally owned. The second type of ownership in the county is private ownership, often governed by leasehold contracts that grant land rights for a limited period. Leasehold tenure mainly applies to surveyed land, particularly within the township area.

5.4.3.4 Health Services Access

Despite recent progress under devolution, the health sector in Mandera County remains less developed compared to other regions, leading to poor health outcomes, especially among the children. Mandera County has 202 health facilities, including:

- 88 public health facilities, categorized as:
    - 1 Referral hospital;
    - 6 Sub- County hospitals;
    - 81 primary health facilities (health centers and dispensaries)
- 15 community units managed by community health assistants; and
- 24 nursing homes and 06 private health clinics[15].

[15] CIDP (2018-2022)

Health provision and the quality of health provision in Mandera County is lower than in the rest of Country. Despite the disparity in healthcare provision in the County and other parts of the Country, Mandera County offers better-quality healthcare services than neighboring areas. As a result, residents of Suftu in Doolow (Ethiopia) and Beled Hawa in Gedo Region (Somalia) frequently rely on health services in Mandera County. This cross-border demand has overstretched healthcare facilities, particularly those located near the Ethiopia and Somalia borders, including Mandera County Referral Hospital (MCRH), Elwak, Lafey, Banisa, and Rhamu Sub-County Hospitals. Like the education sector, Mandera County's healthcare sector struggles with insufficient staffing, a challenge worsened by security threats, particularly in rural areas. Additionally, the county continues to experience high rates of epidemic diseases, including malaria, diarrhea, respiratory infections, brucellosis, measles, dengue fever, chikungunya, and cholera. Several health institutions along the project corridor will be connected to the OFC project, enhancing access to healthcare services through telemedicine technologies.

5.4.3.5 Economic Profile

Mandera's economy is primarily driven by subsistence agriculture, despite the region's harsh climate, arid land, and limited water supply. This is largely sustained by the micro-climatic conditions of the Ethiopian Highlands. Other main sources of livelihood in the County are:

- Pastoralism (in the pastoral livelihood zones);
- Agro-pastoralism (along the river including irrigated crops, livestock keeping and riverine farming); and
- Formal and informal employment is concentrated in urban centres, Commerce and trading concentrated in urban centres[16].

Most of Mandera County's population is rural and pastoral. According to the County Integrated Development Plan (CIDP), pastoralism contributes approximately 72% of total household income in the county. The agriculture sector plays a vital role in Mandera County's economy. Along the River Daua in Mandera Municipality, active crop farming thrives, with the river also serving as a crucial water source for livestock. Additionally, the Kutulo Wadi River provides seasonal water flows from Ethiopia, crossing the eastern parts of Mandera. While most farms in the County are privately owned, there are also government-run agricultural schemes.

[16] KNBS, Gross County Product Report (2019)

Figure 5-4 Google Map Extract Showing Agricultural Activities along Daua River

The main crops grown along these rivers include bananas, lemons, pawpaw, oranges, mangoes, tomatoes, watermelons, onions, cow peas, maize, and fodder crops, and most of this produce is locally consumed. Of these crops tomato farming, watermelon, onions and mango farming have been commercialized. Livestock production in Mandera County primarily takes place within pastoral and agro-pastoral systems. The most reared livestock breeds include Goats – (Galla breed), Cattle – (Boran breed), Camels – (Somali breed) and Sheep – Somali breed blackhead breeds), donkeys (Somali breed) and indigenous chickens.

Mandera County's arid conditions make it well-suited for camel husbandry. Camels are often herded alongside sheep and goats, providing a reliable source of livelihood. Camel milk plays a crucial role in food security and has also contributed to the economic empowerment of women in the county[17].

5.4.3.6 Road Network

Mandera County has three major roads: B9 (Isiolo–Mandera), Arabia Road, and Khalalio Road. These are connected to lower-order roads that primarily provide access to homes and other activity areas in the County as presented in the Table 5-1.

Table 5-1 Mandera County Road Classifications

Road Name	Class	Condition	Function
Isiolo-Mandera Road	A	The section within Mandera town is in fairly good condition and remains passable during the rainy season." The section outside Mandera town municipality is in poor condition and is only passable by four-wheel-drive vehicles during the rainy season	Connects Mandera to Wajir through Rhamu, Wargadud, Elwak, Borehole 11 and Kotulo centers.

[17] Boresha, Value chain analysis on livestock in the cross border between Kenya, Somalia and Ethiopia, 2018

Road Name	Class	Condition	Function
Arabia Road	D	The section within Mandera town is in fair condition and remains passable during the rainy season." The section outside town is rocky, dusty, and generally in poor condition. During the rainy season, it is only easily passable by four-wheel-drive vehicles	Connects Mandera to Hareri Hosle, Arabia, and Lafey, centers and thereafter joins road B9.
Mandera - Khalalio Road	E	The road is dusty during the dry season and passable during the rainy season.	Connects Mandera to Bella, Khalalio and Hareri centers

The proposed upgrading of the Rhamu-Mandera road to bitumen standard will significantly increase paved road surfaces in the county. Mandera County has no rail network or sea/lake ports but is served by four functional airstrips located in Rhamu, Elwak, Mandera, and Takaba.

Plate 5-16 Mandera-Rhamu-Wajir Road

Mandera County has several markets or urban centers: Rhamu, Elwak, Takaba, Banissa, Mandera, Kotulo, Borehole 11 and Lafey. The proposed project will impact several of these towns and market centers. The towns and market centers consist of clusters of Manyattas interspersed with isolated permanent and semi-permanent structures. Most settlements along the road or proposed project corridor are influenced by water availability, particularly in areas where the County Government and other stakeholders have drilled boreholes and constructed earth pans. The main urban centers along the proposed road and OFC corridor are Elwak, Rhamu and Mandera.

5.5 Sexual and Gender-Based Violence (SGBV)

5.5.1 SGBV in Kenya Overview

5.5.1.1 SGBV Types and Statistics

Sexual and gender-based violence (SGBV)[18,19,20,21] remains a pervasive issue in Kenya, affecting women, girls, men, and boys, though women and girls are disproportionately impacted. SGBV includes rape, domestic violence, sexual harassment, child marriage, female genital mutilation (FGM), and human trafficking. Despite legal and policy frameworks, cultural norms, weak enforcement, and systemic barriers perpetuate the crisis.

According to the Kenya Demographic and Health Survey (KDHS) 2022, about 34% of women aged 15–49 have experienced physical violence, while 13% have suffered sexual violence. According to KDHS 2022, 13% of women reported that they had experienced sexual violence at some point in their lives. A slightly lower proportion of men reported experiencing sexual violence; 7% have ever experienced sexual violence. The percentage of women who have experienced sexual violence increases with age, from 7% among those age 15–19 to 18% among those age 40–49. Three percent of women who have never been married and never had an intimate partner report sexual violence, as compared with 12% of never married women who ever had an intimate partner, 13% of currently married women, and 27% of formerly married women. By county, the percentages of women who have experienced sexual violence are highest in Bungoma (30%), Murang'a (24%), Homa Bay (23%), and Embu (22%). The most reported perpetrators of sexual violence among women who have ever been married or ever had an intimate partner were current husbands or intimate partners (71%) and former husbands or intimate partners (19%). Similarly, the most reported perpetrators of sexual violence among men who have ever been married or had an intimate partner were current wives or intimate partners (63%) and former wives or intimate partners (32%) (KNBS, 2023[22]).

The COVID-19 pandemic exacerbated SGBV cases due to lockdowns, economic strain, and limited access to support services. A report by UNFPA (2021)[23] noted a 92% increase in gender-based violence (GBV) cases during the pandemic. Child marriage and FGM persist, particularly in rural areas. UNICEF (2022) estimates that 23% of Kenyan girls are married before 18, with rates higher in Samburu, Marsabit, and Narok counties. FGM affects 21% of women (KDHS, 2023), despite being outlawed under the Prohibition of Female Genital Mutilation Act (2011).

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[18] Gender-based violence (GBV) is an umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially-ascribed (i.e., gender) differences between males and females. It includes acts that inflict physical, sexual or mental harm or suffering, threats of such acts, coercion, and other deprivations of liberty. These acts can occur in public or in private (2015 Inter-Agency Standing Committee Gender-based Violence Guidelines, pg. 5).

[19] Sexual exploitation: any actual or attempted abuse of a position of vulnerability, differential power or trust for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another (UN Glossary on Sexual Exploitation and Abuse 2017, pg. 6).

[20] Sexual abuse: actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions (UN Glossary on Sexual Exploitation and Abuse 2017, pg. 5).

[21] Sexual harassment (SH) is any unwelcome sexual advances, request for sexual favors, and other verbal or physical conduct of a sexual nature.

[22] Kenya National Bureau of Statistics (KNBS). (2023). *Kenya Demographic and Health Survey 2022*.

[23] UNFPA. (2021). Impact of COVID-19 on Gender-Based Violence in Kenya

5.5.1.2 SGBV Main Root Causes

SGBV root causes and contributing factors in Kenya are:

- Cultural norms – Patriarchal traditions normalize violence, with some communities viewing domestic abuse as a disciplinary measure (Amnesty International, 2020[24]);
- Poverty and inequality – Economic dependence forces victims to stay in abusive relationships (World Bank, 2021);
- Weak law enforcement – Police often dismiss SGBV cases due to corruption, victim-blaming, or lack of training (Human Rights Watch, 2022[25]); and
- Conflict and displacement – In regions like Turkana and Kakuma refugee camps, SGBV risks increase due to instability (UNHCR, 2023).

5.5.1.3 Legal Framework

Kenya has progressive laws against SGBV, including:

- The Constitution (2010) – Guarantees gender equality and prohibits discrimination. *Article 28* of the Constitution guarantees human dignity while *Article 29* guarantees every person the freedom and security and this includes the right not to be subjected to any form of violence from either the public or private sources and not to be treated or punished in a cruel, inhuman, or degrading manner;
- The Penal Code, Cap 63 – *Sections 250 and 251* on protects against assault and causing actual bodily harm.
- The Sexual Offences Act (2006) – Criminalizes rape, defilement, and sexual harassment;
- The Protection Against Domestic Violence Act (2015) – Provides protection orders for survivors;
- Prohibition of Female Genital Mutilation Act (2011); and
- The Employment Act, 2007 – *Section 6* of the Act defines sexual harassment and makes it a requirement for an employer with 20 or more employees to have a policy statement on sexual harassment and ensure that every employee knows about it.

However, implementation of these laws remains weak. Few cases are prosecuted, and conviction rates are low due to inadequate evidence collection and victim intimidation (FIDA-Kenya, 2021).

5.5.1.4 Response and Interventions

To prevent and mitigate against SGBV, several responses and interventions have been implement by different stakeholders. These are but not limited to:

- Healthcare – Government-established GBV recovery centers offer medical and psychological support;
- NGO/CSO efforts – Several organizations provide shelters and legal aid. For instance, Gender Violence and Recovery Centre (GVRC) – Beyond shelter and physical protection from harm,

[24] Amnesty International. (2020). *The Unseen Crisis: Gender-Based Violence in Kenya*

[25] Human Rights Watch. (2022). *"Why Do You Want to Rest?" Police Abuse of Domestic Violence Survivors in Kenya*.

the Centre provides psychosocial support and awareness to the community on gender violence, a key step in causing attitude and behavior change against gender-based violence.

- Awareness campaigns – Movements like #16DaysofActivism "Safe Home Safe Spaces" #MeTooKenya and #TotalShutDownKE advocate for policy reforms.

5.5.2 County SGBV Profiles

5.5.2.1 Isiolo County SGBV Overview

Approximately 53% of the residents live in rural areas. The drivers of gender-based violence in Isiolo County include poverty, limited access to information, illiteracy and cultural norms. In Isiolo County, a survey by the KNBS in 2022, indicated that 45.6% of women have experienced physical violence since age 15. The survey also revealed that 13% of women reported experiencing sexual violence, and 3% of men reported the same. Additionally, 30% of women in Isiolo reported experiencing a form of sexual violence.

Isiolo County Government (ICG) has a County Gender Policy, 2021-2025, that among other objectives, it seeks to eliminate gender-based violence through improved prevention, response mechanisms, and survivor support services (Isiolo County Government, 2021).

Key SGBV Risks and Drivers

- Workforce risks – Male project workers harassing female coworkers or local women.
- Community risks – Transactional sex for jobs near project sites and online harassment – digital SGBV – as internet access grows.
- Reporting barriers – Fear of stigma prevents victims from speaking up, and poor network coverage may limit digital reporting.
- Traditional resolution channels – hands out lenient punishment that does not deter future perpetration of SGBV.

Recommended Mitigation Measures

- Recruitment and diversity:
    - Ensure that at least 30% of technical roles in the project are filled by women; and
    - Implement targeted recruitment strategies to increase the representation of women in technical positions.
- Training and awareness:
    - Provide comprehensive training to all staff members on the SEA/SH/GBV requirements;
    - Utilise local radio stations, such as Radio Shahidi and Star Fm, to disseminate information about SGBV and facilitate reporting of cases; and
    - Launch a USSD code for anonymous reporting of SGBV cases throughout the project.
- Enforcement and accountability:
    - Implement strict enforcement measures to ensure compliance with SGBV requirements by contractors; and
    - Consequences should be applied to contractors who disregard or fail to enforce these requirements.

- Stakeholder Collaboration:
    - Foster collaboration between stakeholders, including the Catholic Diocese of Isiolo - Caritas, contractors, local leaders, and the police, to address SGBV effectively.
        - The Catholic Diocese of Isiolo - Caritas should be encouraged to raise awareness about SGBV and facilitate reporting.
        - Contractors should be trained to enhance their staff's awareness and provide support for SGBV campaigns.
        - Local leaders should advocate against SGBV and promote a culture of respect and equality.
        - The police should establish SGBV desks near project sites to facilitate prompt response and investigation.

5.5.2.2 Meru County SGBV Overview

Meru County exhibits high rates of gender-based violence (GBV). Recent data from the National Crimes Centre indicates that women have a 65% lifetime risk of experiencing GBV from an intimate partner. Specifically, Meru County reports that incidents of hitting, battering, and beating constitute 88%, while murders of GBV victims account for 34.9%. Additionally, 66.7% of women have indicated experiences of GBV, including emerging forms such as cyberbullying. There is also evidence of inadequate action and response from public authorities responsible for addressing GBV, which has impeded survivors' ability to access services and justice.

In 2019, Meru County created a Policy on Sexual and Gender Based Violence to address gender-related violence and its social, political, and economic impacts on individuals. This policy, which aligns with Kenya's National Policy on SGBV (2014), focuses on maintaining the dignity of survivors while ensuring perpetrators are held accountable (County Government of Meru, 2019).

Key SGBV Risks and Drivers

- Cultural norms driven by patriarchal traditions that perpetuate gender inequality and discourage reporting SGBV, especially in rural communities.
- Economic factors, such as poverty, which can lead to transactional sex or early marriages, and economic dependence, which keeps survivors in abusive relationships.
- Weak justice systems are marked by underreporting due to fear of retaliation or mistrust in authorities, slow court processes, and low conviction rates for SGBV cases.
- Environmental stressors like droughts increase competition for resources such as water and land, worsening gender-based conflicts.
- Youth and adolescent risks include teen pregnancies, peer exploitation in schools, and harmful practices like FGM in some sub-counties (e.g., Tigania, Igembe, etc.).

Recommended Mitigation Measures

- Community Sensitization: Involve elders, religious leaders, and men's groups to address societal norms; Utilize local media (e.g., Meru FM, Mugaa FM, etc.) for awareness campaigns on SGBV.
- Enforce SGBV clauses in project contracts.

- Strengthen GBV recovery centers with Post Exposure prophlaxis (PEP) kits, counseling, and legal aid.
- Partner with Meru Law of Society of Kenya branch for free legal support.
- Collaborate with County GBV Committee led by the County Executive for Gender to monitor SGBV interventions.

5.5.2.3 Wajir County SGBV Overview

The Kenya Demographic and Health Survey 2022, report states that women aged 15-49 in Wajir County have experienced physical, sexual, or emotional violence by a husband or partner. The survey indicates that Wajir County has: High rates of child marriage (over 30% of girls married before 18; FGM estimated 23% prevalence, often hidden due to cultural secrecy; Intimate Partner Violence (IPV) and domestic abuse, often underreported due to stigma; Sexual exploitation linked to humanitarian aid, displacement, and economic vulnerability; and Harmful cultural practices, such as forced marriages and widow inheritance ("*Dhaqan Celis*").

Key Drivers of SGBV

Harmful social norms and lack of women's voices drive GBV in the county. The Council of Elders often arbitrates SGBV cases, imposing lenient punishments. Rape and defilement cases, although criminal, are frequently handled by elders and *Maslaah* dispute resolution systems (KNBS, 2023). In addition, Wajir Municipality Gender Inclusion and Participation Framework, notes that SGBV is a pervasive issue in the County, exacerbated by cultural norms, conflict, and limited access to justice and support services. And that women and girls are particularly vulnerable, with many cases going unreported or unresolved due to stigma, fear, and inadequate legal frameworks. The justice system in Wajir is often inaccessible to SGBV survivors due to geographical, financial, and procedural barriers.

Recommended Mitigation Measures

Improving access to legal aid, establishing more Gender Desks in police stations, and enhancing the capacity of local healthcare providers to handle SGBV cases are crucial steps (County Government of Wajir, 2023). Other interventions should include: advocating for the full implementation of existing laws and policies on SGBV, and ensuring effective enforcement in Wajir; enhancing government support for shelters, counseling, and medical services for SGBV survivors in Wajir, ensuring access to holistic care; working with at-risk populations, such as women engaged in sex work and IDUs, to reduce their vulnerability to SGBV through targeted programs and services; and conducting research to better understand the underlying causes of SGBV in Wajir and develop evidence-based strategies to address them (County Government of Wajir, 2023).

In early 2020, women leaders from Wajir, with the support of REINVENT and Raia Development Initiative (RDI), established the Wajir Women Council of Elders (WCE). The Council now has multiple chapters across Wajir County. Its formation aimed to address women's needs, protect their rights, and ensure justice for survivors of sexual and gender-based violence (SGBV). Furthermore, the new council sought to amplify women's voices on critical issues affecting them and to integrate these concerns into decision-making processes. Additionally, the County enacted the Sexual and Gender Violence Bill

2019 and launched a recovery center for GBV survivors at the Wajir Referral Hospital. These initiatives focus on safeguarding women's rights, ensuring justice for survivors, and amplifying women's voices.

5.5.2.4 Mandera County SGBV Overview

Mandera County GBV prevalence is lower compared to other areas, with only 9% of women experiencing physical violence since the age of 15. While not as high as in some regions, GBV persists, driven by factors like cultural norms, poverty, and lack of education. Existing support structures include the Government's GBV referral system, GBV recovery and Child Protection Centers.

Key Drivers of SGBV

- Cultural and religious norms such as FGM is prevalent, affecting over 90% of women, and child and forced marriages are common due to clan agreements and poverty.
- Poverty and economic exclusion lead to the commodification of girls through bride prices, encouraging early marriage. Again, women's economic dependence hinders their escape from abusive relationships.
- Inadequate justice systems – Clan-based dispute resolution prioritises reconciliation over legal justice. Corruption, fear of retaliation, and limited police presence lead to low prosecution rates.
- Al-Shabaab's spillover and clan clashes increase vulnerability to trafficking and sexual violence.
- Low awareness and education – Women's literacy rate is less than 20% (KNBS 2019), limiting their knowledge of rights. Again, misinterpretations of religion justify gender discrimination.

Recommended mitigation Measures

- Train Islamic scholars and clan elders on Kenya's Sexual Offences Act (2006) and Mandera Municipality's Gender Participatory Framework to align tradition with law.
- Engage religious leaders (Ulamaa) to condemn SGBV in Friday sermons.
- Initiate "Men and Boys as Allies" programs to shift patriarchal mindsets.
- Girls' education campaigns with scholarships to reduce early marriages.

An SGBV or SEA/SH action plan with some of these recommendations has been developed and is found in Section 9.4.1 of this report.

6 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 F.

The engagement process has been designed to meet both Kenyan legal requirements[26] for public participation in relation to an ESIA FSR, and international requirements for engagement as outlined in the World Bank ESSs.

6.1 Objectives of Stakeholder Engagement

The objectives of engaging stakeholders 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 finalization of the ESIA FSR. 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 VMGs:** 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 VMGs 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; and

[26] Article 10 (2)(a) of the Constitution recognizes public participation as a fundamental governance principle. Additionally, Article 69(1) (d) affirms the role of public participation in the management, protection, and conservation of the environment. Furthermore, Articles 70 (3) and 42 uphold every person's right to a clean and healthy environment without requiring proof of harm caused by any harmful activity. Based on these provisions, public participation extends beyond decision-making to include the enforcement of environmental rights. Public participation is also provided under EMCA, Cap 387 and the Environmental (Impact Assessment & Audit) Regulations 2003.

- **Ensuring compliance:** The process is designed to ensure compliance with both local regulatory requirements and international best practice.

6.2 Project Stakeholders

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 6-1 presents the range of stakeholder groups that have been identified and included within the stakeholder engagement process to date.

Table 6-1 Identified Project Stakeholders and Connection to the Project

Stakeholder Category	Stakeholder Group	Connection to the Project	Stakeholders to be Consulted	Comment
Core Category	National road agencies	The OFB Network will be installed along the road corridor and within road reserves which are demarcated and maintained clear and free from encroachment by roads agencies. In fact, some ducts constructed by KeNHA will be used during installation the OFB Network.	KeNHA KURA KERRA	The aim is to engage with officials at the county level and determine whether further consultations are required at the national level.
	National regulatory bodies and agencies	They establish policy, grant permits or other approvals for the proposed OFB Network, and monitoring and enforcing compliance with Kenyan law throughout all stages of the Project lifecycle.	CA NEMA KWS KFS WRA	The aim is to engage with officials at the county level and determine whether further consultations are required at the national level. In all instances NEMA will be consulted.
	Isiolo, Meru, Wajir and Mandera County governments	County governments are responsible for implementation of legislation, and development plans and policies at the county level. They also have a role in issuing permits and processing applications. Finally, they have a role in ensuring the views of the communities it represents are presented to the Project.	Respective departments of ICT, Roads, Health, Education, Water, Environment, Gender, Forestry and Wildlife	These are relevant departments relevant to the project development. The aim is to have one meeting with all relevant departments present.
	Implementing Agency	Responsible for design and supervision of the installation of active equipment, fiber blowing, connections to schools, hospitals, other strategic locations including pastoralist roadside markets, export processing zones, rest stops, community centers and service centers along the corridor as part of the smart roads network.	ICT Authority	Owner and implementer of this Project. Provide project design information to non-core stakeholder groups.

Stakeholder Category	Stakeholder Group	Connection to the Project	Stakeholders to be Consulted	Comment
	Financiers	Financiers of the HoAGDP in conjunction with GoK. Project supports goals of their own work	World Bank AfDB Consortium of Arab Banks	Key informants interview to understand implementation progress relative to initial strategic objectives.
	Executing entities	Policy makers for implementer, roads agencies and regulators	MICDE MoRT	
Project Affected Persons (PAPs)	Project beneficiaries	Users of improved internet connectivity	Internet users	Engage them through public barazas. Provide insights on project benefits, community conflict dynamics, youth and gender dynamics in the area, environmental and social risks and impacts.
	VMGs	Potential project beneficiaries though might be excluded due to power dynamics.	Women Youth PWDs the elderly children	Ensure their representation and participations in stakeholder engagement meetings
	Project workers and their representatives	Involved in project implementation. Sensitive receptors to adverse environmental and social risks and impacts from project activities especially OHS risks.	Contractor workers	Provide insights on OHS risks and mitigation.

Stakeholder Category	Stakeholder Group	Connection to the Project	Stakeholders to be Consulted	Comment
Other Interested Parties (OIPs)	Other government agencies and institutions	Contribute to the project implementation e.g. provide security to project workers and infrastructure, assist in community mobilization, etc.	Ministry of Interior and National Administration Ministry of Education	Courtesy call and participation in public baraza.
	Community and traditional leaders	Represent people at different levels of government. Share project goal to improve internet connectivity and digitalization. Can lobby for more resources for the project.	Area Chiefs Sub-Chief Elders MCAs MPs	Courtesy calls Invite them to public barazas
	Special interest groups	Share project goal to improve internet connectivity and digitalization. Lobby and advocate for VMGs rights, and against Gender based violence (GBV), including sexual exploitation and abuse and workplace sexual harassment environment (SEA/SH, GBV). Awareness creation.	CBOs FBOs NGOs Women and Youth organizations	Key informants. Provide insights on community conflict dynamics, youth and gender dynamics in the area, GBV, including SEA/SH.
	Media	Share project goal to improve internet connectivity and digitalization. Awareness creation on project benefits, activities, risks and impacts	Local media houses	Invite them to public baraza.

Stakeholder Category	Stakeholder Group	Connection to the Project	Stakeholders to be Consulted	Comment
	Private sector	Potential project beneficiaries through improved connectivity. May suffer disruptions during installation of the OFB Network.	KNCCI, ISPs and businesses in major centers along the road corridor	Provide information on project potential benefits, environmental and social risks and impacts and recommendation on mitigation.
	Academia	Share project goal to improve internet connectivity and digitalization.	Academic institutions along the road corridor.	Provide information on project potential benefits, environmental and social risks and impacts and recommendation on mitigation.

6.3 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 its development as follows:

- ESIA process engagement; and
- Post ESIA engagement.

6.3.1 ESIA Process Engagement

The objectives of the ESIA process engagement were to:

- Meet/communicate with key stakeholders and introduce them to the Project and ESIA process;
- Discuss the Project with the stakeholders including identified impacts and the plans in place to manage them;
- Obtain stakeholders' view on the Project;
- Obtain stakeholders' concerns on the Project;
- Understand stakeholders' expectation from the Project;
- Collect baseline data through a variety of methods including using participatory tools; and
- Notify stakeholders of the next steps of the Project development.

Table 6-2 presents a summary of the stakeholder engagements conducted during the ESIA process, while a summary of the key issues raised/comments made by VMGs[27] is presented in Section 6.3.2. Outcomes from public meetings are included in the SEP. The results of the stakeholder consultations have been incorporated into the baseline information as well as into the impact assessment Chapter (Chapter 7 of this ESIA FSR).

Table 6-2 Details of ESIA Process Stakeholder Engagement

No.	Stakeholder	Mode of Engagement	Venue	Date	Number of Participants
1.	Multi-stakeholder workshop including KeNHA and KURA	Low Level Design Workshop	Kyaka Hotel, Machakos Town	February 27-28, 2025	48
2.	Catholic Diocese of Isiolo (CDI) – Caritas	Meeting – planning stakeholder engagement	CDI Offices, Isiolo Town	March 11, 2025	5
3.	National Government Administrative Officers (NGAOs)	Courtesy call to Mutuati's Assistant County Commissioner (ACC)	Mutuati ACC office, Meru County	March 12, 2025	5

[27] VMGs participating in the FGDs were selected from the participants in the larger public meeting. As such, they were not mobilized differently. As indicated in Table 6-1, they comprised Women, Youth, PWDs, the elderly, and children. Discussion topics were different for the public meeting and FGDs.

No.	Stakeholder	Mode of Engagement	Venue	Date	Number of Participants
4.	The Public and other key stakeholders	Public Meeting	Kachuru Market Centre, Meru County	March 12, 2025	56
5.	Vulnerable and Marginalized Groups (VMGs)	Focused Group Discussion (FGD)	Kachuru Market Centre	March 12, 2025	12
6.	Isiolo-Garbatulla Road	Site visit to Soliton Telmec	Soliton Telmec moving the old OFC.	March 12, 2025	12
7.	NGAO	Courtesy call to Garbatulla's ACC	Garbatulla ACC office	March 13, 2025	4
8.	The Public and other key stakeholders	Public Meeting	Baraza Park	March 13, 2025	60
9.	VMGs	FGD	Baraza Park	March 13, 2025	12
10.	NGAO	Courtesy call to Habaswein's ACC	Habaswein ACC office	March 14, 2025	4
11.	NGAO	Courtesy call to Tarbaj's ACC	Tarbaj ACC office	March 14, 2025	3
12.	The Public and other key stakeholders	Public Meeting	County ICT Department Hall	March 15, 2025	69
13.	VMGs	FGD	County ICT Department Hall	March 15, 2025	12
14.	County Government Officers	FGD	County ICT Department Hall	March 15, 2025	10
15.	The Public and other key stakeholders	Public Meeting	Red Sea Hotel	April 12, 2025	33
16.	HoAGDP's PMT	Meeting – ESIA Draft Report	ICTA Offices, 23rd Floor, Telposta Towers	May 14, 2025	12
17.	ICTA Staff	Online ESIA Awareness Session	Google Meet	May 22, 2025	66

6.3.2 Outcomes of Engagement Conducted to Date

The key questions and concerns raised by stakeholders during the ESIA process are outlined in tables in this section and further details included in the SEP (Appendix F). The Background Information

Document (BID), detailed minutes of the stakeholder engagement meetings conducted during the ESIA process, meeting photos, attendance registers, and the developed stakeholder engagement database, are all presented in Appendix C and Appendix D.

6.3.2.1 Kachuru VMGs FGD Outcomes

Table 6-3 Kachuru VMGs FGD Outcomes

Topic/Aspect	Key stakeholder issues/ comments
Economic Activities	The first question focused on community livelihood. The participants confirmed that their primary economic activities include livestock keeping, retail businesses such as selling miraa, milk, and Boda-boda services among the youth, as well as, to a smaller extent, salt mining in the Bagado area. Other activities include casual construction work among the youth, and salon businesses.
Conflict Resolution Mechanism	Due to the community cultural structure, the responsibility for resolving conflicts is vested in the elders, with no roles assigned to women or youth. The youth are primarily tasked with maintaining security and surveillance to ensure the safety of the community. However, civil and criminal cases are referred to national government.
Land Ownership	The land tenure system in Kachuru Market Centre and its surrounding areas is individually owned by women, youth, and elders. However, the land adjudication process has not been carried out, and land grabbing is rampant in the area. Resolutions for land conflicts are typically handled internally by the elders, and if a solution cannot be reached, the cases are referred to local administration, such as the chiefs.
Community perspective on the proposed project	The community supports the project development, citing several benefits. However, due to the looming threat of demolition and the absence of title deeds, the community expressed concerns during the FGD discussions, fearing that conflict might arise. They emphasized that they could only be certain of their future in the area once compensation and a consensus are completed.
Project Key Stakeholders	The participants were gauged on their knowledge of the key stakeholders involved in the proposed project, which they identified as follows: KeNHA, Contractor, Caritas handling GRC component, ESIA expert. KeNHA was identified as the primary key stakeholder, with a crucial role in ensuring the success of the proposed development by fulfilling all promises made through CSR activities. The participants emphasized that prior engagement with the community is essential for the successful implementation of the project.
Obstacle to Representation	No obstacles to fair representation were identified by the participants. However, people living with disabilities (PWDs) claimed that they are not included in the project implementation. They have requested that employment opportunities be provided and that they be included and invited to participate in community meetings.

Topic/Aspect	Key stakeholder issues/ comments
Project Objectives	The project objectives were discussed, and the participants were able to highlight some of the potential impacts of the project, including: • Provision of internet to public institutions, • Employment opportunity especially for the young populace. While the proposed development is expected to bring positive impacts, the participants expressed skepticism about some of the potential negative effects, such as displacement due to demolition. They also raised concerns that the influx of outside workers could lead to social risks and increased competition for limited resources, potentially causing conflicts with the host community. The participants advocated for the establishment of a mechanism to address conflicts during the project's implementation.
Perceived Conflict Causes	The participants highlighted several potential conflicts that may arise during project implementation, including the exclusion of residents from employment opportunities in favor of non-locals, resource use conflicts, and criminal cases. To prevent conflicts stemming from the employment of non-locals, the participants recommended giving priority to residents for job opportunities. The participant also noted the role played by GRC in solving conflict arising from the project implementation.
Community Expectation	Through the FGD discussions, the community expressed expectations that several CSR activities would be implemented, including hospitals, schools, and water projects. However, they lamented that some of these promises have not been fulfilled, noting that fulfilling these promises would help reduce conflicts within the community.
Liaison Committee	The community liaison committee lacks the capacity in terms of empowerment and remuneration to effectively facilitate their activities, and they have requested support for their empowerment.
Community Awareness	The participants' public engagement awareness was assessed, and they confirmed that community awareness is typically conducted through local administration (chiefs), Group WhatsApp chats, and the GRC announcements.
End of Discussion Question	The participants inquired about the project implementation timeline, expressing skepticism due to past experiences with government projects. However, the ESIA consultant reassured them that the project would be implemented, citing examples like the Turkana-South Sudan project. The participants also raised concerns about compensation delays, which have created anxiety among the locals.

6.3.2.2 Garbatulla VMGs FGD Outcomes

The participants included elders, sheikhs, women, PWDs, and youth. The discussion focused on the proposed development.

Table 6-4 Garbatulla VMGs FGD Outcomes

Aspects	Findings
Economic Activities	Key economic activities identified during discussion were Livestock rearing, Business activities such as retail and general trading accounting for 70% of the economic activities. In terms of cohort representation, 90% of women are involved in business activities mainly Mirra selling, while youth primarily engage in Boda Boda operations, and elders are mainly involved in livestock rearing and sales. Other roles identified for women include caring for the elderly in the community, as well as performing domestic chores.
Land Ownership	The discussion identified various forms of land tenure and ownership, including individually owned land and communal lands. It was noted that every community member including youth and women has the right to own land, particularly within town centers where individual ownership is more common. In contrast, in remote or rural areas, land is predominantly communally owned. A key challenge affecting landownership across this area is the lack of formal title deeds (titling).
Key Stakeholders	During the discussion, several key stakeholders were identified, including National Land Commission (NLC), County government, National government (Local administration) Community members, Frontier County Development Committee (FCDC), KeNHA, Caritas (GRC), Contractor (Egis). Among all the identified stakeholders, the contractor held the greatest responsibility.
Greivance Redress Mechanism	During the discussion, it became evident that there is a lack of a formalized channel to address community concerns, especially in relation to road construction activities. This gap in communication often leads to misunderstandings and delays and sometimes conflict. However, Caritas GRC plays a crucial role by serving as an intermediary between the contractor and the community, facilitating dialogue and ensuring that issues are addressed. Additionally, the previous Deputy County Commissioner (DCC) identified as a bottleneck in the communication process, as it often obstructed the flow of information between the contractor and the community, creating more animosity with the community.
Conflicts Causes	Social conflicts often stem from the exclusion of community from key activities, particularly employment opportunities. Other identified causes included the lack of effective communication channels and barriers created by the national government through local and sub-county administrations. Competition for resources, including health services and the limited supply of essential services, puts added pressure on existing facilities, thereby fueling conflicts. Others include unfulfilled promises and culturally inappropriate behavior.
Inclusion of VMG and PWDs	The participants expressed a desire for greater inclusion in project activities, particularly for PWDs and VMGs, in areas such as material supply and employment opportunities.

Aspects	Findings
Project Impacts	The spread of disease, due to the influx of construction workers, and concerns about security for the local community, particularly regarding social norms that conflict with cultural beliefs were highlighted during discussions. Additional impacts identified included increased charcoal burning, dust, and noise. However, participants suggested that they be offered job opportunities, such as planting trees and monitoring activities like watering.
Conflict Resolution	Conflict resolution is largely handled by community elders, with women playing a partial role, while youths are excluded due to traditional customs. The identified conflict resolution mechanisms include effective stakeholder engagement, ensuring that all project-affected groups such as PWDs, youths, women, Sheiks, clerics, and community elders are included in the project implementation phases. Additional solutions suggested includes giving priority to the local community in employment opportunities to reduce conflicts. Lastly, participants emphasized the importance of community ownership of the project.
Public Awareness Channel	Participants suggested utilizing local FM radio stations and existing structures, such as area administration (Chiefs) and Caritas (GRC) team, to disseminate information to the public. Additionally, they recommended empowering local communities to act as ambassadors in spreading awareness about the proposed upcoming project.

6.3.2.3 Wajir County VMGs FGD Outcomes

Table 6-5 Wajir VMGs FGD Outcomes

Aspect	Findings
Economic Activities	Key Economic Activities identified during discussion included Livestock keeping (50%) and selling, selling food products (in support with World Food Program), Retail business (Clothing), Boda-boda, Cyber business, Saloon and Kinyozi mainly for non-locals, and Charcoal burning and selling milk.
Land ownership	Land ownership in the area is categorized under several types. Some land is owned by the national and county governments (Public land). There is also individual ownership, with some landowners holding title deeds though areas located about 4 kilometers outside the metropolitan zones are primarily communal land. Additionally, freehold ownership exists in certain parts of the community.
Land Dispute Resolution	The land dispute resolution is primarily handled by the Land Dispute Tribunal based in Wajir town.
Key Stakeholder	Key stakeholders identified include Local leaders (MCA), National administrative units (Chiefs), Women Groups, NGOs (Wajir Peace) and Red-Cross, APID, CBOs, Security personnel, Wajir One Youth Association, Wajir Apple Plus initiative (PWD), Civil societies, Kenya National Human Right Commission, NLCA, Ministry of Environment (National and County), Wajir Municipality.
Stakeholder Influence	Key stakeholders influencing community matters in the area include the SUPKEM leadership, Members of County Assembly (MCAs), various Non-Governmental

Aspect	Findings
	Organizations (NGOs), and Wajir Peace. These stakeholders play a significant role in shaping decisions, mobilizing community engagement, and supporting development initiatives.
Barriers to Project Involvement	Several barriers hindering community involvement in projects were discussed. These include the demand for bribes, which discourages participation, and limited access to information, often due to high levels of illiteracy. Poor road infrastructure also makes it difficult to reach remote areas. Additionally, fear of accountability among community mobilizers and restrictive cultural norms further limits effective engagement in project activities.
Mitigations Measures	Participants suggested serval mitigation measures to potential impacts of the project. These include capacity building through targeted training programs and routine health examinations to ensure the well-being of those involved. The provision of Personal Protective Equipment (PPE) was also emphasized to enhance safety. Additionally, raising awareness about the project through local media channels was recommended to keep the community informed. Induction and training sessions on the cultural norms of the host community were also suggested to promote respect, harmony, and smoother integration with non-local laborers.
Exclusion of PWDs and VMGs	One of the key challenges hindering the active involvement of vulnerable groups and marginalized communities (VGM) in projects is the lack of public awareness and access to information. Illiteracy and limited access to vital information compound this issue, making it difficult for these groups to engage, contribute, and benefit from any proposed development efforts.
Causes of Conflicts	The main causes of conflicts within the community identified include competition over natural resources, particularly water and grazing land, Land ownership disputes are also common, often exacerbated by unclear boundaries and overlapping community claims. Political tensions and inter-religious differences further contribute to unrest. Additionally, skewed employment opportunities, where certain groups are favored over others, fuel resentment. Administrative conflicts related to unclear or contested location boundaries also play a significant role in triggering disputes within the community.
Conflict Resolutions	Conflict resolution within the community is handled through a variety of mechanisms. The council of elders plays a central role in mediating disputes using traditional approaches. Wajir Peace Actors also contribute significantly by facilitating dialogue and reconciliation efforts. In more complex situations, the intervention of the national government is sought.

Aspect	Findings
	Religious leaders are often called upon to mediate, especially in matters involving inter-religious tensions. Political mediation also serves as a means of resolving conflicts, particularly those linked to governance or representation. For legal disputes, formal court settlements through both the Kadhi and magistrate courts were identified as the official channels of dispute resolution.
The Role of Youth in Peacebuilding	According to the participants, youths and women are often excluded from conflict resolution processes due to cultural norms. However, emerging initiatives such as inter-community football matches and community support projects like the provision of water and food resources by young people are being promoted and encouraged as part of peacebuilding efforts within the community.
Initiative to Support Vulnerable Groups	The participants encouraged the use of digital platforms and capacity building through training and information sharing as one of the key strategies to include and support vulnerable groups.
Existing Mechanisms for Information Dissemination	Several mechanisms are in place to effectively disseminate information across various communities according to the participants. These channels were identified as: Mosques, Local Radio FM, National administration, NGOs, and Business community.
Ways to strengthen communication	During the discussion, the use of social media platforms such as Facebook and WhatsApp was identified as the most preferred and effective means of communicating with the community. These platforms offer the significant advantage of reaching a large and diverse audience rapidly, ensuring that information is disseminated quickly and efficiently. Additionally, social media facilitates real-time communication, making it an ideal tool for sharing urgent updates and ensuring that the community stays informed in a timely manner.
Community expectation	Employment opportunities and improved government services.

All stakeholder comments were noted and were considered in the assessment of the Project at all phases. Where necessary, responses were given by both the ESIA team, National and County Government officials present in the various meetings (refer to Appendix D for detailed minutes of the stakeholder engagement meetings).

6.3.3 Post ESIA Stakeholder 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 cognizant 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.

Post ESIA stakeholder engagement is expected at the following Project stages:

- **Pre-construction stage** where stakeholders who will be directly affected by the Project will be notified and discussions held with them;
- **Mobilization phase**: At this stage, information regarding the location of associated project infrastructure, detailed construction schedule, and expected construction team (including employment opportunities) will be shared with the Project stakeholders;
- **Construction phase**: Continuous engagement with the Project stakeholders throughout the construction phase to keep them updated of the construction activities as well as any changes to the initial Project plans that may happen during this phase;
- **Demobilization phase** notifying the stakeholders of the end of the construction activities and close-out of outstanding construction phase related grievances;
- **Operations Phase**: Continuous engagement with stakeholders to keep them updated of the operation activities including available e-government services as well as any changes made during this phase; and
- **Decommissioning Phase**: Currently there are no plans to decommission the Project constructed, however, should this arise in future, the relevant stakeholders at that time will need to be appropriately engaged to minimize related negative impacts. It is anticipated that the current baseline information will have been drastically changed at that time (the PAI/road corridor is expected to experience emergence and growth of urban centers) thus it is recommended that a decommissioning engagement plan is prepared at that stage, at least three months prior to the commencement of the decommissioning activities.

6.4 Project Grievance Mechanism (GRM)

The Project will utilize the existing well-resourced HoAGDP GRM for dealing with grievances. A grievance is a complaint or concern raised by an individual or organization who judges that they have been adversely affected by a project during any stage of its development.

7 ANTICIPATED IMPACTS AND MITIGATION MEASURES

The predicted impacts to the biophysical and socioeconomic environment because of the Project are described in this section, which also details potential mitigation measures to avoid, minimize, reduce, remedy or compensate for potentially negative impacts, and enhance potential positive benefits of the proposed Project. Where possible, the section also provides a prediction of the residual impacts likely to remain, assuming that the appropriate mitigation measures are implemented.

The development of mitigation/management measures and the management of residual impacts are fully described in the Environmental and Social Management Plan (ESMP), see Chapter 9. The methodology used to identify and assess impacts is explained in Section 1.8.

For each impact:

- Background information relating to the impact is then provided. This includes a description of the baseline environment that will be affected, the Project aspect or activities that will cause the impact and a description of the effected receptors.
- Significance of the impact pre-mitigation is then assessed and rated.
- Following the pre-mitigation rating tables, a section describing the recommendations and mitigation/management measures proposed are provided.
- Once the recommended mitigation/management measures are provided, for moderate and high impacts, a residual impact (post-mitigation) is rated through use of a less detailed rating table.

7.1 Construction Phase Impacts

7.1.1 Terrestrial Habitat Alteration

The road corridors where project activities will be implemented are highly modified since they are road construction activities currently ongoing in several sections. In these sections. The OFC installation duct has been included as part of the road construction activities. However, there are some sections without roadworks thus pristine terrestrial habitats may be altered during construction.

Terrestrial habitats may be altered primarily during the construction or installation of the OFC Backbone Network, Metros, and Access Networks. Potential adverse impacts may result from several activities such as vegetation clearing, trenching, and increased human traffic along previously undeveloped land. Moreover, these activities may result in the removal of plant species listed under the International Union for Conservation of Nature (IUCN) Red List[28]. However, a site visit did not reveal the presence of any species classified as threatened by the IUCN. Most of the plant species recorded along the proposed project corridor are common, with some even identified as invasive.

The main sensitive receptors to this impact are biodiversity along at the subproject sites in the PAI.

[28] The IUCN Red List is a critical indicator of the health of the world's biodiversity. **Far more than a list of species and their status**, it is a powerful tool to inform and catalyse action for biodiversity conservation and policy change, critical to protecting the natural resources we need to survive. It provides information about range, population size, habitat and ecology, use and/or trade, threats, and conservation actions that will help inform necessary conservation decisions. See https://www.iucnredlist.org/about/background-history

Based on the analysis provided above, the impact on terrestrial habitats will be "**Moderate Negative Impact**" pre-mitigation as summarized below.

Aspect	Rating	Justification of choice
Magnitude (M)	Medium (3)	The impacts on habitats are expected to be restricted to the subproject sites and material/waste disposal sites within the PAI. This impact will be manifested within the Project footprint (approximately 1,000 km).
Sensitivity (S)	Low (2)	Subproject sites are not of conservation value.
Significant Rating Before Mitigation (M*S)		
Moderate Negative Impact (6)		

Recommended Mitigation/Management Measures:

- Site fixed line infrastructure (e.g., fiber optic cable) and other types of linear infrastructure, rights-of-way, access roads, lines, and towers to avoid critical habitat through use of existing utility and transport corridors (road reserves), whenever possible;
- Avoidance of construction activities during the breeding season and other sensitive seasons or times of day;
- Develop biodiversity management plan (BMP) for protected areas, as necessary;
- Revegetation of disturbed areas with native plant species; and
- Management of construction site activities as described in relevant sections of the **World Bank's General EHS Guidelines**.

Based on the implementation of the proposed mitigation measures, the significance of the impacts on terrestrial habitats will be "**Minor Negative Impact**" post-mitigation.

7.1.2 Waste and Effluent

There are no formal waste collection and management services in the PAI. During site visits, plastic waste (bags and bottles) was strewn along the road corridor.

Inefficient waste management during construction and maintenance activities may lead to inadequate disposal of solid (domestic and construction) and liquid wastes that may pollute soils and watercourses and visually degrade natural and man-made landscapes. Trenching and vegetation clearing may create exposed sites. Sediment-laden runoff from cleared areas could impact water quality of downstream watercourses. Release of hazardous substances associated with construction and maintenance activities or with transport of materials (e.g., accidental spills and leaks, etc.), may lead to soil, surface, or groundwater contamination.

The sensitive receptors to these impacts are soil and water resources that may be used by the local communities for agricultural production and consumption respectively.

Based on the analysis provided above, the impact on water, soil and landscapes will be "**Moderate Negative Impact**" pre-mitigation as summarized below.

Aspect	Rating	Justification of choice
Magnitude (M)	Medium (3)	There are no waste management services in the PAI. The adverse impact will go beyond the Project footprint. Adverse effects will occur beyond the construction phase.
Sensitivity (S)	Medium (3)	Communities will be highly sensitive to any pollution and soil contamination in their area.
Significant Rating Before Mitigation (M*S)		
Moderate Negative Impact (9)		

Recommended Mitigation/Management Measures:

- Mandate contractor to only provide workers with water in returnable glass bottles;
- Train project workers on waste handling and segregation;
- Waste segregation (hazardous or non-hazardous) in should be practiced throughout construction phase;
- No garbage, refuse, oily waste, fuel, waste oil or removed/excess materials (e.g., asphalt, sidewalks, metal scrap, etc.) shall be discharged into drains, onto site grounds, natural areas, or watercourses;
- If feasible, reuse of removed/demolished materials (e.g., asphalt, sidewalks, metal scrap, etc.) or donate to local community. In addition, careful selection of adequate sites for final disposal of removed/excess materials not reused or donated;
- Prompt removal and safe disposal of soil contaminated with hydrocarbons;
- Hazardous and oil waste shall be collected and disposed by NEMA licensed waste handlers;
- Implementation of hazardous materials handling and control procedures (e.g., identify chemical products and store in storage area with restricted access, keep track of movement of each chemical, etc.);
- Keep records of waste generation (i.e., type of waste; hazardous or non-hazardous; weight or volume; properties; destination; date; etc.);
- Maintenance and cleaning of vehicles, trucks and equipment should take place offsite, and prohibition of vehicle washing in watercourses; and
- Toilet facilities shall be provided for construction workers to avoid indiscriminate defecation in nearby bushes.

With implementation of the above measures, the impact on water, soil and landscapes will be "**Minor Negative Impact**" post-mitigation as summarized below.

Aspect	Rating	Justification of choice
Magnitude (M)	Low (2)	Project will not contribute to the waste management problem in the PAI. Adverse impact will not go beyond the Project footprint. Any adverse effects will be limited to the construction phase.

Sensitivity (S)	Very low (1)	No community grievances on pollution.
Significant Rating Before Mitigation (M*S)		
Minor Negative Impact (2)		

7.1.3 Emissions to Air

Ambient air environment plays a crucial role in the health of humans, animals, wildlife, and vegetation. Air pollutants, emitted from both point and non-point sources, are transported, dispersed, or concentrated depending on meteorological and topographical conditions. The PAI is most located in a rural area interspersed with few settlements and urban areas. Air quality (Particulate matter $PM_{2.5}$ & PM_{10}) assessments conducted during the ESIA process in several settlements indicated that the ambient air quality is generally good. The primary sources of air pollution are limited to vehicle and motorbike movement on unpaved roads, fugitive dust from open land, and the regular occurrence of whirlwinds and dust pools. The results were within the acceptable threshold, except in certain instances when vehicle movement generated fugitive dust, causing $PM_{2.5}$ levels to exceed the limit. See Appendix F for detailed air quality measurements results

Several construction activities such as vegetation clearing, trenching, backfilling, and increased human traffic along previously undeveloped land have the potential to generate dust. Again, transportation of Project materials on unpaved roads and other access roads will likely lead to a rise in nuisance and particulate dust. In addition, exhaust emissions from construction equipment and machinery are expected to include CO_2, NO_2, SO_2 and Volatile Organic Compounds (VOCs) from diesel/ petrol engines.

The main sensitive receptors are communities next to subproject sites and construction workers.

Based on the analysis provided above, impacts on local air quality during the construction phase will be **"Moderate Negative Impact"** pre-mitigation as per the assessment below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	Medium (3)	Emissions to air will be limited to the subproject sites and along the access roads. This impact will be manifested within the PAI. However, if the emissions exceed the maximum levels permitted in the EMCA (Air Quality) Regulations, 2024, and World Bank EHSGs at source, this will pose health concerns to receptors and will result in a breach of relevant legal requirements.
Sensitivity (S)	Low (2)	The receptors are used to vehicular movements and dust and are thus less sensitive to emissions from their normal operations. However, local communities and construction workers will be affected by any non-compliance
Significant Rating Before Mitigation (M*S)		
Moderate Negative Impact (6)		

Recommended Mitigation/Management Measures:

- Conduct regular air quality measurement at the subproject site.
- Develop and implement a grievance procedure (for both workers and other stakeholders) to manage any dust complaints.
- Where feasible, regular wetting or chemical treating of exposed open earthworks such as at the levelled and material laydown areas, may be required. Upon completion of earthworks, stabilization of temporary used surfaces (i.e., establishing vegetative cover as part of the landscaping activities, or placing ground cover) should occur as soon as possible.
- Regular wetting of construction access routes. This will not only lower dust levels but will improve visibility and hence lower the risk of accidents.
- Vehicles to maintain speed limits imposed.
- The smallest possible area for cleared ground required for construction work should be exposed.
- Drop heights of material should be minimized, as far as reasonably possible.
- Construction equipment should be maintained and serviced on a regular basis to ensure that they function optimally and to reduce excessive emissions, this will also apply to all stationary generators utilized on site.
- Issue all Project workers appropriate Personal Protective Equipment (PPE) including dust masks where required.
- Keep community abreast of the construction schedule.
- Develop and implement an appropriate Traffic Management Plan (TMP) throughout the construction phase.

With the implementation of the above mitigation measures, the significance of the emissions to air will be **"Minor Negative Impact"** post-mitigation per the assessment below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	Low (2)	Emissions to air will be limited to the subproject sites and along the access roads. Negative effects will cease shortly after construction phase. The concentration of emissions will be kept below the maximum levels permitted in the EMCA (Air Quality) Regulations, 2024 and World Bank EHSGs.
Sensitivity (S)	Very low (1)	Emissions to air will not exceed current levels.
Significant Rating Before Mitigation (M*S)		
Minor Negative Impact (6)		

7.1.4 Noise and Vibration

Subproject sites will mostly be in rural areas where potential sources of noise and vibrations may include markets, schools, health facilities, judicial bodies, and other government offices noise, and light motor traffic along access roads. The ambient noise at subproject sites is, therefore, influenced

by educational, health, and light commercial activities across the PAI. Noise measurement was also done at selected locations in the PAI. The Noise Level Measured in 'A' scale Decibel (dBA) was within the Threshold standard set by NEMA which ranges between 46.7 Minimum to 68.9 maximum dBA. See Appendix F for detailed noise measurement results.

The main source of noise and vibrations will be attributed to construction machinery and construction vehicles that will be used during the construction phase.

The main sensitive receptors are local communities, schools, health facilities, judicial bodies, county offices, national government offices, market centers, and construction workers.

Based on the above analysis, the impact on noise environment and vibration during construction phase will be "**Major Negative Impact**" pre-mitigation as below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	Medium (3)	The noise and vibrations will be localized and limited to subproject sites though will be generated throughout the construction phase (daytime). However, no noise will be generated at night since construction activities are expected to be limited to daytime activities only.
Sensitivity (S)	High (4)	The receptors will be highly sensitive to any noise excess of the maximum levels permitted in the EMCA (Noise and Excessive Vibration Pollution) (Control) Regulations, 2024 and World Bank EHSGs. For example, learners may be distracted by noise any nuisance on a school day.
Significant Rating Before Mitigation (M*S)		
Major Negative Impact (12)		

Recommended Mitigation/Management Measures:

- The Contractor shall implement best driving practices when approaching and leaving construction sites to minimize noise generation created through activities such as unnecessary acceleration and breaking;
- Strict control of timing of activities within authorized working hours, including banning work at night and limiting installations near offices and schools to weekends;
- Minimize noise levels and vibrations (e.g., sound insulation, select equipment with lower sound power levels, install acoustic enclosures for equipment, install suitable mufflers on engine exhausts and compressors components);
- Keep sensitive receptors and community abreast of the construction schedule; and
- Issue all project workers with appropriate PPE including earmuffs where required.

With implementation of the recommended mitigation measures, the significance of the impact on noise environment and vibration will be a **"Minor Negative Impact"** post-mitigation per the assessment below.

Aspect	Rating	Justification of choice
Magnitude (M)	Low (2)	The noise and vibrations will be localized and limited to subproject sites and effects will cease after construction phase.
Sensitivity (S)	Low (2)	Project activities near sensitive receptors will only be undertaken when they are away. Noise and vibrations will only be generated when equipment and machinery are being operated. No noise will be generated at night.
Significant Rating Before Mitigation (M*S)		
Minor Negative Impact (4)		

7.1.5 SEA/SH/GBV Impacts

One (1) in three (3) Kenyan females has experienced sexual violence before attaining the age of 18, and between 39% and 47% of Kenyan women experience GBV in their lifetime. The project is expected to have civil works across Kenya (the SEA/SH risk is high for work sites within schools and hospitals). In one FGD, the consultant learnt that SEA/SH/GBV was rampant in one of the beneficiary counties (Wajir) of the project. The participants noted that no day passes without a case being reported to the authorities or a person being treated for GBV injuries at the county referral hospital. Section 5.5.2 of this report provides SEA/SH/GBV profiles for the four counties (Meru, Isiolo, Wajir, and Mandera) with the largest project footprint.

ICTA has adequate capacity internally to handle SEA/SH/GBV matters as it is currently Implementing two other World Bank-financed projects with similar activities to HoAGDP. These are Kenya Digital Economy Acceleration Project (KDEAP, P170941), and Eastern Africa Regional Transport and Trade Development Facilitation Project (EARTTDFP, P145583). Both projects are implementing the World Bank GBV Good Practice Note. During the last six years of implementation of these projects, the WBG has continuously provided targeted training to ICTA staff as well as associated contractors and supervising engineers. Under the EARTTDFP for the last six years there have not been any SEA/SH cases reported involving ICTA-related works. Further, ICTA has a Gender and Sexual Exploitation and Abuse Policy and a separate Gender Mainstreaming Policy. In the institution, there exists a Gender Committee and a Gender Focal Point responsible for the management of SEA/SH risks for the Authority. Moreover, HoAGDP also works with local stakeholders in implementing a GRM that includes channels for handling SEA/SH/GBV matters. However, ICTA's internal capacity notwithstanding, SEA/SH/GBV is still likely because: OFC projects involve mobile crews, usually male, working near communities, which increases the risk of sexual harassment and exploitation; Contractors for trenching or cable-laying may lack SEA/SH policies; Isolated rural worksites limit survivor access to help; and the PAI is inhabited by VMGs where SEA/SH is underreported.

The main sensitive receptors to SEA/SH/GBV, and as detailed in Section 5.5 of this report, are women, girls, men, and boys, though women and girls are disproportionately impacted.

Based on the above analysis, the project impact on SEA/SH/GBV during construction phase will be "**Major Negative Impact**" pre-mitigation as below.

Aspect	Rating	Justification of choice
Magnitude (M)	High (4)	OFC projects involve mobile crews, usually male, working near communities, which increases the risk of sexual harassment and exploitation. Contractors for trenching or cable-laying may lack SEA/SH policies. Isolated rural worksites limit survivor access to help. The PAI is inhabited by VMGs where SEA/SH is underreported.
Sensitivity (S)	High (4)	Project workers and local communities will be highly sensitive to acts of SEA/SH/GBV. SEA/SH/GBV occurrence may even lead to local community social unrests and even premature closure of the project due to disrepute.
Significant Rating Before Mitigation (M*S)		
Major Negative Impact (16)		

Recommended Mitigation/Management Measures:

- Perform a gender-sensitive mapping of subproject sites (e.g., locate unsafe areas near schools or hospitals, etc.) prior to commencement of construction activities;
- Add SEA/SH/GBV clauses in contracts with contractors and primary suppliers, requiring training and enforcing zero tolerance;
- Deploy Caritas Isiolo, Wajir Peace and Frontier Counties Development Council (FCDC) as independent monitors to audit remote subproject sites and act as trusted reporters;
- Review the appropriateness of the HoAGDP's GRM for handling SEA/SH/GBV matters. If fit for purpose, adopt and implement for the OFC project;
- Discourage use of traditional grievance resolution methods in addressing SEA/SH/GBV matters in the project. They have been found to issue lenient sentences to perpetrators;
- Train contractors and supervisors on SEA/SH/GBV (e.g., how to respond to, and escalate complaints, etc.);
- Publish annual SEA/SH reports as part of ICTA's annual reporting (e.g., number of received cases, % of resolved cases, etc.) to build trust;
- Social inclusion e.g. ensure VMGs are included during recruitment;
- Implement the developed GBV/SEA/SH Action Plan.

With implementation of the recommended mitigation measures, complemented with ICTA's internal capacity to manage SEA/SH/GBV matters, the significance of the project impact on SEA/SH/GBV will be a **"Minor Negative Impact"** post-mitigation per the assessment below.

Aspect	Rating	Justification of choice
Magnitude (M)	Low (2)	The SEA/SH/GBV risk will be localized and limited to subproject sites and effects will cease after construction phase.
Sensitivity (S)	Low (2)	Project activities near sensitive receptors e.g. schools, etc. will only be undertaken when they are away. They will also be limited to the construction phase.

Aspect	Rating	Justification of choice
Significant Rating Before Mitigation (M*S)		
Minor Negative Impact (4)		

7.1.6 Labour and Working Conditions [Including Occupational Health and Safety (OHS)]

The Project will create both direct and indirect employment opportunities across different skills levels (unskilled, semi-skilled and skilled) across the country. The Project, during construction, among others, will employ skilled drivers with relevant defensive driving training, engineers, environmentalists and sociologists, surveyors, and ICT compliance teams. Unskilled labourers, during construction, will mainly be community members and shall ensure safe offloading activities, trenching, backfilling, laying of ducts, warning tape installation, OFC pulling and blowing, pole installation, and traffic management along routes of interest.

Sensitive receptors will be Project employees. Given the wide Project footprint, approximately 1,000km, and the fact that some of these workers may not have previously worked at already completed ICT infrastructure projects by ICTA or private telcos, these workers thus lack a fair understanding of general construction conditions and common construction related OHS risks and how they can be minimized. Again, the project is being implemented in Northeastern Kenya inhabited by VMGs.

Labour and working conditions, including occupational health and safety, will need to be considered to avoid any occupational incidents and/or injuries. Issues that need to be considered include fair treatment of workers, non-discrimination, equal opportunities, as well as the provision of a safe and healthy working environment. These issues should be considered not only for those employed directly by the ICTA/Proponent, but also employees of the Contractor and any other sub-contractors during the construction phase.

Without careful OHS management, the workforce employed may be exposed to OHS risks, potentially resulting in occupational accidents and injury or death. Some of these OHS risks are:

- **Electrical Safety –** Telecommunications workers may be exposed to occupational hazards from contact with live power lines during construction, maintenance, and operation activities;
- **Optical Fiber Safety –** Workers involved in fiber optic cable installation or repair may be at risk of permanent eye damage due to exposure to laser light during cable connection and inspection activities;
- **Elevated and Overhead Work –** The assembly of towers and installation of antennae can pose a physical hazard to workers using lifts and elevated platforms and those located below due to the potential for falling objects;
- **Fall Protection –** Workers may be exposed to occupational hazards when working at elevation during construction, maintenance, and operation activities;

- **Confined Spaces and Excavations –** The type of confined spaces encountered in telecommunications projects varies but may include underground OFC infrastructure co-located with other underground infrastructure in urban areas. Ditches and trenches may also be considered a confined space when access or egress is limited; and
- **Motor vehicle safety –** The geographically dispersed nature of the infrastructure of some telecommunications operators may require the frequent use of ground transportation for construction and maintenance activities.

Most labour laws in Kenya are aligned with international labour laws since the country has ratified seven (7) of the eight (8) core ILO conventions, including:

- Right to Organize and Collective Bargaining Convention, 1949 (No. 98);
- Forced Labour Convention, 1930 (No. 29);
- Abolition of Forced Labour Convention, 1957 (No. 105);
- Minimum Age Convention, 1973 (No. 138);
- Worst Forms of Child Labour Convention, 1999 (No. 182);
- Equal Remuneration Convention, 1951 (No. 100); and
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

It is important to note that while labour laws exist, there are issues with regards to their implementation. Also, due to the lack of employment opportunities in Kenya, workers are willing to sacrifice their labour rights to secure employment. There is, therefore, the risk that the Contractor and sub-contractors will not operate in line with international best practice if measures to manage such risks are not enforced.

With regards to on-site worker welfare, the Contractor will be required to adhere to World Bank ESS2: Labour and Working Conditions, Kenyan Labour Laws and the ratified ILO conventions.

Based on the analysis provided above, impacts to exposure of the workforce to poor labour and working conditions including OHS will be a **"Major Negative Impact"** pre-mitigation as per the assessment below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	High (4)	The impact is only relevant for the workforce (including direct, third party and supply chain workers) all of whom are at the PAI (although a few of them may come from elsewhere in Kenya or globally). PAI labour will be provided by VMGs who the project must ensure they are not disproportionately affected by adverse impacts from the project. Inadequate labour and working conditions will cease to manifest after the construction phase; however, some of the effects such as major injuries will continue to affect the concerned individuals.
Sensitivity (S)	High (4)	Project workers, estimated at 500 during the peak of the construction phase, will be highly sensitive to any inadequate labour and working conditions during Project implementation.

Aspect	Rating	Justification of choice
		Injuries may be severe and fatal thus significantly affecting households and communities' ability to maintain their quality of life and livelihoods beyond the project.
Significant Rating Before Mitigation (M*S)		
Major Negative Impact (16)		

Recommended Mitigation/Management Measures:

The Project will ensure adequate and appropriate measures are put in place for Contracted workers including establishing and maintaining safe working environment, carrying out OHS hazards risks assessments for the different tasks:

Management System

- All contractors should develop and implement an Occupational Health and Safety Management System (OHSMS) in line with good international industry practice (GIIP), including the requirements of the World Bank ESS2, and in accordance with Kenya's Occupational Health and Safety Act (OSHA). This OHSMS will need to consider hazard identification, OHS risk assessment and control for different tasks (identify OHS control measures that include the mitigation hierarchy: (i) elimination/substitutions; (ii) engineering controls; (iii) administrative controls; and (iv) OHS training and supervision at the field level), use of Personal Protection Equipment (PPE), incident investigation and reporting, reporting and tracking of near misses, incidents, etc. The management system will also include emergency response plans that tie in with existing emergency response procedures of the ICTA. Roles and responsibilities for the implementation of the OHS Plan should be clearly defined;
- All contractors should have a Human Resources Policy in place that adheres to the requirements of the World Bank ESS2, Kenyan Law and the ILO Core Labour Conventions, to which Kenya is a signatory. The HR policy will include a Labour and Employment Plan, conditions of employment and Worker Grievance Mechanism. These requirements will also be passed on to any sub-contractors. Key aspects of the HR policy which should be included, are the following:
    - Provision of clear and understandable information regarding rights under national labour and employment law, and any applicable collective agreements, including those related to hours of work, wages, overtime, compensation, etc.;
    - 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;
    - Provision of adequate welfare facilities on site;

- Implementation of a grievance mechanism;
- Adoption and implementation of a sexual exploitation and harassment policy;
- Maintain a Worker Injury Benefit Act (WIBA) insurance and Contractor all risks insurance; and
- Adoption of an open attitude towards freedom of association.

Contractor Management

- All contracts should explicitly reference compliance with Kenyan law, international standards (especially World Bank ESS2), and ratified ILO conventions.
- As part of the contractor and supplier selection process, the ICTA should take into consideration performance regarding worker management, worker rights, and health and safety as outlined in Kenyan law and international standards;
- Regular checks should be undertaken to ensure the relevant labour laws and OHS are always adhered to;
- All workers (including those of contractors and subcontractors) should, as part of their induction, receive training on health and safety and should receive updated training routinely, as well as when undertaking new tasks, such as working at heights or working in confined spaces; and
- Daily toolbox talks will be held with the Project workers to discuss the health and safety risks associated with the tasks at hand.

Workers' Rights

- All Contractors should put in place hiring mechanisms to ensure no employee or job applicant is discriminated against based on his or her gender, marital status, nationality, ethnicity, age, health status, religion or sexual orientation;
- All workers (including those of the contractor and subcontractors) will, as part of their induction, receive training on worker rights in line with Kenyan legislation to ensure that positive benefits around understanding labour rights are enhanced. This process will be formalized within the Code of Conduct that will be provided by the contractor;
- All workers (including those of the contractor 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. Contracts must be in place prior to workers commencing work;
- All contractors should put in place a worker grievance mechanism that will be accessible to all workers, whether permanent or temporary, or directly or indirectly employed. The worker grievance mechanism shall be open to all the Project workers if their grievance is not adequately resolved by their direct employer. Workers will also have access to ICTA's grievance management system, to raise any issues with their employer;
- All workers (including those of the contractor and subcontractors) will have access to training on communicable diseases and STDs and community interactions in general. This training will be developed in collaboration with local health institutions; and

- Surveillance and assurance that no children or forced labour is employed directly by the contractor, and to the extent possible by third parties related to the Project and primary suppliers where any such risk may exist.

Based on the implementation of the mitigation measures, the significance of the residual impact related to exposure of the workforce to inadequate labour and working conditions will be a **"Minor Negative Impact"** post-mitigation as per the assessment below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	Low (2)	The impact is only relevant for the workforce (including direct, third party and supply chain workers) all of whom are at a local level (although they may come from elsewhere in Kenya or globally).
Sensitivity (S)	Low (2)	With the implementation of the management measures, exposure of Project workers to OHS risks will be rare.
Significant Rating Before Mitigation (M*S)		
Minor Negative Impact (4)		

7.1.7 Impact on Employment, Procurement, and the Economy

The Project will create both direct and indirect employment opportunities across different skills levels (unskilled, semi-skilled and skilled). The Project, during construction, among others, will employ skilled drivers with relevant defensive driving training, engineers, environmentalists and sociologists, surveyors, and ICT compliance teams. Unskilled labourers, during construction, will mainly be community members and shall ensure safe offloading activities, trenching, backfilling, laying of ducts, warning tape installation, cable pulling, pole installation, traffic management along routes of interest. As such, Project impacts include:

- Creation of temporary jobs during the laying of OFC, and the installation and upgrade of ICT equipment and services. To enhance this positive impact, unskilled labor will be recruited exclusively from local communities, and semi-skilled labor will be recruited preferentially from such communities, if they have the requisite qualification, competence, and desired experience; and
- Temporary enhancement of local economic activity along the routes where the optical fiber will be laid, and ICT equipment and services will be installed, because of increased demand of materials, supplies, and goods from Contractors (e.g., aggregates, fuel, etc.) and workers (e.g., food, clothing, etc.). To enhance this positive impact, the Project will promote local procurement where technically and commercially reasonable and feasible. In addition, Contractors shall procure aggregates (sand, gravel, crushed stone, etc.) from licensed sources to avoid environmental degradation.

These impacts support Kenya government and World Bank goals of reducing poverty, increasing economic development and opportunity for all, and enabling social changes through universal internet access.

Positive Impact
Direct and indirect employment opportunities and the procurement of construction materials, goods and services, and combined multiplier effect of this economic growth will result in increased incomes for successful candidates and their local communities; promoting some degree of an increase in standards of living.

To enhance this positive impact, the following management measures will be implemented:

- Contractors should prioritize the recruitment of workers (unskilled and semi-skilled) from the local communities, where available;
- Contractors should notify identified representatives of the County Government and local administration (i.e., the Area Chief) of the specific jobs and the skills required for the Project, during the recruitment process;
- Advertisements on the employment and procurement opportunities during the construction phase should be placed at the Chief's Office notice board. If the position cannot be filled from within the Subproject Area, it will be advertised further country-wide then nationally;
- No recruitment is to take place at the subproject site. This is particularly important with respect to casuals and managing labour influx; and
- Contractor should aim at procuring locally available materials where feasible and use local suppliers where appropriate.

7.1.8 Traffic Congestion, Hazardous Driving Conditions and Obstruction of Access

Potential traffic congestion, creation of hazardous driving conditions and obstruction of access to homes, businesses and community services during trenching and cable laying operations. Trucks will be expected to deliver materials. These trucks will be using the available local and wider road network and regulated as per the Traffic Act, Cap 403. Although the existing road network is open to traffic and will thus be serving its purpose, increased traffic due to transportation of the required Project materials and equipment has a potential of slowing down road traffic along the routes that will be used.

The risk of injuries from road traffic accidents are generally low but may increase during civil works (including site mobilization and demobilization) associated with the movement of equipment and people by road.

The increase in traffic could also create dust, noise, and safety (including injury or even death due to accidents) impacts for other road users and people living or working within proximity to the roads on the selected transport routes. Traffic impacts will be further exacerbated if the selected equipment and/or delivery routes are through busy roads.

The receptors for traffic impacts will be the existing users of the roads that will also be used during the transportation of Project materials, equipment, machinery, and workers.

Based on the analysis provided above, traffic impacts during the construction phase will be **"Moderate Negative Impact"** pre-mitigation as per the assessment below.

Aspect	Rating	Justification of choice
Magnitude (M)	Medium (3)	Traffic impacts will be limited to the Project footprint and its environs; however, it is understood that some of the required components such as electrical, mechanical equipment and fiber optic cables will be imported from overseas. Increased traffic attributed to transportation of equipment along major in-country highways will be negligible since such highways are already approved and continuously used for transportation of large volumes of goods in addition to general transport services.
Sensitivity (S)	Medium (3)	Given the Project regional nature and large footprint, a big number of people especially in settlements where subprojects are implemented will be potentially affected. Again. traffic impacts will inconvenience the PAI road users and businesses along them.
Significant Rating Before Mitigation (M*S)		
Moderate Negative Impact (9)		

Recommended Mitigation/Management Measures:

- All contractors to develop and implement a Traffic Management Plan (TMP), that inter alia, includes the following conditions:
    - No work should commence on a public road without first obtaining a wayleave from the road authority concerned;
    - It is the responsibility of the contractor's supervisor/s to ensure that each member of his crew wears the required PPE and to ensure that the work area is protected using the various signs, cones, flashing lights, traffic control personnel, etc.;
    - Traffic movement shall be inhibited as little as possible. Should this be unavoidable, alternative access to routes must be made available;
    - Work carried out on busy roads, should be restricted to outside the following periods; from 06:30 to 09:00 and 15:30 to 18:00, to ensure the free flow of traffic during peak hours;
    - Roads shall be kept free of debris or equipment;
    - Where cyclists and/or pedestrians are likely to be present, their need for safe and convenient passage must be considered and sufficient, safe crossings shall be planned for;
    - Create 'no go' zones around hazardous areas and implement safe work distances;
    - Choose signs with messages clearly indicating the actions drivers or pedestrians are required to take;
    - Where necessary, traffic control persons shall be used to provide positive guidance to motorists; and
    - Remember that the visibility of hazards/workers can be greatly diminished in darkness and/or poor weather conditions.

- Ensure only what can be excavated and backfilled within 24 or 48 hrs is done. contractors must therefore only excavate what they can lay and backfill in 1 or 2 days maximum depending on a risk/hazard assessment for each location.
- Road crossing shall be done using directional drilling or thrust boring and shall meet the following minimum requirements[29]:
    - Bores shall be at a depth of 1.8m across spur subsidiary roads and 2m across the carriage way from the tarmac level;
    - Bores shall exit at a depth of 1.8m; same level as the trench;
    - Bores shall typically span to lengths of 15m-20m but could span to a maximum of 30m if need be;
    - The equipment used shall drill bores spanning to a maximum of up to 30m long;
    - The drilling head shall accommodate rock drilling bits for rocky ground;
    - After making a bore across the road, two (X2) 102 mm diameter galvanized pipes or two 110mm HDPE plastic pipes (one to act as spare for future use) shall be inserted through the bore; and
    - Bores shall be well marked on both ends with marked reinforced concrete;
- Only experienced and trained drivers/operators shall drive/operate construction vehicles, trucks, and machinery.
- In hilly terrains or areas where distances are too long to cover by underground OFC cable drops, ICTA should plan to accommodate such areas through wireless Point to Multi-Point microwave nodes. This will minimize traffic disruptions as no trenching will be undertaken.
- Trench excavation within a market center or a township shall only be done after verifying that all utility lines (water pipes, electric cables, and sewer lines) in the area are marked and known; and
- All reasonable steps necessary shall be taken and special consideration given to water, electricity and sewer systems within the area that cannot be located accurately.

With implementation of the proposed mitigation measures, the significance of traffic impacts will be a **"Minor Negative"** post-mitigation as per the assessment below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	Low (2)	Traffic impacts will be limited to the Project footprint and its environs. Adverse effects will cease to be manifested after the completion of the construction phase.
Sensitivity (S)	Low (2)	With proper scheduling of project activities, noticeable traffic impacts will occur rarely. Again, traffic is low in the PAI.
Significant Rating Before Mitigation (M*S)		
Minor Negative Impact (4)		

[29] Fiber Optic-Backbone, Metro and Last Mile Infrastructure Standard, ICTA.2.001:2021

7.1.9 Temporary Loss of Access to Productive Assets

There are some ongoing commercial activities being undertaken in the PAI. Excavation and backfilling operations required to install underground OFC may temporarily impede access to commercial establishments, residential buildings, and livestock to grazing areas. The civil works may also involve removal of trees, shrubs, fences, and other landscape items adjacent to or within the work area.

The receptors for partial loss of productive assets will be tradespeople and communities in the PAI.

Based on the analysis provided above, the impact on access to productive assets during the construction phase will be **"Minor Negative Impact"** pre-mitigation as per the assessment below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	Low (2)	Minor civil works will be restricted to the road reserves owned by KeNHA, KURA, KERRA and county governments.
Sensitivity (S)	Low (2)	Construction of the OFC Backbone duct has been incorporated into road works of which people along Isiolo-Mandera Road will be compensated by KeNHA.
Significant Rating Before Mitigation (M*S)		
Minor Negative Impact (4)		

Recommend Mitigation/Management Measures:

- Use the HoAGDP's Resettlement Policy Framework (RPF) and Plan to guide any resettlement and loss of access to productive assets;
- Businesses/property owners shall be informed one week (7-days) in advance of any construction activities commencing in the vicinity of their properties;
- These notices will announce upcoming work tasks and potential impacts, such as traffic, parking, and access changes, noise, utility interruptions, vibration, etc.;
- If a private driveway or footway constructed with non-standard materials is to be excavated, the owner of the property concerned must be informed in advance and in writing of the intended work;
- Where possible, excavations on private property shall not be left open outside normal working hours (08:00 to 17:00). Where unavoidable, the Contractor must take adequate precautions to safeguard such excavations;
- The Contractor shall be responsible for the protection of all trees, shrubs, fences, and other landscape items adjacent to or within the work area;
- The occupants of the properties must be kept informed at all times of how their access will be affected;
- When trenching through entrances to properties, access must be maintained by using steel plates or other temporary bridges of ample strength and, it must be well secured against movement;
- Surfaces shall always be reinstated to the original state or better;

- Where a Contractor must undertake tree and bush cutting and/or shrub clearing he must prior to undertaking such work, obtain approval in writing from the relevant authority and/or property owner;
- The Contractor shall dispose of all cuttings and cleared material;
- The Contractor shall be solely responsible and accountable to remedy any damages and/or claims, arising due to his activities;
- All drainage systems must be cleared daily;
- In residential areas the reinstatement of paving, grass or landscaping must be done to the property owner's satisfaction; and
- Remove all material and equipment not needed onsite, as soon as possible.

Based on the implementation of the proposed mitigation measures, the significance of access to productive assets impact will be a **"Negligible"** post-mitigation as per the assessment below.

7.1.10 Impact on Disease Transmission

Construction of the proposed Project may lead to an increase in communicable and sexually transmitted diseases including HIV/AIDS, mainly because of interactions between Project workers as well as those between Project workers and the local community members. However, for the proposed Project, most of the workers will be recruited from the local communities thus limiting labour influx which would exacerbate this issue.

In addition to increases in disease prevalence related to direct interactions with the workforce, absence of adequate sanitation could contribute to an increased incidence of infectious disease, in particular, water borne diseases. The PAI is a water stressed area. Construction activities, if resulting in increased dust levels, may exacerbate respiratory illnesses which is already a challenge in the PAI.

The receptors of increased disease transmission will be the local communities at subproject sites as well as Project workers.

Based on the above analysis, impacts on disease transmission during the construction phase will be **"Moderate Negative Impact"** pre-mitigation as per the assessment below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	Low (2)	It is anticipated that the potential impacts of increased disease transmission will be limited to the Project footprint.
Sensitivity (S)	Medium (3)	Adverse effects of e.g., HIV/AIDS, respiratory tract infections, etc. may manifest throughout the project cycle. Any increase in disease transmission will result in negative impacts to the health system e.g., exert pressure on limited resources, etc.
Significant Rating Before Mitigation (M*S)		
Moderate Negative Impact (6)		

Recommended Mitigation/Management Measures:

- Project workers to sign a code of conduct;
- Conduct awareness campaigns on HIV/AIDS among the workers and the locals. This can be undertaken by the various NGOs and government agencies in the Counties;
- Erect billboards to sensitize locals on the need to practice safe sex to help in the fight against HIV/AIDS; and
- Provision of free condoms to the workers.

With implementation of the recommended mitigation measures, the significance of the impact on disease transmission will be a **"Minor Negative"** post-mitigation as per the assessment below.

Aspect	**Rating**	**Justification of choice**
Magnitude (M)	Very low (1)	This impact will be limited to the PAI
Sensitivity (S)	Low (2)	The incidence of communicable diseases and other diseases attributable to the Project will be avoided or only occur rarely.
Significant Rating Before Mitigation (M*S)		
Minor Negative Impact (2)		

7.1.11 Conflicts with Local Communities

Projects of such magnitude usually attract public uproar especially from the local community if they are not involved in its implementation. Conflicts usually arise due to inadequate consultations with the local community, importation of unskilled labourers, loss of access to productive assets including displacement of people, ineffective grievance redress mechanism (GRM), incidences of SEA/SH/GBV, and non-provision of equal opportunities to VMGs (e.g. women, PWDs, youth, etc.).

Recommended Mitigation/Management Measures:

- Consultation with the host community and relevant stakeholders on the mitigation measures proposed for the negative impacts;
- Utilize area Chiefs and Ward administrators in the recruitment of local unskilled labour;
- Ensure the Project implements the developed grievance redress mechanism, in which potential project beneficiaries/project affected communities have reasonable representation;
- Ensure multiple entries to grievance mechanism and publicise GRM including through media, training, and meetings and through communication using local languages;
- Enhance the capacity of individuals who will be involved in grievance handling processes through appropriate trainings;
- Follow the guidance of the SEP;
- Minimize the risk by making use of and follow up the strict observation of the government policy on gender and other forms of social inclusion, as stated in policy and legal frameworks of this ESIA; and

- Provide as a risk reduction measure local language interpreters to ensure understanding and ability to give feedback during engagement.

7.1.12 Security Risk

Security risks will involve the theft of contractor equipment in low-risk security areas in Kenya. However, some areas like Northeastern Kenya including Wajir, Garissa, Mandera, and Lamu Counties have experienced security instability for decades, related to terrorist attacks, cattle rustling, community conflict over access to natural resource and in recent years the conflict in Somalia.

An assessment of the level of risk for employees, local communities, and security personnel themselves along the road corridor was determined and rated as either low, medium or high. The outcome of this assessment has informed the decision on whether to use private security or armed forces as well as the location and designs of camps; and decisions regarding the type, number, responsibilities of security forces.

Recommended Mitigation/Management Measures:

- The bidding documents should include provisions and bill items related to the facilitation of security aspects to ensure the protection of workers, equipment, and structures during the implementation of the project. A budget has been allocated for the implementation of the plan including allowances for training;
- Adopt and implement HoAGDP's security management plan (SMP);
- Contractor to prepare a security management plan (C-SMP) that will assess the types and likelihood of security threats posed by the project's operating environment. This C-SMP should be guided by the HoAGDP's overarching SMP and shall be submitted to ICTA for approval. The C-SMP will also consider the impacts their security arrangements might have on local communities and provide mitigation measures, include hire of private security, have Standard Operating Procedures (SOP) have been developed and provide clear guidelines regarding (a) security chain of command; (b) work and campsites access controls; (c) safety of constructions and worksites; (c) safety and security of contractors and workmen; (d) vehicle access to construction and worksites; (e) emergency response and incident reporting; and (f) general security supervision and control; and
- The National Police Service (NPS) should take the lead in the provision of security along the project corridor. The multi-agency approach will be applied throughout the execution of the project.

7.1.13 Exclusion of VMGs

The annexed SEP identifies several VMGs as at risk of being negatively affected by project activities due to their vulnerabilities. Such groups often have limited access to information because of educational, linguistic, physical, social, cultural, and structural barriers. The VMGs include women, youth, PWDs and the elderly. During the ESIA process, VMGs were consulted through FGDs at Kachuru, Garbatulla, and Wajir.

Recommended Mitigation/Management Measures:

- The project team should ensure that VMGs, along with their organizations, are fully informed about the activities, design, and implementation processes in a culturally appropriate and accessible manner;
- In-depth consultation with the VMG communities, community elders/leaders, civil society organizations and other relevant stakeholders shall be undertaken;
- There should be a transparent and free analysis of socio-economic impacts on vulnerable groups and affected communities;
- The project team (ICTA) should ensure consultations and information dissemination are appropriate for all genders and generations;
- Collaborate with organizations supporting PWDs to tailor project interventions to their needs;
- Apply local languages in communication; and
- Adequate communication and engagement framework to ensure VMGs voices are heard

7.1.14 Impact on Cultural Heritage

The Project will involve excavation works along the road reserves. It is not anticipated that tangible and non-tangible cultural material will be encountered. This ESIA includes *'Chance Finds Procedure'* to be included on all contracts undertaking the civil works. Contractors must ensure that provisions are put in place so that any "chance finds" encountered in excavation or construction are noted and registered, and responsible authorities contacted, and works activities delayed or modified to account for such finds. In addition, the ESMF will include an exclusion list for avoidance of significant impacts and risks, such as opening new paths/access roads that will potentially impact cultural heritage sites.

7.2 Operations Phase Impacts

During operation it is expected that the installed OFC and related services will have no significant negative environmental or social impacts. During the operational phase there will be mostly routine maintenance of the infrastructure. However, several environmental or social risks and impacts suffice:

7.2.1 Impact on Employment, Procurement, and the Economy

The proposed Project will create both direct and indirect employment opportunities across different skills levels (unskilled, semi-skilled and skilled) during the operations phase. A workforce of approximately 15 people is expected to be directly employed at the PMT during the operations phase. Community ICT centers will also provide jobs in the last mile. Other direct jobs will be created in operation and maintenance of broadband infrastructure and associate facilities, in automating and digitizing selected government services, developing the critical enablers for digital government, enhancing regional data governance, and supporting digital literacy. Indirect employment is also expected from induced employment related to jobs ensuing from the expenditure of incomes associated with direct and indirect project related jobs.

Another positive impact on the economy because of this Project, is digital skills training, which will result in more Kenyans participating in the digital economy. This will result ultimately in increased revenues for individuals and taxes for the government.

Positive Impact
Direct and indirect employment opportunities, and combined multiplier effect of this economic growth will result in increased incomes; promoting some degree of an increase in standards of living for all beneficiaries.

To enhance this positive impact, the following management measures will be implemented:

- The Project will prioritize the recruitment of workers (unskilled, semi-skilled and skilled) from the local communities around subprojects where available;
- The Project will develop a fair and transparent employment and procurement policy, and will implement processes, that prevents any form of nepotism and favoritism;
- Advertisements on the employment and procurement opportunities during the operations phase will be placed at the Chief's Office notice board. If the position cannot be filled from within the subproject sites, it will be advertised county-wide, and only then, nationally; and
- ICTA should aim at procuring locally available materials where feasible and use local suppliers where appropriate.

7.2.2 Hazardous Materials and Waste

Telecommunications processes do not normally require the use of significant amounts of hazardous materials. However, the operation of certain types of switching and transmitting equipment may require the use backup power systems consisting of a combination of batteries (typically lead-acid batteries) and diesel-fueled backup generators for electricity.

Operations and maintenance activities may also result in the generation of electronic wastes (e.g., nickel-cadmium batteries and printed circuit boards from computer and other electronic equipment as well as backup power batteries, etc.). The operation of service vehicles may also result in the generation of used tires, and waste oils and used filters.

Recommended hazardous materials management actions include:

- Implementing procedures for the management of lead acid batteries, including temporary storage, transport and final recycling by a licensed facility;
- Purchasing electronic equipment that meets international phase out requirements for hazardous materials contents and implementing procedures for the management of waste from existing equipment according to the hazardous waste guidance in the **World Bank's General EHS Guidelines**;
- Considering the implementation of a take-back program for consumer equipment such as computers, cellular telephones and their batteries;
- Generated e-waste should be recycled or disposed safely and properly; and
- To mitigate and manage the generated e-waste, ICTA should adopt and implement an E-Waste Management Environmental Codes of Practice.

7.2.3 Exclusion of VMGs from Project Benefits

There is a likelihood that the project might exclude VMGs from its benefits thus leading to continued socio-economic exclusion. During the ESIA study, several VMGs that are likely to be excluded have been identified. They include:

- **Women and girls:** Due to high illiteracy levels among women and girls, compared to their male counterparts, women risk being excluded in the digitalization process. This is further compounded by lower income levels among women compared to men.
- **Youth**: The youth, especially those in rural areas, are at risk due to limited access to internet, which is required for learning and access to financial and other digital services. Affected youth groups also include those from low-income households, which cannot afford smart devices.
- **PWDs:** The ICT sector does not often consider special needs of PWDs. For instance, focus of programme implementation does not often consider the needs of the physically challenged such as the blind.

To address these specific risks and ensure that the HoAGDP high-capacity OFC and related services is inclusive, below tailored mitigation measures should be implemented:

- Ensure that project consultations and information dissemination actively involve all the disadvantaged and vulnerable, using accessible language and formats;
- Implement SEA/SH/GBV prevention measures, including community awareness campaigns and support services for victims;
- Provide digital literacy training specifically targeting youth, women and girls to bridge the gender digital divide;
- Offer training and support programmes aimed at helping disadvantaged and vulnerable groups bridge the gender digital divide and understand and use new digital technologies'
- Ensure all digital platforms and services are accessible, adhering to international standards for accessibility;
- Provide alternative communication methods, such as sign language interpretation or Braille, to ensure inclusive participation in project activities;
- Collaborate with organisations supporting PWDs to tailor project interventions to their needs; and
- Ensure that digital services and educational content are child-friendly and accessible, particularly for those in remote or underserved areas.

7.2.4 Labour and Working Conditions (Including OHS)

OHS risks during the operations phase will include:

- **Electrical Safety –** Telecommunications workers may be exposed to occupational hazards from contact with live power lines during maintenance and operation activities;
- **Optical Fiber Safety –** Workers involved in fiber optic cable repair may be at risk of permanent eye damage due to exposure to laser light during cable connection and inspection activities;
- **Fall Protection –** Workers may be exposed to occupational hazards when working at elevation during maintenance and operation activities;

- **Confined Spaces and Excavations –** The type of confined spaces encountered in telecommunications projects varies but may include underground fixed line infrastructure co-located with other underground infrastructure in urban areas. Ditches and trenches may also be considered a confined space when access or egress is limited; and
- **Motor vehicle safety –** The geographically dispersed nature of the infrastructure of some telecommunications operators may require the frequent use of ground transportation for maintenance activities.
- **Increased Workload –** Adoption of new digital services often requires deploying new types of infrastructure, like software-defined networking (or SDN) and multi-cloud environments. Those modern technologies extend the reach of services and allow for rapid scalability. But they also extend the potential attack surface of Ministries, Counties, Departments and Agencies (MCDAs) and other institutions. With cloud and SDN, workloads expand beyond the confines of the data center. That taxes security and IT professionals – who now must monitor a greater sprawl of services to maintain visibility and track potential threats. Recommended mitigation measures:
    - Develop curriculum and training officers in the public service in high-end ICT specialized areas; and
    - Recruit more highly skilled ICT officers for MCDAs.
- **Electromagnetic fields (EMF) –** Telecommunications workers typically have a higher exposure to EMF than the public due to working in proximity to transmitting antennas emitting radio waves and microwaves. Radio wave strength is generally much greater from radio and television broadcast stations than from cellular phone communication base transceiver stations. Microwave and satellite system antennas transmit and receive highly concentrated directional beams at even higher power levels.

Although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high- voltage power lines and substations or radio frequency transmissions systems, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment[30].

Table 7-1 below lists exposure limits for public exposure to EMF published by the ICNIRP.

Table 7-1 ICNIRP exposure guidelines for public exposure to electric and magnetic fields

Frequency	Electric Field (v/m)	Magnetic Field (µT)
3-150 kHz	87	6.25
10-400 kHz	28	0.092
2-300 gHz	61	0.20

Additional indicators specifically applicable to telecommunications activities include the ICNIRP exposure limits for occupational exposure to EMF listed in Table 7-2.

[30] International Commission on Non-Ionizing Radiation Protection (ICNIRP) (2001); International Agency for Research on Cancer (2002); US National Institute of Health (2002); Advisory Group to the United Kingdom National Radiation Protection Board (2001), and US National Institute of Environmental Health Sciences (1999).

Table 7-2 ICNIRP exposure guidelines for occupational exposure to electric and magnetic fields

Frequency	Electric Field (v/m)	Magnetic Field (µT)
0.2-65 kHz	610	30.7
10-400 kHz	61	0.2
2-300 gHz	137	0.45

Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program including the following components:

- Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities;
- Training of workers in the identification of occupational EMF levels and hazards;
- Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers;
- Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE).
- Personal exposure monitoring equipment should be set to warn of exposure levels that are below occupational exposure reference levels (e.g., 50 percent);
- Action plans to address occupational exposure may include deactivation of transmission equipment during maintenance activities, limiting exposure time through work rotation, increasing the distance between the source and the worker, when feasible, use of shielding materials; or installation of ladders or other climbing devices inside the mast or towers, and behind the transmission beams.

7.2.5 Security Risk

Northeastern Kenya faces security challenges, including inter-communal conflicts, banditry, and poverty, which may contribute to ICT equipment theft. The region's vast distances and challenging terrain can hinder effective security surveillance and response. Theft of ICT equipment can cause significant economic losses for individuals and organisations, as they incur costs to replace the stolen equipment. It can also disrupt daily operations and service delivery, negatively impacting learning programs and data security. Moreover, theft can hinder development efforts in the region, as ICT is crucial for education, communication, and economic growth.

The following mitigation measures are recommended:

- Enhance physical security by installing secure storage, robust locks, and alarm systems.
- Use passwords, encryption, and tracking software to assure device security.
- Promote community awareness and reporting of suspicious activities to prevent theft.
- Maintain detailed records of ICT equipment can aid in tracking and recovery if theft occurs.
- Promptly report any theft to police for investigations and potential recovery of stolen items.
- Develop a database for registering ICT devices in the project.

7.2.6 Impact on Community Health and Safety (CHS)

7.2.6.1 Structural and site access issues

Communities may be exposed to structural safety issues in the event of structural failure of poles or even community centers. These same sites may also attract unauthorized persons interested in climbing these structures, also representing a risk to their safety. Recommendations to manage site safety issues include:

- Design and installation of structures and components according to GIIP, considering the potential frequency and magnitude of natural hazards;
- Erection of fences in combination with other institutional controls and management approaches, such as the posting of signs forbidding entry and placement of guards to protect the premises surrounding the site; and
- Equipping poles with anti-climbing devices to preclude unauthorized climbing.

7.2.6.2 Air Emissions such as Dust

Air emissions will mostly emanate from trenching activities and the transportation of construction materials (e.g., cement, concrete, wire, machinery, equipment, etc.). The emissions may comprise particulate matter (dust) and exhaust emissions from vehicle movements are expected to include CO_2, NO_2, SO_2 and Volatile Organic Compounds (VOCs) since most of them are powered by diesel/petrol engines. Again, emissions from telecommunications projects may be primarily associated with the use of backup power generators, and the use of cooling and fire suppression systems.

There is a likelihood that generated dust and exhaust emissions may affect the workers and the surrounding community members' health. Recommended mitigation measures:

- Whenever dust generation at construction sites becomes a problem:
    - Water spraying to suppress dust shall be undertaken; and
    - Truck drivers should be sensitized on and ensure they observe speed limits on earth roads to reduce dust generation.
- Contractor should only operate well-maintained construction machinery, vehicles, and trucks, and implement a routine maintenance program for all vehicles and trucks; and
- Engines of vehicles, trucks and earth-moving machinery shall be switched off when not in use.
- Issue all project workers with appropriate Personal Protective Equipment (PPE) including dust masks where required.

7.2.6.3 Cybersecurity Risks

Cybersecurity risks, for example, from data breaches, lack of privacy, etc., will be addressed through systematic management and reporting of incidents, at a regional level, while the risk of furthering the digital divide would be countered by following an inclusive approach in design. Other recommended mitigation measures are:

- Recruit information technology experts and use ticketing software to keep government tech issues organized;
- Create great IT workflows paired with expert information technology employees will ensure that the government technology is up to speed, computer systems remain functional across departments, and the cyber secure;

- Encourage all departments to switch to cloud-based government infrastructure. The cloud is substantially more secure and difficult for hackers to break into, and automatically backs up government data on a frequent basis;
- Implement security controls in line with the GoK information security standards. For instance, Identification: All authorized users of the Network Equipment (NE) shall be uniquely identified to support individual accountability. The requirements for Identification are:
    - Within a specific NE, the NE shall enforce unambiguous User-IDs to identify its users;
    - All NE interfaces and ports that accept user command inputs shall require unambiguous User-IDs before performing any actions;
    - The NE shall internally maintain the identity of all current active users;
    - The NE shall restrict a User-ID to only one active session;
    - All operations-related processes running on the NE shall be associated with the User-ID of the invoking user;
    - If a user-ID has not been used for a period of 3 months, the NE shall be capable of disabling that User-ID;
    - In addition, the security administrator shall have a choice of automatic or manual disabling of these User-IDs;
    - The NE shall log all activities carried out by the user during each session. All logs must include timestamps and activity, or system accessed; and
    - All building sites and equipment (and all information and software contained therein)

7.2.6.4 Digital Gender-Based Violence (DGBV)

This is gender-based violence enabled by digital technology. While the magnitude of the phenomenon is unknown, an FRA (EU's Rights Agency) survey on violence against women asked respondents about their experience of online gender-based violence. While 14% of women who had experienced such harassment could not identify the perpetrator, 9% were harassed by someone from their work context (FRA, 2014b)[31].

While digital technology can bring huge advantages, there is no doubt it can also facilitate violence. Women and girls are more likely to be targets of online violence, such as physical threats, sexual harassment, bullying, stalking, sex trolling and exploitation[32].

Online abuse is likely for women participating in the creative economy as espoused by the Project as one is required to maintain a strong online presence. In this context, insults, defamation, threats and hate speech are enabled and facilitated by digital technologies. The volume of abuse and increased anonymity are strong enabling factors. Such abuse disproportionately affects women …., while abuse directed at men from the dominant group is more often based on their opinions or status in society (FRA, 2017).

There's a far-reaching impact of abuse on women's professional and personal lives, with many affected women choosing to opt out of certain social networks despite their usefulness in their

[31] See https://eige.europa.eu/publications/gender-equality-index-2020-report/gender-based-violence-enabled-digital-technology-new-occupational-hazard

[32] See https://www.google.com/url?client=internal-element-cse&cx=0903a1a109a46b6e5&q=https://www.unicef.org/eap/blog/six-ways-tech-can-help-end-gender-based-violence&sa=U&ved=2ahUKEwjQ4Jqk0YX8AhWCQUEAHfjZCu0QFnoECAUQAg&usg=AOvVaw281gb-8dGqT2KCMSXlnngw

profession, to write only anonymously, to avoid disseminating their work and to withdraw from an exposed profession altogether.

Mitigation measures[33]:

- Center the safety and privacy of survivors;
- Align with the government's priorities and use these dialogues to raise awareness about gender-based violence;
- Think carefully about the role of each stakeholder;
- Develop modular approaches that can be adapted to various ecosystems; and
- Consider inclusive solutions that consider digital divides.

7.3 Unplanned Events

Unplanned events are activities that are not expected to occur during a project's normal activities, such as flooding risk. The significance of impacts associated with unplanned events cannot be determined using the framework described in Section 1.8 because:

- The range of possible effects of a single event is highly variable (i.e. the impact intensity is almost infinitely variable); and
- The kind of unplanned event that may result in a severe environmental impact is, by definition, undesirable, and the Project has substantial built-in controls to avoid such occurrences. Therefore, the probability of such an event occurring should always be very low, whereas the framework described in Section 1.8 is designed for the assessment of impacts that are considered reasonably likely to happen.

Therefore, while consideration is given in this ESIA FSR to some of the Project design measures designed to prevent undesirable events, the assessment of potential impacts resulting from unplanned events is restricted to comments regarding the relative sensitivity of the receiving environment should such an event occur and potential levels of consequence. The management measures included in this section are to be in-built in the Project design to further minimize the possibility of occurrence of the unplanned events. In addition, Emergency Management Plans (EMPs) are recommended for the management of impacts from unplanned events if they occur.

7.3.1 Flooding Risk

Extreme climatic events have long posed a significant risk to regions in Kenya, and they have contributed to making it one of the most disaster-prone countries in the world.[34] Of particular concern are floods and droughts, with major droughts occurring about every 10 years, and moderate droughts or floods every three to four years. Historically, these extreme climatic events have caused significant loss of life and adversely affected the national economy. Droughts have affected most people and had the greatest economic impact (Earth Institute, n.d.); it is estimated that droughts cost about 8.0 per cent of GDP every five years. [35] While usually more localized, floods have led to the greatest loss of

[33] https://blogs.worldbank.org/voices/thinking-about-using-technology-address-gender-based-violence-five-recommendations-experts

[34] Ministry of State for Special Programmes (MOSSP). (n.d.). *Strategic plan 2008–2012*. Retrieved from http://www.sprogrammes.go.ke/images/plan2.pdf

[35] AEA Group. (2008b). *Kenya: Climate screening and information exchange*. Retrieved from http://www.dewpoint.org.uk/Asset%20Library/Climate%20Risk%20Assemment%20Flier%20-%20Kenya.pdf

human lives[36]. Critical national infrastructures (are the physical backbone of modern societies, as they are essential for the continued delivery of goods and services and maintaining economic and social well-being), including energy, transport, **digital communications** and water, are prone to flood damage. Their geographical extent is a determinant of, and is determined by, patterns of human development, which is often concentrated in floodplains[37].

Ewaso Ngiro River is prone to expansive flood incidents on a stretch of 20 kilometers along the Isiolo-Mandera corridor, part of the PAI. However, this risk has been considered in the engineering designs of the respective road sections supported by the proposed project.

Recommended mitigation/management measures:

- Conduct flood risk assessment for the project and incorporate findings into project design;
- Repair stormwater drainages (affected during civil works) during project implemented;
- Build infrastructure resilience to flooding via emergency planning and response; and
- Consider implementing nature-based solutions (NBS) such as reforestation and afforestation, wetland restoration, and green infrastructure (e.g., solar energy, permeable pavements, etc.), to mitigate flooding risk.

7.3.2 Fire Hazards

The operation of ICT equipment and machinery may lead to fire outbreaks including poor handling of electricity systems, faulty electrical equipment, carelessness, etc. The project design should provide firefighting measures and control facilities. These include the following:

- Installation of an automatic fire alarm system for the equipment building and the main operations building;
- Provision of firefighting equipment and hydrant points;
- Display of fire evacuation procedures and emergency response plan at all buildings;
- Regular maintenance of fire electrical and first aid equipment; and
- Provision of sufficient emergency exit points and marked fire assembly points.

7.4 Cumulative Impacts

7.4.1 Overview

The proposed project corridor is not experiencing significant developmental pressures, apart from the construction of the Isiolo-Mandera Road. Given this, the impact of the OFC project remains minimal with no cumulative impacts anticipated. The proposed (high-capacity OFC and related services) will be laid along an already disturbed road reserves, reducing the need for additional land clearance. Unlike large-scale infrastructure projects, the Fibre optic network does not contribute significantly to habitat loss, or resource depletion.

[36] Earth Institute at Columbia University. (n.d.). *Kenya natural disaster profile*. Retrieved from http://www.ldeo.columbia.edu/chrr/research/profiles/pdfs/kenya_profile1.pdf

[37] See https://ora.ox.ac.uk/objects/uuid:713262bb-63fd-4d54-856f-2d75409b3237/download_file?file_format=application%2Fpdf&safe_filename=Pant%2Bet%2Bal%2C%2BCritical%2Binfrastructure%2Bimpact%2Bassessment%2Bdue%2Bto%2Bflood%2Bexposure.pdf&type_of_work=Journal+article

In evaluating the cumulative impacts of the proposed (OFC) Project, the following existing and potential future developments within the broader region were considered:

- **Road Infrastructure Projects**: The Isiolo-Mandera KeNHA Road construction is ongoing, potentially affecting land use and traffic patterns;
- **Utility Infrastructure**: Presence of power lines, water pipelines, and telecommunications networks; and
- **Urban Expansion & Settlements:** Population growth and development in key towns along the proposed project corridor.

6.1.1.Assessment of Cumulative Impact

The cumulative impact of the proposed Optical Fibre Cable (OFC) Project has been assessed as low to negligible due to its minimal environmental and social footprint. The project is expected to provide significant benefits while complementing broader infrastructure developments.

7.4.2 Key Factors Supporting a Low Cumulative Impact

- Route alignment with existing infrastructure: The OFC network route will be confined along the already disturbed road reserves, reducing additional land disturbance and habitat fragmentation,
- Restricted Land Use Changes: The proposed project will have no significant interference with agriculture, natural ecosystems, or community settlements, and
- Unlike large-scale construction or extractive industries, the project does not require major resource extraction, deforestation, or high energy consumption.

The proposed Project presents negligible cumulative environmental and social impacts while significantly enhancing digital infrastructure and regional connectivity. Through careful planning, alignment with existing developments, and stakeholder engagement, the project will contribute positively and sustainably to long-term economic and technological growth of the larger northern region and across Horn of Africa.

8 CLIMATE RISK VULNERABILITY ASSESSMENT (CRVA)

8.1 Introduction

Climate change affects everybody and everything, and this includes fiber optic cables and related infrastructure. This chapter details the climate profile of the PAI. Specifically, it looks at the impact climate stressors on project and beyond. A climate stressor is a climate factor that can affect the functioning of a system. For example, climate change is predicted to lead to more frequent and severe weather events, including floods, droughts, storms, and earthquakes. These events can damage or disrupt fiber optic cables, leading to communication outages. Climate stressors can also limit the potential success of development interventions.

8.2 Kenya's Projected Weather and Climate Changes

Kenya has a complex climate that varies significantly between its coastal, interior, and highland regions and from season to season, year to year, and decade to decade. This climatic variability is influenced by naturally occurring factors such as movement of the Intertropical Convergence Zone (ICZ) and the El Nino Southern Oscillation (ENSO). In recent decades, observed mean annual temperatures have increased by 1.0°C since 1960, or an average rate of 0.21°C per decade.[38] Changes in rainfall patterns have also been noticed since the 1960s. Greater rainfall has been observed during the short rains of October to December[39], and the long rains of March to April have become increasingly unreliable in locations such as Eastern Province[40]. However, no statistically significant national trends toward wetter or drier conditions have been found.[41]

Extreme climatic events have long posed a significant risk to regions in Kenya, and they have contributed to making it one of the most disaster-prone countries in the world.[42] Of particular concern are floods and droughts, with major droughts occurring about every 10 years, and moderate droughts or floods every three to four years. Historically, these extreme climatic events have caused significant loss of life and adversely affected the national economy. Droughts have affected most people and had the greatest economic impact (Earth Institute, n.d.); it is estimated that droughts cost about 8.0 per cent of GDP every five years. [43] While usually more localized, floods have led to the greatest loss of

[38] McSweeney, C., New, M., & Lizcano, G. (2009). *UNDP climate change country profile: Kenya*. Retrieved from http://ncsp.undp.org/sites/default/files/Kenya.oxford.report.pdf

[39] Government of Kenya (GOK). (2010). *National climate change response strategy: Executive brief.* Retrieved from http://www.environment.go.ke/wp-content/documents/complete%20nccrs%20executive%20brief.pdf

[40] Awuor, C. (2009). Increasing drought in arid and semi-arid Kenya. In J. Ensor & R. Berger (Eds.), *Understanding climate change adaptation: Lessons from community-based approaches* (pp. 101–114). Rugby: Practical Action Publishing.

[41] AEA Group. (2008a). *Final report. Kenya: Climate screening and information exchange* (ED 05603, Issue 2). Retrieved from http://www.dewpoint.org.uk/Asset%20Library/DFID/Climate%20Risk%20Assessment%20Report%20-%20 Kenya.pdf

[42] Ministry of State for Special Programmes (MOSSP). (n.d.). *Strategic plan 2008–2012*. Retrieved from http://www.sprogrammes.go.ke/images/plan2.pdf

[4343] AEA Group. (2008b). *Kenya: Climate screening and information exchange*. Retrieved from http://www.dewpoint.org.uk/Asset%20Library/Climate%20Risk%20Assemment%20Flier%20-%20Kenya.pdf

human lives[44]. Other climate-related hazards in Kenya include forest fires and landslides, the latter of which mostly affect the highland regions.[45]

Global climate change is projected to alter Kenya's mean annual climatic conditions as well as its pattern of climate extremes. Temperatures are expected to continue to rise in all seasons, with models suggesting that warming of about 1°C will occur by the 2020s, and 4°C by 2100[46]. Warming will vary from region to region within Kenya[47]. Greater uncertainty persists regarding how precipitation patterns might be altered by climate change. Analysis by the Intergovernmental Panel on Climate Change (IPCC) using global circulation models projects that East Africa will likely become wetter, particularly during the rainy seasons[48]. However, analyses focused on Kenya project that a general decrease in mean annual precipitation will occur within the country, although wetter conditions are likely during the short rains of October to December. Projections vary widely regarding how extreme weather event patterns will change[49]. Possibilities include increased flooding due to more heavy rainfall events and continued occurrence of droughts at least as extreme as at present, possibly increasing in intensity over this century. Current uncertainty regarding how climate change might manifest in Kenya reflects, in part, ongoing gaps in knowledge at the regional and international levels, such as incomplete understanding of how critical drivers such as ENSO influence Africa's climate, a severe lack of local weather data in Kenya specifically and in Africa as a whole, the granularity of global circulation models, and the limited development of regional climate models[50].

8.3 Kenya's Climate-Related Natural Hazards

8.3.1 Overview

Kenya is highly exposed to many natural hazards, the most common being floods and droughts. It is estimated that over 70% of natural disasters in Kenya are attributable to extreme climatic events. Typically, major droughts occur approximately every ten years, and moderate droughts or floods every three to four years. Repeating patterns of floods and droughts in the country have had large socio-economic impacts and high economic costs. For example, the 1998 to 2000 drought cost an estimated $2.8 billion, principally due to crops and livestock loss, as well as forest fires, damage to fisheries,

[44] Earth Institute at Columbia University. (n.d.). *Kenya natural disaster profile*. Retrieved from http://www.ldeo.columbia.edu/chrr/research/profiles/pdfs/kenya_profile1.pdf

[45] United Nations Development Programme (UNDP). (n.d.a). *Kenya natural disaster profile*. Enhanced Security Unit. Retrieved from http://mirror.undp.org/kenya/KenyaDisasterProfile.pdf

[46] AEA Group. (2008a). *Final report. Kenya: Climate screening and information exchange* (ED 05603, Issue 2). Retrieved from http://www.dewpoint.org.uk/Asset%20Library/DFID/Climate%20Risk%20Assessment%20Report%20-%20 Kenya.pdf

[47] Funk, C., Eilerts, G., Davenport, F., & Michaelsen, J. (2010). *A climate trend analysis of Kenya – August 2010* [Fact Sheet 2010-3074]. United States Geological Survey. Retrieved from http://www.fews.net/docs/Publications/FEWS%20Kenya%20Climate%20Trend%20Analysis.pdf

[48] Boko, M., Niang, I., Nyong, A., & Vogel, C. (2007). Africa. In M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, & C. E. Hanson (Eds.), *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 433–467). Cambridge, UK: Cambridge University Press.

[49] Stockholm Environment Institute (SEI). (2009). *Economics of climate change in Kenya: Final report submitted in advance of COP15*. Available from http://www.sei-international.org/mediamanager/documents/Publications/Climate-mitigation-adaptation/kenya-climatechange.pdf

[50] Conway, G. (2009). *The science of climate change in Africa: Impacts and adaptation* (Discussion Paper no. 1). London, UK: Grantham Institute for Climate Change, Imperial College London.

reduced hydropower generation, reduced industrial production and reduced water supplies.[51] Droughts have affected more people and had the greatest economic impact (8% of GDP every five years). As many as 28 droughts have been recorded in the past 100 years, and these appear to be increasing in frequency. Droughts are often nation-wide, but normally have the most severe impacts in the country's highly arid zones.[52] Drought also remains a significant concern to Kenya's agricultural sector.[53] Arid and semi-arid areas comprise 18 or the 20 poorest counties and are particularly at risk from increased aridity and periods of drought.[54] While droughts affect the most people, floods have caused the greatest losses in terms of human lives. Baringo, West Pokot, Kisumu and Laikipia counties are some of the country's most disaster-prone areas and have required significant disaster risk investment.[55] Vulnerability from these hazards poses major challenges for economic stability and fiscal sustainability and have had adverse social and fiscal consequences. Indeed, lower-income populations reside in more hazard prone locations, with high potential for significantly increased exposure of already vulnerable populations.[56]

8.3.2 Key Trends

Climate change is expected to increase the risk and intensity of flood events, as well as increase average annual rainfall amounts, while also furthering drought likelihoods for some areas across Kenya. Intense rainfall and flooding may increase the likelihood of mudslides and landslides, particularly in mountainous areas. As the incidence of extreme rainfall rises, additional soil erosion and water logging of crops is likely to reduce yields and increase food insecurity. Rising temperatures are also likely to increase the periods of aridity in the northwest regions. Furthermore, as temperatures rise and droughts are prolonged, water storage capacities will likely be reduced. This may result in significant economic losses, damage to agricultural lands and infrastructure as well as human casualties. Additionally, land degradation and soil erosion, exacerbated by recurrent floods,

[51] National Environment Management Authority (2015). Kenya- Second National Communication to the United National Framework
Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Kennc2.pdf

[52] Republic of Kenya (2013). Sector plan for drought risk management and ending drought emergencies, Second medium-term plan:
2013–2017. URL: https://www.ndma.go.ke/index.php/resource-center/send/43-ending-drought-emergencies/4271-ede-medium-
term-plan-2013-2017

[53] Republic of Kenya (2013). National Climate Change Action Plan, 2013–2017: Vision 2030. URL: https://cdkn.org/wp-content/
uploads/2013/03/Kenya-National-Climate-Change-Action-Plan.pdf

[54] World Bank (2018). Disaster Risk Management Development Policy Financing with a Catastrophe Deferred Drawdown Option.
URL: http://documents.worldbank.org/curated/en/131661529811034069/pdf/KENYA-DDO-NEWPAD-2-05312018.pdf

[55] Development Initiatives Kenya (2019). Tracking subnational government investments in disaster risk reduction in Kenya. URL:
https://reliefweb.int/sites/reliefweb.int/files/resources/Tracking-subnational-government-investments-in-disaster-risk-reduction-
in-Kenya.pdf

[56] Ministry of Foreign Affairs (2018). Climate Change Profile, Kenya. URL: https://reliefweb.int/sites/reliefweb.int/files/resources/
Kenya_2.pdf

will negatively impact agricultural productivity, disproportionately affecting the livelihoods of the rural poor.[57]

Recurring disasters, particularly droughts and floods, have significantly impacted livelihoods and the country's economic development agenda. Flood and drought events are becoming more frequent, with drought cycles occurring every 2–3 years instead of every 5–10 years. A severe and prolonged drought from 2008–2011 affected 3.7 million people, caused $12.1 billion in damages and losses, and cost over $1.7 billion in recovery and reconstruction needs.[58]

Additionally, deforestation, watershed degradation, land use changes, urbanization and poor management of settlements have exacerbated the likelihood of and impact from floods and droughts. These conditions contribute to water scarcity and pollution, which limit water for drinking, agriculture, and other uses. Heavy rainfall can also trigger riverine, coastal and flash floods. Flash floods are common in the country's high plateau areas and can also trigger mudflows. Increasing urbanization, particularly into flood plains and/or low-lying areas also has increased flood risk, as water drainage systems fail. Water stress may be further exacerbated as household consumption and agriculture continue to compete for limited supply. Increased heat will further strain water resources and impacts from changing rainfall patterns.[59] Figure 8-1 shows risk of river flood.

The PAI faces a potential flooding risk as shown in Figure 8-1 attributed to Ewaso Ngiro River, which traverses the area. The river is prone to expansive flood incidents on a stretch of 20 kilometers along the Isiolo-Mandera corridor However, this risk has been considered in the engineering designs of the respective road sections supported by the proposed project.

8.3.3 Climate Change Impacts to Key Sectors in the PAI

8.3.3.1 Agriculture

Climate change poses a serious negative impact on agriculture-based livelihoods in Kenya, challenging the sustainability of current arable, pastoral and fishing practices. The high inter-annual variability of precipitation is already having devastating consequences on rural livelihoods, with droughts and floods a frequent occurrence in both the arid and semi-arid lands and key agricultural zones. Additionally, indirect impacts, such as increased rates of runoff and soil erosion, and increased crop losses from wildlife migrations, rising and novel infestations from insects, diseases and weeds, could significantly magnify production losses.[60]

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[57] Ministry of Environment and Natural Resources (2016). Kenya National Adaptation Plan, 2015–2030. URL: https://www4.unfccc.
int/sites/NAPC/Documents%20NAP/Kenya_NAP_Final.pdf.

[58] GFDRR (2020). Kenya Overview. URL: https://www.gfdrr.org/en/kenya

[59] Republic of Kenya (2013). Sector plan for drought risk management and ending drought emergencies, Second medium-term plan:
2013–2017. URL: https://www.ndma.go.ke/index.php/resource-center/send/43-ending-drought-emergencies/4271-ede-medium-
term-plan-2013-2017

[60] National Environment Management Authority (2015). Kenya- Second National Communication to the United National Framework
Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Kennc2.pdf

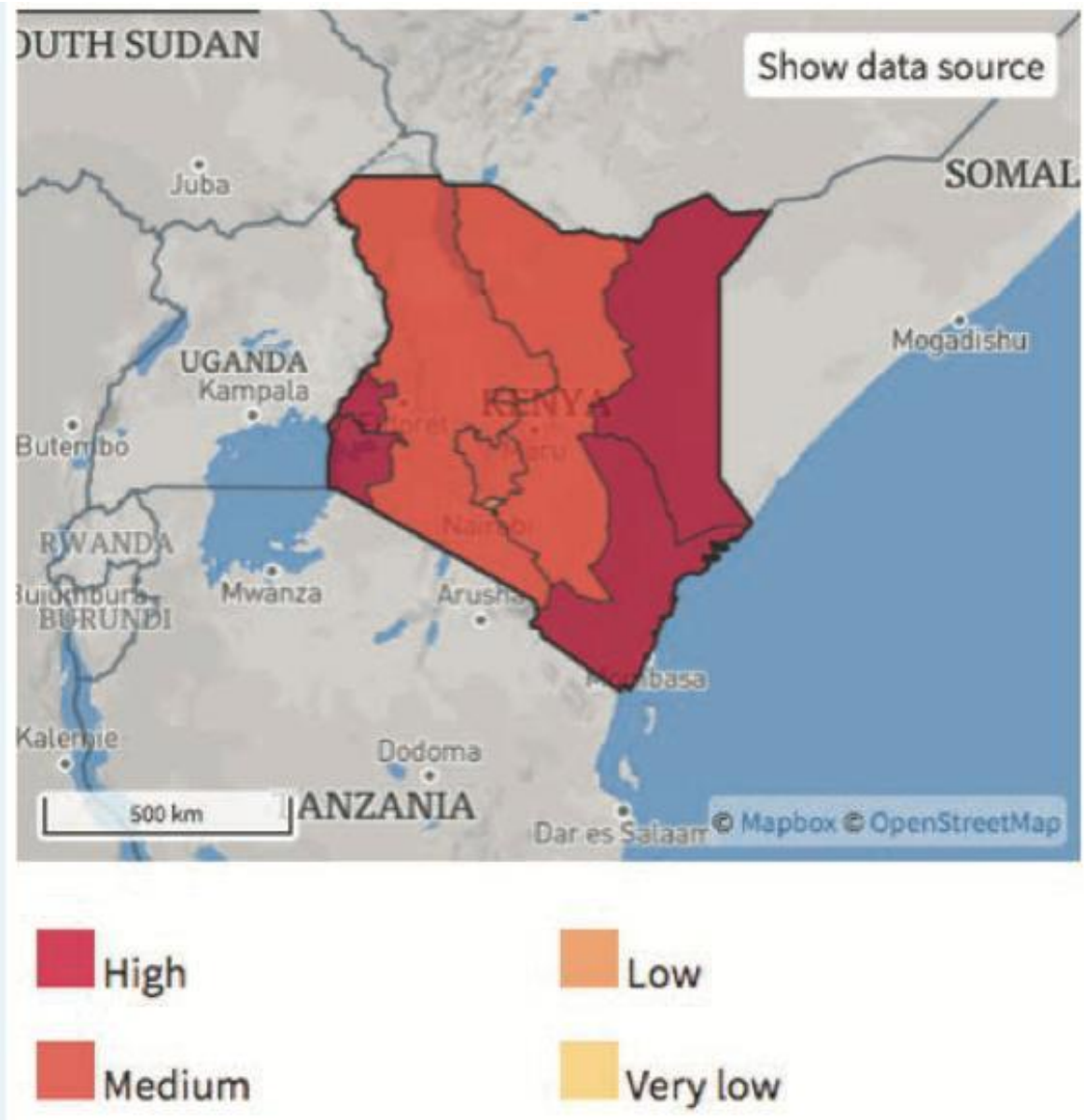

Figure 8-1 Risk of River Flood (Source: World Bank)

Semi-arid and arid land areas are projected to see a significant decline in agricultural productivity and livestock numbers, as water resources become increasingly scarce.[61] Given its exposure and sensitivity, the agriculture sector is one of the most vulnerable to climate change. Rising temperatures will likely alter the mix and distribution of agriculture and livestock pests, while the increased incidence of droughts, coupled with reduced rainfall projections for the arid and semi-arid regions, is expected to reduce yields in key crops: maize, wheat, rice, livestock and fisheries. Key cash crops such as coffee and tea are also likely to be highly affected due to temperature increases as well as the increased presence of pests and diseases.[62]

[61] Ibid.

[62] Ministry of Environment and Natural Resources (2016). Kenya National Adaptation Plan, 2015–2030. URL: https://www4.unfccc.
int/sites/NAPC/Documents%20NAP/Kenya_NAP_Final.pdf.

As adaptation to these climate change impacts, farmers and pastoralists in the PAI should implement sustainable land management actions, as well as livestock production systems that are environmentally sound can support the conservation of natural grasslands and native forests.

8.3.3.2 Water

Changes projected in climate will increase water scarcity, particularly in the arid and semi-arid areas of the country. Rising temperatures will also likely exacerbate the drought conditions and may have a significant impact on water availability and general human well-being.[63] The expected changes in rainfall, coupled with increased aridity and more severe droughts, are anticipated to increase existing vulnerabilities in agriculture, forests, urban areas, as well as in livestock and dryland water resource management. Conflict in Kenya's arid and semi-arid zones over limited water resources, which are already significant, are likely to increase. Rising temperatures are furthermore leading to accelerated glacial loss on Mount Kenya, further straining water resources and the flows of glacially fed rivers.[64]

Improved water management will likely provide a wide range of benefits for various sectors, including agriculture, safeguarding food security and water access. Implementing guidelines and mainstreaming activities identified in the National Water Master Plan further will support the joint work between institutions in charge of water resource management and to ensure there is available water for development and continued quality water for domestic consumption.[65]

8.3.3.3 Energy

Extreme weather events such as heavy rains can damage infrastructure, roads, communication networks and disrupt supply lines. An increase in the frequency of heat waves in urban centers like Nairobi or Mombasa could translate into higher demand for air conditioning and cooling systems, putting power plants under severe stress and reducing their efficiency. In coastal areas, sea level rise and storm surge threaten water and electricity infrastructure with inundation and salinity damage.[66] Given increasing temperatures and the increased energy demand that will coincide, change in cooling degree days provides insight into the potential for extended seasons of power demand or periods in which cooling demand (power demands) might increase.

Mitigation strategies should collectively target: (i) adoption of energy efficiency technologies that require less energy for the same functionality; (ii) energy conservation by encouraging change in the behavior of electricity consumers behaviors; (iii) adaptive policy, planning and investments for sustainable bioenergy use; and (iv) deployment of solar PV systems in off-grid electrification towards

[63] National Environment Management Authority (2015). Kenya- Second National Communication to the United National Framework
Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Kennc2.pdf
[64] Kenya (2015). Common Program Framework for Ending Drought Emergencies. URL: http://extwprlegs1.fao.org/docs/pdf/ken152740.pdf
[65] National Environment Management Authority (2015). Kenya- Second National Communication to the United National Framework
Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Kennc2.pdf
[66] Ministry of Foreign Affairs (2018). Climate Change Profile, Kenya. URL: https://reliefweb.int/sites/reliefweb.int/files/resources/
Kenya_2.pdf

universal electricity access through renewable-energy based distributed systems, which may include productive uses (reducing and/or avoiding diesel-based power supply options).[67]

The project will install and deploy solar energy to complement local grid supply.

8.4 Climate Change Impacts and Adaptations for OFCs

8.4.1 Climate Change Impacts on OFC

Climate change poses significant risks to OFC, primarily through increased frequency and intensity of extreme weather events like floods, droughts, and earthquakes, which can damage or disrupt the cables, leading to communication outages and costly repairs.

8.4.1.1 Increased Extreme Weather Events

Climate change is predicted to lead to more frequent and severe weather events, including floods, droughts, storms, and earthquakes. These events can damage or disrupt fiber optic cables, leading to communication outages.

8.4.1.2 Damage to Infrastructure

Flooding can inundate buried cables, while droughts can cause soil to shrink and crack, potentially damaging cables. Storms and earthquakes can cause physical damage to cables and infrastructure.

8.4.1.3 Costly Repairs and Outages

Damage to fiber optic cables can result in expensive repairs and prolonged communication outages, impacting businesses and individuals. For example:

- In Africa, a recent internet outage in East Africa was linked to damage to submarine cables, highlighting the vulnerability of these critical infrastructure assets to environmental factors.
- Seismic activity on the seabed near the Ivory Coast damaged four major undersea data cables, including the West African Cable System (WACS) and the East Africa Submarine System (EASSy).

8.4.2 Mitigation and Adaptation to Ensure Continued Resilience

- **Cable Placement –** Consider burying cables deeper or in areas less prone to flooding or landslides.
- **Reinforced Infrastructure –** Strengthen infrastructure to withstand extreme weather events, such as using more robust materials for cable conduits or building structures that can withstand earthquakes.
- **Early Warning Systems –** Implement early warning systems to alert operators to potential threats, allowing for proactive measures to protect cables.
- **Diversification –** Consider diversifying infrastructure to reduce reliance on a single cable route.

[67] Ministry of Energy (2020). Bioenergy Strategy 2020–2027. Kenya.

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

9.1 Introduction

The purpose of this Environmental and Social Management Plan (ESMP) is to ensure that social and environmental impacts and risks identified during the ESIA process are effectively managed during the construction and operations of the Project. The ESMP specifies the mitigation and management measures to which the ICTA and the Contractor are committed and shows how the Project will mobilize organizational capacity and resources to implement these measures. The ESMP also shows how mitigation and management measures will be scheduled and will ensure that the Project complies with the applicable laws and regulations within Kenya.

The key objectives of the ESMP are to:

- Formalize and disclose the programme for environmental and social management; and
- Provide a framework for the implementation of environmental and social management initiatives.

Best practice principles require that every reasonable effort is made to reduce, and preferably to prevent, negative impacts while enhancing the Project benefits. These principles have guided the ESIA process.

The overall responsibility for the ESMP lies with the Proponent (ICTA) and the Contractor that will be appointed and responsible for carrying out the specific Project activities.

9.2 ICTA E&S Compliance Framework

In the development, construction, and operation of the Project, ICTA and its contractors and business partners will adhere to the following standards:

- All applicable legislation and regulations in Kenya; and
- World Bank Environmental and Social Standards (ESSs).

This ESMP has been developed in accordance with the requirements of these legislations, regulations and standards.

9.3 Environmental and Social Management Plan (ESMP)

The ESMP covers information on the management and/or mitigation measures that will be taken into consideration to address impacts with respect to:

- The project construction phase (including mobilization and demobilization activities associated with the construction phase); and
- The operations/maintenance phase.

In practice, some of the recommended management measures will be incorporated into the Project design/influence the Project design, to avoid or minimize the identified negative Project impacts as indicated in this ESMP.

Table 9-1 summarizes the ESMP for the Project. It describes the mitigation measures to be undertaken, and, to ensure the mitigation measures are adequately implemented, a monitoring programme is also described. This programme provides for parameters that can be monitored, and suggests how monitoring should be done, how frequently, and who should be responsible for such monitoring.

Table 9-1 Environmental and Social Management Plan (ESMP)

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
Construction/Installation Phase					
General	Contractor is required to develop and implement a contractor's Construction Environmental and Social Management Plan (C-ESMP) meeting the conditions set out in the environmental authorizations (EIA Certificate for this Project once issued by NEMA), as well as this ESIA Full Study Report (FSR) and World Bank requirements. All applicable elements of this ESMP should be used in drafting and finalizing the C-ESMP, which is to be used for the construction phase, and against which the E&S performance of the contractor will be monitored.	Contractor	A comprehensive and appropriate C-ESMP in place	Once – off (prior to commencement of construction activities, but after obtaining NEMA EIA FSR Approval)	No additional cost (expected to be undertaken by the contractor's E&S team)
Terrestrial Habitat Alteration	• Site fixed line infrastructure (e.g., fiber optic cable) and other types of linear infrastructure rights-of-way, access roads, lines, and towers to avoid critical habitat through use of existing utility and transport corridors (road reserves), whenever possible; • Avoidance of construction activities during the breeding season and other sensitive seasons or times of day; • Develop biodiversity management plan (BMP) for protected areas, as necessary; • Revegetation of disturbed areas with native plant species; and • Management of construction site activities as described in relevant sections of the World Bank's General EHS Guidelines	ICTA/Contractor/KWS	Records of audits/visual inspection	Daily	450,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
Waste and Effluent	• Mandate contractor to only provide workers with water in returnable glass bottles; • Train project workers on waste handling and segregation; • Segregated waste storage containers with appropriate signs (hazardous or non-hazardous) shall be provided throughout construction phase; • No garbage, refuse, oily waste, fuel, waste oil or removed/excess materials (e.g., asphalt, sidewalks, metal scrap, etc.) shall be discharged into drains, onto site grounds, natural areas, or watercourses; • If feasible, reuse of removed/demolished materials (e.g., asphalt, sidewalks, metal scrap, etc.) or donate to local community. In addition, careful selection of adequate sites for final disposal of removed/excess materials not reused or donated; • Implementation of appropriate storage and containment areas (e.g., bunded area with impervious polyliner or similar) for both new and waste fuel, oil, and hazardous materials to prevent and contain any spillage and leaks; • Prompt removal and safe disposal of soil contaminated with hydrocarbons; • Hazardous and oil waste shall be collected and disposed by NEMA licensed waste handlers; • Implementation of hazardous materials handling and control procedures (e.g., identify chemical products and store in storage area with restricted access, keep track of movement of each chemical, etc.);	Contractor	An effective WMP in place No recorded grievances at the waste sources or related to the supply of construction materials Records of audits/visual inspection	Monthly	1,200,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• Keep records of waste generation (i.e., type of waste; hazardous or non-hazardous; weight or volume; properties; destination; date; etc.); • Maintenance and cleaning of vehicles, trucks and equipment should take place offsite, and prohibition of vehicle washing in watercourses; and • Toilet facilities shall be provided for construction workers to avoid indiscriminate defecation in nearby bushes.				
Emissions to Air	• Conduct regular air quality measurement at the subproject site. • Develop and implement a grievance procedure (for both workers and other stakeholders) to manage any dust complaints. • Where feasible, regular wetting or chemical treating of exposed open earthworks such as at the levelled and material laydown areas, may be required. Upon completion of earthworks, stabilization of temporary used surfaces (i.e., establishing vegetative cover as part of the landscaping activities, or placing ground cover) should occur as soon as possible. • Regular wetting of construction access routes. This will not only lower dust levels but will improve visibility and hence lower the risk of accidents. • Vehicles to maintain speed limits imposed. • The smallest possible area for cleared ground required for construction work should be exposed. • Drop heights of material should be minimized, as far as reasonably possible.	Contractor	No recorded incidents or dust-related grievances to local community Records of audits/visual inspection Air quality emissions at respective receptors not exceeding the maximum permitted limits	Daily	200,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• Construction equipment should be maintained and serviced on a regular basis to ensure that they function optimally and to reduce excessive emissions, this will also apply to all stationary generators utilized on site. • Issue all Project workers appropriate Personal Protective Equipment (PPE) including dust masks where required. • Keep community abreast of the construction schedule. • Develop and implement an appropriate Traffic Management Plan (TMP) throughout the construction phase				
Noise and Vibration	• The Contractor shall implement best driving practices when approaching and leaving construction sites to minimize noise generation created through activities such as unnecessary acceleration and breaking; • Strict control of timing of activities within authorized working hours, including banning work at night and limiting installations near offices and schools to weekends; • Minimize noise levels and vibrations (e.g., sound insulation, select equipment with lower sound power levels, install acoustic enclosures for equipment, install suitable mufflers on engine exhaust and compressors components); • Keep sensitive receptors and community abreast of the construction schedule; and	Contractor	No recorded noise-related incidents or grievances to local community Noise monitoring records Noise emissions at respective receptors not exceeding the maximum permitted limits	Monthly	150,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• Issue all project workers with appropriate PPE including earmuffs where required.				
Sexual Exploitation and Abuse, and Sexual Harassment and Gender-Based Violence (SEA/SH/GBV)	• Contractors' workforce on all sites including schools should be lean, trained and well supervised by minimizing the SEA/SH risks for the project; • Perform a gender-sensitive mapping of subproject sites (e.g., locate unsafe areas near schools or hospitals, etc.) prior to commencement of construction activities; • Add SEA/SH/GBV clauses in contracts with contractors and primary suppliers, requiring training and enforcing zero tolerance; • Deploy Caritas Isiolo, Wajir Peace and Frontier Counties Development Council (FCDC) as independent monitors to audit remote subproject sites and act as trusted reporters; • Review the appropriateness of the HoAGDP's GRM for handling SEA/SH/GBV matters. If fit for purpose, adopt and implement for the OFC project; • Discourage use of traditional grievance resolution methods in addressing SEA/SH/GBV matters in the project. They have been found to issue lenient sentences to perpetrators; • Train contractors and supervisors on SEA/SH/GBV (e.g., how to respond to, and escalate complaints, etc.); • Publish annual SEA/SH reports as part of ICTA's annual reporting (e.g., number of received cases, % of resolved cases, etc.) to build trust;	ICTA Contractor HoAGDP GRC teams	Number of contracts with SEA/SH/GBV provisions Gender expert retained by the contractor Number of workers who have signed the code of conduct Disciplinary procedures for workers who contravene the Code of Conduct Number of reported SEA/SH/GBV cases linked to the project. MOUs with local organizations	Weekly	As provided in the SEA/SH/GBV plan

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• Social inclusion e.g. ensure VMGs are included during recruitment; • Implement the developed GBV/SEA/SH Action Plan.				
Labour and Working Conditions [Including Occupational Health and Safety (OHS)]	• All contractors should develop and implement an Occupational Health and Safety Management System (OHSMS) in line with good international industry practice (GIIP), including the requirements of the World Bank ESS2, and in accordance with Kenya's Occupational Health and Safety Act (OSHA). This OHSMS will need to consider hazard identification, OHS risk assessment and control for different tasks (identify OHS control measures that include the mitigation hierarchy: elimination/substitutions; engineering controls; administrative controls; and OHS training and supervision at the field level), use of Personal Protection Equipment (PPE), incident investigation and reporting, reporting and tracking of near misses, incidents, etc. • The management system will also include emergency response plans that tie in with existing emergency response procedures of the ICTA. Roles and responsibilities for the implementation of the OHS Plan should be clearly defined; • All contractors should have a Human Resources Policy in place that adheres to the requirements of the World Bank ESS2, Kenyan Law and the ILO Core Labour Conventions, to which Kenya is a signatory. The HR policy will include a Labour and Employment	ICTA (contractual arrangements) Contractor (implementation)	Employment records and other key performance indicators (KPIs) for worker rights. A record of workers' grievances. Emergency Response Plan. Induction documentation for all workers to include necessary items. Daily toolbox talks.	Monthly	500,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	Plan, conditions of employment and Worker Grievance Mechanism. These requirements will also be passed on to any sub-contractors. Key aspects of the HR policy which should be included, are the following: • Provision of clear and understandable information regarding rights under national labour and employment law, and any applicable collective agreements, including those related to hours of work, wages, overtime, compensation, etc.; • 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; • Provision of adequate welfare facilities on site; • Implementation of a grievance mechanism • Adoption and implementation of a sexual exploitation and harassment policy; • Maintain a Worker Injury Benefit Act (WIBA) insurance and Contractor all risks insurance; and • Adoption of an open attitude towards freedom of association. **Contractor Management** • All contracts should explicitly reference compliance with Kenyan law, international standards (especially World Bank ESS2), and ratified ILO conventions.				

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• As part of the contractor and supplier selection process, the ICTA should take into consideration performance regarding worker management, worker rights, and health and safety as outlined in Kenyan law and international standards; • Regular checks should be undertaken to ensure the relevant labour laws and OHS are always adhered to; • All workers (including those of contractors and subcontractors) should, as part of their induction, receive training on health and safety and should receive updated training routinely, as well as when undertaking new tasks, such as working at heights or working in confined spaces; and • Daily toolbox talks will be held with the Project workers to discuss the health and safety risks associated with the tasks at hand. **Workers' Rights** • All Contractors should put in place hiring mechanisms to ensure no employee or job applicant is discriminated against based on his or her gender, marital status, nationality, ethnicity, age, health status, religion or sexual orientation; • All workers (including those of the contractor and subcontractors) will, as part of their induction, receive training on worker rights in line with Kenyan legislation to ensure that positive benefits around understanding labour rights are enhanced. This process will be formalized within the Code of Conduct that will be provided by the contractor;				

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• All workers (including those of the contractor 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. Contracts must be in place prior to workers commencing work; • All contractors should put in place a worker grievance mechanism that will be accessible to all workers, whether permanent or temporary, or directly or indirectly employed. The worker grievance mechanism shall be open to all the Project workers if their grievance is not adequately resolved by their direct employer. Workers will also have access to ICTA's grievance management system, to raise any issues with their employer; • All workers (including those of the contractor and subcontractors) will have access to training on communicable diseases and STDs and community interactions in general. This training will be developed in collaboration with local health institutions; and • Surveillance and assurance that no children or forced labour is employed directly by the contractor, and to the extent possible by third parties related to the Project and primary suppliers where any such risk may exist				

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
Traffic Congestion, Hazardous Driving Conditions and Obstruction of Access	• All contractors to develop and implement a Traffic Management Plan (TMP) that inter alia, includes the following conditions: • No work should commence on a public road without first obtaining a wayleave from the road authority concerned; • It is the responsibility of the contractor's supervisor/s to ensure that each member of his crew wears the required PPE and to ensure that the work area is protected using the various signs, cones, flashing lights, traffic control personnel, etc.; • Traffic movement shall be inhibited as little as possible. Should this be unavoidable, alternative access to routes must be made available; • Work carried out on busy roads, should be restricted to outside the following periods; from 06:30 to 09:00 and 15:30 to 18:00, to ensure the free flow of traffic during peak hours; • Roads shall be kept free of debris or equipment; • Where cyclists and/or pedestrians are likely to be present, their need for safe and convenient passage must be considered and sufficient, safe crossings shall be planned for; • Create 'no go' zones around hazardous areas and implement safe work distances; o Choose signs with messages clearly indicating the actions drivers or pedestrians are required to take;	Contractor in liaison with ICTA and Kenya Police	Incident records Records of complaints Traffic Management Plan Grievance mechanism in place, where traffic incidents are recorded and addressed	Monthly	120,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	○ Where necessary, traffic control persons shall be used to provide positive guidance to motorists; and • Remember that the visibility of hazards/workers can be greatly diminished in darkness and/or poor weather conditions. • Ensure only what can be excavated and backfilled within 24 or 48hrs is done. Contractors must therefore only excavate what they can lay and backfill in 1 or 2 days maximum depending on a risk/hazard assessment for each location. • Road crossings shall be done using directional drilling or thrust boring and shall meet the following minimum requirements: ○ Bores shall be at a depth of 1.8m across spur subsidiary roads and 2m across the carriage way from the tarmac level; ○ Bores shall exit at a depth of 1.8m; same level as the trench; ○ Bores shall typically span to lengths of 15m-20m but could span to a maximum of 30m if need be; ○ The equipment used shall drill bores spanning to a maximum of up to 30m long; ○ The drilling head shall accommodate rock drilling bits for rocky ground; ○ After making a bore across the road, two (X2) 102 mm diameter galvanized pipes or two 110mm HDPE plastic pipes (one to act as spare				

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	for future use) shall be inserted through the bore; and ○ Bores shall be well marked on both ends with marked reinforced concrete; • Only experienced and trained drivers/operators shall drive/operate construction vehicles, trucks, and machinery. • In hilly terrains or areas where distances are too long to cover by underground OFC cable drops, ICTA should plan to accommodate such areas through wireless Point to Multi-Point microwave nodes. This will minimize traffic disruptions as no trenching will be undertaken. • Trench excavation within a market center or a township shall only be done after verifying that all utility lines (water pipes, electric cables, and sewer lines) in the area are marked and known; and • All reasonable steps necessary shall be taken and special consideration given to water, electricity and sewer systems within the area that cannot be located accurately				
Temporary Loss of Access to Productive Assets	• Use the HoAGDP's Resettlement Policy Framework (RPF) and Plan to guide any resettlement and loss of access to productive assets; • Businesses/property owners shall be informed one week (7-days) in advance of any construction activities commencing in the vicinity of their properties;	Contractor ICTA	Records of complaints	Before and throughout construction	1,000,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• These notices will announce upcoming work tasks and potential impacts, such as traffic, parking, and access changes, noise, utility interruptions, vibration, etc.; • If a private driveway or footway constructed with non-standard materials is to be excavated, the owner of the property concerned must be informed in advance and in writing of the intended work; • Where possible, excavations on private property shall not be left open outside normal working hours (08:00 to 17:00). Where unavoidable, the Contractor must take adequate precautions to safeguard such excavations; • The Contractor shall be responsible for the protection of all trees, shrubs, fences, and other landscape items adjacent to or within the work area; • The occupants of the properties must be kept informed at all times of how their access will be affected; • When trenching through entrances to properties, access must be maintained by using steel plates or other temporary bridges of ample strength and, it must be well secured against movement; • Surfaces shall always be reinstated to the original state or better; • Where a Contractor must undertake tree and bush cutting and/or shrub clearing he must prior to undertaking such work, obtain approval in writing from the relevant authority and/or property owner;				

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• The Contractor shall dispose of all cuttings and cleared material; • The Contractor shall be solely responsible and accountable to remedy any damages and/or claims, arising due to his activities; • All drainage systems must be cleared daily; • In residential areas the reinstatement of paving, grass or landscaping must be done to the property owner's satisfaction; and • Remove all material and equipment not needed onsite, as soon as possible.				
Impact on Disease Transmission	• Project workers to sign a code of conduct; • Conduct awareness campaigns on HIV/AIDS among the workers and the locals. This can be undertaken by the various NGOs and government agencies in the Counties; • Erect billboards to sensitize locals on the need to practice safe sex to help in the fight against HIV/AIDS; and • Provision of free condoms to the workers	Contractor/ ICTA GRC Consultant	HIV/AIDS/Malaria/TB Policy Worker Code of Conduct Disciplinary procedures for workers who contravene the Code of Conduct	Monthly	350,000.00
Conflicts with Local Communities	• Consultation with the host community and relevant stakeholders on the mitigation measures proposed for the negative impacts; • Utilize area Chiefs and Ward administrators in the recruitment of unskilled local labour; • Ensure the Project implements the developed grievance redress mechanism, in which potential project beneficiaries/project affected communities have reasonable representation;	ICTA Contractor GRC Consultant	Number of consultation meetings held with local communities Number of project workers hired through Chiefs/Ward Administrators	Monthly	250,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• Ensure multiple entries to grievance mechanism and publicize GRM including through media, training, and meetings and through communication using local languages; • Enhance the capacity of individuals who will be involved in grievance handling processes through appropriate trainings; • Follow the guidance of the SEP; • Minimize the risk by making use of and follow up the strict observation of the government policy on gender and other forms of social inclusion, as stated in policy and legal frameworks of this ESIA; and • Provide as a risk reduction measure local language interpreters to ensure understanding and ability to give feedback during engagement		Number of grievances received from local communities. Number of grievances resolved, and resolutions reported to complainants SEP implemented Number of meetings where services of translators are sought		
Security Risk	• The bidding documents should include provisions and bill items related to the facilitation of security aspects to ensure the protection of workers, equipment, and structures during the implementation of the project. A budget has been allocated for implementation of the plan including allowances for training; • Contractor to prepare a security management plan (C-SMP) that will assess the types and likelihood of security threats posed by the project's operating environment. This C-SMP should be guided by the HoAGDP's overarching SMP and shall be submitted to ICTA for approval. The C-SMP will also consider the impacts their security arrangements might have on	ICTA Contractor GRC Consultant	Contractor's security management plan (C-SMP) Budget for security provision Number of NPS officers engaged in provision of security to staff and equipment	Monthly	2,000,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	local communities and provide mitigation measures, include hire of private security, have Standard Operating Procedures (SOP) have been developed and provide clear guidelines regarding (a) security chain of command; (b) work and campsites access controls; (c) safety of constructions and worksites; (c) safety and security of contractors and workmen; (d) vehicle access to construction and worksites; (e) emergency response and incident reporting; and (f) general security supervision and control; and • The National Police Service (NPS) should take the lead in the provision of security along the project corridor. The multi-agency approach will be applied throughout the execution of the project.				
Exclusion of Vulnerable and Marginalized Groups (VMGs)	• The project team should ensure that VMGs, along with their organizations, are fully informed about the activities, design, and implementation processes in a culturally appropriate and accessible manner; • In-depth consultation with the VMG communities, community elders/leaders, civil society organizations and other relevant stakeholders shall be undertaken; • There should be a transparent and free analysis of socio-economic impacts on vulnerable groups and affected communities; • The project team (ICTA) should ensure consultations and information dissemination are appropriate for all genders and generations; • Collaborate with organizations supporting PWDs to tailor project interventions to their needs;	ICTA Contractor GRC Consultant	Number of women, youth, PWDs, and the elderly attending Project meetings Number of women, youth, PWDs, and the elderly engaged gainfully in the project Number of grievances by VMGs MOUs with PWDs leaning organizations	Monthly	300,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• Apply local languages in communication; • Adequate communication and engagement framework to ensure VMGs voices are heard				
Impact on Cultural Heritage	Contractors must ensure that provisions are put in place so that any "chance finds" encountered in excavation or construction are noted and registered, and responsible authorities contacted, and works activities delayed or modified to account for such finds	Contractor/ NMK	Chance finds procedures Number of physical cultural resources encountered	Daily	120,000.00
Operations Phase					
General	Develop and implement an operational phase Environment, Health and Safety (EHS) Management Plan meeting the conditions set out in the environmental authorizations, as well as this ESIA PR and lender requirements.	ICTA	An effective operations phase EHS Plan	Developed once and implemented throughout the operations phase	Internal costs
Hazardous Materials and Waste	• Implementing procedures for the management of lead acid batteries, including temporary storage, transport and final recycling by a licensed facility; • Purchasing electronic equipment that meets international phase out requirements for hazardous materials contents and implementing procedures for the management of waste from existing equipment according to the hazardous waste guidance in the World Bank's General EHS Guidelines; • Considering the implementation of a take-back program for consumer equipment such as computers, cellular telephones and their batteries;	ICTA	An effective e-waste management plan	Developed once and implemented throughout the operations phase	450,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• Generated e-waste should be recycled or disposed safely and properly; and • To mitigate and manage the generated e-waste, ICTA should adopt and implement an E-Waste Management Environmental Codes of Practice				
Exclusion of VMGs from Project Benefits	• Ensure that project consultations and information dissemination actively involve all the disadvantaged and vulnerable, using accessible language and formats; • Implement SEA/SH/GBV prevention measures, including community awareness campaigns and support services for victims; • Provide digital literacy training specifically targeting youth, women and girls to bridge the gender digital divide; • Offer training and support programmes aimed at helping disadvantaged and vulnerable groups bridge the gender digital divide and understand and use new digital technologies' • Ensure all digital platforms and services are accessible, adhering to international standards for accessibility; • Provide alternative communication methods, such as sign language interpretation or Braille, to ensure inclusive participation in project activities; and • Ensure that digital services and educational content are child-friendly and accessible, particularly for those in remote or underserved areas	ICTA	Number of women, youth, PWDs, and the elderly engaged gainfully in the project Number of grievances by VMGs Number of assistive devices in community ICT centers Number of child friendly courses	Half-yearly	As provided in the SEA/SH/GBV

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
Labour and Working Conditions (Including OHS)	• Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities; • Training of workers in the identification of occupational EMF levels and hazards; • Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers; • Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE). • Personal exposure monitoring equipment should be set to warn of exposure levels that are below occupational exposure reference levels (e.g., 50 percent); • Action plans to address occupational exposure may include deactivation of transmission equipment during maintenance activities, limiting exposure time through work rotation, increasing the distance between the source and the worker, when feasible, use of shielding materials; or installation of ladders	ICTA	Employment records and other key performance indicators (KPIs) for worker rights. A record of workers' grievances. Emergency Response Plan. Induction documentation for all workers to include necessary items.	Monthly	Internal costs

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	or other climbing devices inside the mast or towers, and behind the transmission beams				
Security Risk (Theft of ICT devices in the project)	• Enhance physical security by installing secure storage, robust locks, and alarm systems. • Use passwords, encryption, and tracking software to assure device security. • Promote community awareness and reporting of suspicious activities to prevent theft. • Maintain detailed records of ICT equipment can aid in tracking and recovery if theft occurs. • Promptly report any theft to police for investigations and potential recovery of stolen items. • Develop a database for registering ICT devices in the project.	ICTA	Number of ICT devices lost through theft Number of ICT devices with passwords, encryption, and tracking software Database/register for ICT devices in the project	Annually	250,000.00
Cybersecurity Risks	• Recruit information technology experts and use ticketing software to keep government tech issues organized; • Create great IT workflows paired with expert information technology employees will ensure that the government technology is up to speed, computer systems remain functional across departments, and the cyber secure; • Encourage all departments to switch to cloud-based government infrastructure. The cloud is substantially more secure and difficult for hackers to break into, and automatically backs up government data on a frequent basis; • Implement security controls in line with the GoK information security standards. For instance,	ICTA in collaboration with NPS and CA	Number of government staff attending cybersecurity training Number of cybersecurity staff recruited Effective cloud-based government infrastructure Effective internet security controls	Annually	1,000,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	Identification: All authorized users of the Network Equipment (NE) shall be uniquely identified to support individual accountability. The requirements for Identification are: o Within a specific NE, the NE shall enforce unambiguous User-IDs to identify its users; o All NE interfaces and ports that accept user command inputs shall require unambiguous User-IDs before performing any actions; o The NE shall internally maintain the identity of all current active users; o The NE shall restrict a User-ID to only one active session; o All operations-related processes running on the NE shall be associated with the User-ID of the invoking user; o If a user-ID has not been used for a period of 3 months, the NE shall be capable of disabling that User-ID; o In addition, the security administrator shall have a choice of automatic or manual disabling of these User-IDs; o The NE shall log all activities carried out by the user during each session. All logs must include timestamps and activity, or system accessed; and o All building sites and equipment (and all information and software contained therein)				

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
Digital Gender-Based Violence (DGBV)	• Center the safety and privacy of survivors; • Align with the government's priorities and use these dialogues to raise awareness about gender-based violence; • Think carefully about the role of each stakeholder; • Develop modular approaches that can be adapted to various ecosystems; and • Consider inclusive solutions that consider digital divides	ICTA in collaboration with NPS and CA	Media campaign on DGBV	Annually	As provided in the SEA/SH/GBV plan
All Project Phases					
Flooding Risk	• Conduct flood risk assessment for the project and incorporate findings into project design; • Repair stormwater drainages (affected during civil works) during project implemented; • Build infrastructure resilience to flooding via emergency planning and response; and • Consider implementing nature-based solutions (NBS) such as reforestation and afforestation, wetland restoration, and green infrastructure (e.g., solar energy, permeable pavements, etc.), to mitigate flooding risk	ICTA	Flood risk assessment report Infrastructure with flood-resilient designs Records of audits/visual inspection	Developed once and implemented throughout the operations phase	450,000.00
Fire Hazards	• Installation of an automatic fire alarm system for the equipment building and the main operations building; • Provision of firefighting equipment and hydrant points;	ICTA	Firefighting equipment at subproject sites Effective emergency response plan (ERP)	Monthly	200,000.00

Parameters/Aspects	Mitigation Measures	Responsibility	Completion Indicator(s)	Frequency of Monitoring	Cost Estimates
	• Display of fire evacuation procedures and emergency response plan at all buildings; • Regular maintenance of fire electrical and first aid equipment; and • Provision of sufficient emergency exit points and marked fire assembly points.				

9.4 Topic Specific Management Plans

The following Sections present the specific management plans foreseen for construction and operations, based on the outcomes of the impact assessment.

9.4.1 SEA/SH/GBV Action Plan

Table 9-2 shows an SEA/SH/GBV Action Plan that provides a comprehensive and strategic framework outlining the specific steps ICTA should take to prevent and respond to SEA/SH/GBV during project implementation. It's a dynamic document that should be regularly reviewed and updated (ICTA should review it against the larger HoAGDP's GBV/SEA/SH Action Plan, as necessary) to ensure its effectiveness. Other key tools for managing SEA/SH/GBV have been included as part of the SEP. The SEP is annexed to this ESIA report.

9.4.2 Waste Management Plan

The Waste Management Plan (WMP) will be developed to manage solid and liquid waste and to avoid any discharges into the soil or water for both the construction and operation phases. It will establish procedures for the storage, collection and disposal of waste, including liquid and solid waste, as well as hazardous and non-hazardous waste.

The WMP will provide for the following:

- Compliance with the Environmental Management and Coordination (Waste Management) Regulations, 2024;
- Compliance with the Sustainable Waste Management Act, 2022;
- Compliance with the National Environment Policy, 2014;
- Outline of waste characteristics and sufficient capacity for managing different waste streams and waste quantities; and
- The developed WMP should comply with World Bank's ESS3.

Furthermore, it will contribute to ensuring that the capacity and the nature of waste collection and treatment systems are in line with the wastes to be managed. The overall objective is to minimize impact of waste generated during the construction and operational phases through the following:

- minimize the amount of waste that is generated;
- maximize the amount of waste that is recovered for recycling – including segregation of recyclable wastes at source;
- ensure any hazardous wastes (e.g. e-waste, etc.) are securely collected, stored and transferred to appropriate facilities;
- avoid dust impacts from excavation and handling of construction wastes;
- ensure all wastes are properly contained, labelled and disposed of in accordance with local regulations; and
- ensure waste is disposed of in accordance with the waste management hierarchy.

Table 9-2 HoAGDP's OFC SEA/SH/GBV Action Plan

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
Define and reinforce GBV/SEA/SH requirements in procurement processes and contracts	Incorporate GBV/SEA/SH requirements and expectations in the contractor and consultants' contracts.	Ensure that GBV/SEA/SH issues are incorporated in all contracts, evaluated as part of bidding process, and signed by contractors and consultants	Before project activities begin	Social safeguard specialist Procurement specialist	PMT World Bank	SEA/SH requirement and expectation are adapted in bid document. GBV/SEA/SH standards in procurement/contract documented and addressed. Bidding documents are reviewed and confirmed potential risks of SEA/SH are adequately addressed. Develop list of mandatory SEA/SH procurement requirements for contractors in subprojects and shared to Procurement teams.	No additional cost
	Allocation of funds for GBV/SEA/SH related costs in procurement documents.	Clearly define SEA/SH requirements and expectations in the bidding documents; ensure evaluation of SEA/SH criteria as part of review of bidding documents. Evaluate the contractor's SEA/SH Accountability and	During preparation of bid and Contract documents	PMT (Procurement specialist) World Bank	PMT World Bank	Bid documents with clearly defined SEA/SH/GBV requirements Contract documents with clearly defined SEA/SH clauses/requirements The contractors and suppliers addressed SEA/SH	No additional cost

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
		Response Framework in the C-ESMP and confirm prior to finalizing the contract the contractor's ability to meet the project's GBV/SEAH prevention and response requirements.				through procurement processes, contract selection and negotiation and regular engagement along the supply chain. Ensure as standard practice in contractor Codes of Conduct for workers, prohibition of all forms of SEA/SH/GBV, including language on prohibition against sexual activities with anyone under the age of 18. Numbers of Contractors and workers trained of prevention GBV/SEA/SH.	
Strengthen contractors and primary suppliers' capacity to prevent and respond to GBV/SEA/SH	Maintain PMT's Social Specialist with GBV/SEA/SH specific skills to support implementation and supervision of GBV/SEA/SH risk management requirements.	Maintain PMT's Social Specialist with GBV/SEA/SH skills.	After contract signing and throughout the construction period	PMT	PMT	A qualified and competent social specialist with GBV skills staff retained	1,500,000

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
	Codes of Conduct (CoC) signed and understood.	Define the requirements to be included in the CoC which addresses GBV/SEA/SH Review CoC for provisions/clauses that guard against GBV/SEA/SH Have CoCs signed by all those with a physical presence at the project site. Train project-related staff on the behavior obligations under the CoCs.	During Project implementation	PMT's Social Specialist Contractors	PMT World Bank	CoC developed and ensured GBV/SEA/SH, and Child protection clauses included. Percentage of workers that have signed the CoC. Percentage of workers that have attended CoC training. Number of Contactors and their workers understood and signed Coc	2,000,000.00
	Regularly sensitize the PMT on GBV/SEA/SH issues and conduct GBV/SEA/SH orientation training for all workers. (Project workers: contractors and consultants)	Develop a sensitization/ training plan Develop sensitization/ training materials Conduct training on GBV/SEA/SH risks, responsibilities and legal/policy requirements Conduct training for project staff.	Quarter 1 & 2 after contract signing Retraining during Project implementation.	PMT's Social Specialist GBV Service Provider	PMT Social Specialist	Number of trainings conducted. Number of workers who have attended GBV/SEA/SH training.	1,000,000.00

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
	Develop and establish/review GBV/SEA response and accountability framework to include Allegation Procedures to report SEA/GBV incidents and internally for case accountability procedures which should clearly lay out confidentiality requirements for dealing with cases	Develop/review SEA/GBV Allegation Procedures to report SEA/SH issues Inform employees and the community on how to report cases of SEA/SH/GBV, CoC breaches to the Grievance Mechanism, and how such cases are handled. Develop accountability processes to address allegations of SEA/SH; disciplinary action for violation of the CoC by workers.	Quarter 1 after contract signing	PMT's Social Specialist Contractors	PMT	An established and functional accountability framework	Activity to be done by PMT's Social Specialist
Map out GBV/SEA prevention and response service providers and support capacity of local systems to prevent and respond to GBV/SEA/SH	Recruit and review the existing capacity of quality GBV service providers to be engaged in the subproject locations.	Develop tools for assessing capacity of GBV/SEA service providers Conduct a deeper quality assessment of service providers such as success rate, the response of Service Providers, time is taken to resolve, reputation within the community and State administrations	By end of August 2025 Maintain throughout Project implementation for the update of service providers	PMT's Social Specialist M&E specialists	PMT World Bank	Capacity assessment tool developed and administered Assessment findings and recommendations Identified GBV service provider in all project locations Number of qualified GBV service providers that	2,500,000.00

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
		Contract qualified GBV service providers to facilitate access to timely, safe and confidential services for survivors Signing of MoU with the GBV service providers Disseminated the list of GBV service providers to all PMT staff, contractors, consultants and other stakeholders Sensitization of GBV/SEA/SH service providers.				provides holistic package of services contracted Number of sensitization meetings conducted	
	Stakeholder consultations	Develop interview/ facilitation guides. Officially inform the stakeholders on the components of the projects and project risks. Sensitize the stakeholders including all vulnerable groups identified under the affected persons on GBV/SEA/SH risks and	Prior to initiating construction. Maintain throughout Project implementation.	PMT's Social Specialist NGO GBV service providers	Project Coordinator	Number of stakeholder consultations done.	2,000,000.00

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
		where to seek confidential services. Prepare field visit reports.					
	Conduct GBV risks assessment within the subproject locations	Develop GBV questionnaires for FGDs. Conduct regular safety audits. Prepare GBV risk assessment report.	Annually	GBV service providers	PMT	GBV risk assessment conducted	Cost to be included under the contracted NGO GBV service provider
	Develop and or/update a multi-sectoral GBV/SEA/SH help seeking referral pathway(s)	On the basis of mapped GBV prevention and response service providers develop/ update a GBV referral list for service providers. Develop referral protocols that outline key requirements for reporting cases if they arise and measures for safe, ethical and survivor centered responses. Identify key gaps where remedial measures may be required.	Quarter 1 after signing works contract. Maintain throughout Project implementation.	PMT's Social Specialist in consultation with NGO GBV Service Provider/s	PMT in collaboration with Gender desks in respective counties.	Referral pathway developed/updated Number/type of GBV/SEA preventive and response services available. Number of referrals of SEA/SH incidents to the project GRM/ by GBV service provider.	PMT's Social Specialist

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
		Disseminate the referral pathway/list to stakeholders including service providers					
Inform project affected communities or VMGs about GBV/SEA/SH risks	Develop Stakeholder Engagement Plan that includes GBV/SEA related issues	Include comprehensive GBV/SEA/SH content in the SEP.	Quarter 1 of contract signing Maintain throughout Project implementation	PMT PMT's Social Specialist	PMT	GBV/SEA/SH content in the SEP.	No additional costs as it was done as part of ESIA.
	Conduct community sensitization	Develop a Community GBV/SEA sensitization program, material and messages Conduct community sensitization	Quarter 2 of contract signing Maintain throughout Project implementation.	PMT's Social Specialist NGO GBV service Provider	Social Specialist	Number of community meetings conducted Number of active NGOs/CBOs/CSOs participating	Costs to be covered under Stakeholder consultation
	Develop relevant Information, Education, Communication (IEC) materials for community engagements	Develop relevant IEC materials translated in local languages of the project location. IEC materials to include information on GBV response services and aspects of CoC.	Quarter 2 of contract signing Maintain throughout Project implementation.	PMT's Social Specialist	PMT In coordination with the World Bank.	Number and type of GBV/SEA/SH IEC material developed and disseminated.	500,000.00

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
GBV/SEA/SH sensitive channels for reporting in GM	Develop/Review/ Strengthen GRM for specific GBV/SEA/SH procedures	Undertake review of HoAGDP's GRM for GBV/SEA mitigation. Identify and integrate GBV/SEA entry points within the GRM with clear procedures and tools for management of related complaints. Develop/review SEA/ strengthen GBV Allegation Procedures to report SEA/SH issues. Develop and update disclosure and reporting guidelines/protocol for GBV/SEA/SH with a provision for victim protection and assistance. Create reporting pathways that include support systems and accountability mechanisms including how to handle GBV/SEA/SH allegations properly	Quarter 1 after signing of works contract	PMT's Social Specialist	PMT	GRM with GBV/SEA/SH procedure integrated in the GRM	1,000,000.00

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
		Develop simple, anonymous and confidential tracking system that GM can use to document when they observe/support and refer GBV incidents to service providers. Develop an Information Sharing Protocol – will lay down the principles for data collection, management and storage. It will identify what kind of data should be collected, by whom and for what. It will define how data should be recorded and stored and procedures for alerting the World Bank. Provide and communicate easy-to-follow grievance procedures for workers and community members who may be vulnerable or exposed to project induced risks.					

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
	Train GRM operators on how to handle GBV/SEA/SH cases and referrals as defined in the referral pathway.	Identify and select GBV/SEA focal persons within the GRM operators Train the GRM operators on GBV/SEA basics, the referral pathway, reporting and Confidentiality of data.	During Quarter 1 following signing of the works contract. Retraining during project implementation.	PMT PMT's Social Specialist	PMT	Number of GRM operators trained	1,000,000.00
	Disseminate information on GBV/SEA/SH GRM reporting procedures	Inform employees and the community on how to report cases of SEA/SH, CoC breaches to the GRM, and how such cases are handled Provide and communicate easy-to-follow GBV grievance procedures for workers and community members who may be vulnerable or exposed to project induced risks.	Throughout the project	PMT PMT's Social Specialist	PMT	Number of sessions held with employees on reporting GBV/SEA/SH procedure. Number IEC materials developed distributed to project sited include Hotlines codes.	No additional cost
	Review GM reports/logs for GBV/SEA sensitivity	Review logs for GBV/SEA documentation to ensure it follows standards for documenting GBV/SEA/SH cases. Allow anonymous complaints and protect	During project implementation.	PMT's Social Specialist	PMT's Social Specialist	Number of GBV/SEA cases documented (disaggregated by survivor age and sex and type of incident reported) % of GBV/SEA/SH cases closed within the delays	No additional cost.

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
		confidentiality of complainants.				defined in the project GBV Action Plan (disaggregated by outcome of the verification process)\ % of survivors reporting project-related incidents who were referred to case management services (disaggregated by type of service).	
Effective M&E system in place to track implementation progress of GBV risk mitigation measures	Develop an M&E plan	Develop indicators to assess project implementation Develop a comprehensive M&E plan to monitor work plan implementation Promotion of high-level commitment on monitoring the implementation of GBV action plan in order to support efforts to provide multi-sectoral support to GBV survivors. Monitor GBV/SEA/SH Implementation Plan. Annual reporting to measure effectiveness of	In Quarter 1 after contract signing Maintain throughout Project implementation.	PMT's Social Specialist PMT's M&E specialists	PMT	M&E framework in place, maintained and reviewed.	Developed by M&E specialists

Objective / Outputs	Activity to Address SEA/SH/GBV risk	Steps to be taken	Timelines	Responsible	Monitoring (Who will monitor)	Output indicators	Estimated Budget (KSh)
		the various support systems to respond to GBV/SEA/SH.					
	Total Estimate						**11,500,000.00**

9.4.3 Emergency Response Plan

The Emergency Response Plan (ERP) will assemble and describe in one document the site-specific actions and procedures to be taken in emergency situations occurring during construction and operation phases.

The objective of the ERP is to be prepared to respond to process upset, accidental, and emergency situations in a manner appropriate to the operation risks and to prevent their potential negative consequences. The ERP will clearly make a distinction between all the project phases, since the actions to be undertaken will be different during the construction, operation and decommissioning phases.

The content of the ERP can be summarized as follows:

- Kenyan legal provisions on civil emergencies;
- The identification of the potential hazards (i.e. natural disasters e.g. floods etc., civil disturbances, fire or explosions, malfunctioning of the devices during the processes, pressure issues, etc.) related with the Project and its construction and operation and the possible impact to the environment and societal health;
- Identification of the governmental authorities, the media and other relevant stakeholders to be notified and description of the procedures for communicating with them;
- The necessary measures to limit human and environmental consequences associated with Project related accidents; co-operation between the Contractor, local and national authorities, as well as the local community;
- Safety technical measures to be described and appropriate measures to protect the public safety or property from potential hazards;
- Preliminary description of the organization structure, and explain interactions with Project and operation procedures;
- Preliminary identification of the system and procedures for providing personnel refuge, evacuation, rescue, medical treatment and repatriation; and
- Preliminary description of training activities and the arrangement for training response teams and for testing emergency systems and procedures.

Finally, the Plan shall include provisions for the training of all workers on the emergency response procedures and will include procedures related to communication to stakeholders and community improvement opportunities.

9.4.4 Traffic Management Plan

A Traffic Management Plan (TMP) will be developed to manage traffic attributed to the Project, minimize traffic disruption and road user delay and provide for the on-going safety of road users, including livestock, pedestrians and cyclists. All the traffic related impacts described previously can be mitigated very effectively by the implementation of standard best practices in terms of environmental controls and management practices during construction. These measures will be detailed in the TMP, which will describe in detail the measures that the Contractor and Project Proponent will implement during the construction and operation phases of the Project, respectively.

The key issues that will be addressed by the TMP in terms of mitigation measures will include:

- Access to construction areas;
- Routing of construction traffic;
- Prevention of road user delay;
- Temporary traffic control and management;
- Reducing the probability of traffic accidents and improving safety for road users and others;
- Preventing and remedying road degradation; and
- Road crossings.

The Contractor shall regularly update their TMP as their construction methods are developed and vehicle movement requirements are identified in detail. The Contractor will consult with the principal representative of any communities that will suffer a significant increase in traffic to develop awareness of the mitigation measures within the TMP.

A TMP is important both in ensuring the safety of construction personnel and local communities. The TMP is intended to be a 'live' document, and its traffic management principles will form the basis for subsequent detailed construction traffic management arrangements between the appointed Contractor and the road authorities.

The TMP will include the following minimum requirements:

- Levels of development related to traffic that will use this road network;
- Identification of key sensitivities along proposed access routes;
- Measures to provide for the on-going safety of road users, including pedestrians and cyclists;
- Project driver training requirements with respect to road safety and environment;
- Project Schedule;
- Roles and responsibilities for implementation of the TMP;
- Measures to prohibit "off-route" driving;
- Speed limits and methods of enforcement;
- Means to inform the community of traffic risks;
- Vehicle equipment;
- Vehicle maintenance and refueling locations;
- Inspection, auditing and reporting; and
- Driver competency.

9.4.5 Occupational Health and Safety (OHS) Management Plan

The OHS Management Plan will be a tool that will provide a framework for the following:

- Planning for Health and Safety;
- Accident and Incident Investigation; and
- Health and Safety Auditing.

The OHS Management Plan will be developed following all the relevant World Bank ESSs. The OHS Management Plan will include, at a minimum, the following elements:

- ICTA's HSE Policy, if any;
- OHS Organization: detailed organization chart and description of roles and responsibilities associated with managing OHS. The organization proposed in the Plan will consider the competency of the proposed professionals and will provide mechanisms to ensure cooperation and communication between the OHS management team members;
- OHS Standards, including site safety inductions; hazards identification and risk assessment, including task analysis and construction hazards; OHS targets, and a procedure for safety performance evaluation and review; emergency procedures; toolbox meeting procedure; site visit registers; and Material Safety Data Sheet (MSDS) sheet register;
- Accidents and Incidents, including definitions; reporting and registering procedures; root-cause analysis; and
- OHS Auditing, including the following: auditing plan; setting audit objectives and measuring OHS performance; site safety inspection checklists and first-aid equipment checklist.

The Plan will include provisions for the training of all workers on OHS and will include procedures related to communication to stakeholders and community improvement opportunities.

9.4.6 Supplier Code of Conduct

The Supplier Code of Conduct will set out the ICTA's expectations of worker behavior (also applicable to contractors), consistent with the national labour laws and good international industry practice (GIIP) standards. Specifically, the Workers Code of Conduct will be explicit on the following:

- The scope of the Workers Code of Conduct;
- A requirement by all the Project employees to comply with all the Contractor's rules and regulations;
- Prohibited and restricted activities at the workplace like drug abuse;
- Respect at the workplace including respect for other Project workers as well as the local community members;
- Protection of Project property; and
- Professionalism;
    - Working hours,
    - Personal appearance,
    - Leave policy,
    - Absenteeism and tardiness,
    - Conflict of Interest,
    - Pronouncement on giving and receiving gifts,
    - Confidentiality, and
    - Communication.
- Contractor's pronouncement on all forms of harassment including SEA/SH/GBV;
- Grievance management; and
- Discipline of workers who breach the requirements of the Workers' Code of Conduct.

9.5 Roles and Responsibilities

9.5.1 Contractual Obligation

To ensure that this ESMP and/or derivatives thereof are enforced and implemented, these documents must be given legal standing. This shall be achieved through incorporating the ESMP and/or derivative documents as an addendum to the contract documents for the Contractor and subcontractors (if any) and specifying that the requirements of this ESMP and/or derivative documents apply and must be met. This will ensure that the obligations are clearly communicated to Contractors.

9.5.2 Responsibilities and Duties

9.5.2.1 The Project Proponent (ICTA)

The Project Proponent has overall responsibility for ensuring that the construction and development of the Project is undertaken in an environmentally sound and responsible manner and reflects the requirements and specifications of the ESMP and recommendations from the relevant authorities.

The responsibilities of the ICTA will include:

- Appoint or designate a suitably qualified Project Manager to manage the implementation of the proposed Project;
- Appoint the Project Contractor(s);
- Establish and maintain regular and proactive communications with the designated/appointed Project Manager (PM), Environmental, Health and Safety (EHS) Specialist, and Social Specialist; and
- Ensure that the ESMP and SEP are reviewed and updated as necessary.

Reporting Structure

The Project Proponent will liaise with and/or take instruction from the following:

- Government/regulatory authorities such as NEMA, CA, MICDE;
- The Public; and
- World Bank.

9.5.2.2 ICTA's Project Manager (PM)

The primary role of the PM is to ensure that the Contractor and ICTA's staff complies with the environmental and social specifications in the ESMP. The PM shall further:

- Oversee the general compliance of the Contractor(s) with the ESMP and other pertinent site specifications; and
- Liaise with the Contractor(s) and EHS Specialist on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.

In addition, the PM shall:

- Review and approve Method Statements produced by the Contractor in connection with the ESMP;

- Assume overall responsibility for the effective implementation and administration of the ESMP;
- Be familiar with the contents of the ESMP, and his/her role and responsibilities as defined therein;
- Ensure that the ESMP is included in the Contractor's contract;
- Communicate to the Contractor, verbally and in writing, the advice of the EHS Specialist and the contents of the EHS reports;
- In conjunction with the Construction Supervisor; undertake regular inspections of the Contractor's site as well as the installation works to check for compliance with the ESMP in terms of the specifications outlined therein. Inspections shall take place fortnightly, and copies of the monitoring checklist contained in the file;
- Review and approve drawings produced by the Contractor or professional team in connection with, for example, the construction site layout, access/haul roads, etc.;
- Issue site instructions giving effect to the EHS requirements where necessary;
- Keep a register of all complaints and incidents (spills, injuries, legal transgressions, etc.) and other documentation related to the ESMP;
- Report to the EHS and Social Specialists any problems (or complaints) which cannot first be resolved in cooperation with the Contractor(s);
- Implement recommendations of possible audits;
- Implement Temporary Work Stoppages as advised by the EHS, where serious environmental and social infringements and non-compliances have occurred;
- Facilitate proactive communication between all role-players in the interests of effective environmental management; and
- Ensure that construction staff is trained in accordance with requirements of the ESMP.

Reporting Structure

The PM will report to the Project Proponent (ICTA). Weekly meetings between the contractor and ICTA, and monthly reporting will be required. ICTA may also designate the PM to report quarterly to the World Bank.

9.5.2.3 ICTA's EHS Specialist

The EHS Specialist shall monitor and oversee implementation of the ESMP for the proposed construction works. The EHS Specialist is given authority to ensure that the ESMP is fully implemented and that appropriate actions are undertaken to address any discrepancies and non-compliances.

The role of the EHS Specialist shall be to:

- Act as site 'custodian' for the implementation, integration and maintenance of the ESMP in accordance with the contractual requirements;
- Ensure successful implementation of the ESMP; and
- Ensure that the Contractor(s), their employees and/or sub-contractors receive the appropriate environmental and social awareness training prior to commencing activities.

The responsibilities of the EHS Specialist will be to:

- Liaise with the PM on the level of compliance with the ESMP achieved by the Contractor(s) on a regular basis for the duration of the contract;
- Advise the PM on the interpretation and enforcement of the Environmental and Social, Health, and Safety (ESHS) specifications including evaluation of non-compliances;
- Supply environmental information as and when required;
- Review and approve Method Statements produced by the Contractor, in conjunction with the PM;
- Demarcate particularly sensitive areas (including all No-Go areas) and to pass instructions through the PM concerning works in these areas;
- Monitor any basic physical changes to the environment because of the construction works according to an audit schedule;
- Attend regular site meetings and Project steering committee meetings;
- Undertake regular monthly audits of the construction works and to generate monthly audit reports. These reports are to be forwarded to the PM who will communicate the results and conclusions with the Project Proponent and the World Bank;
- Communicate frequently and openly with the Contractor and the PM to ensure effective, proactive environmental management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts;
- Advise the PM on remedial actions for the protection of the environment in the event of any accidents or emergencies during construction, and to advise on appropriate clean-up activities;
- Review complaints received and made instructions as necessary; and
- Identify and make recommendations to minor amendments to the ESMP as and when appropriate.

Reporting Structure

The EHS Specialist will report to the PM, who in turn will report to the Project Proponent and the World Bank.

9.5.2.4 Contractor

The Contractor will implement the development. The Contractor will be contractually required to undertake their activities in an environmentally and socially responsible manner, as described in the ESMP.

The role of the Contractor shall be to:

- Ensure that the environmental and social specifications of this document (including any revisions, additions or amendments) are effectively implemented. This includes the on-site implementation of steps to mitigate environmental and social impacts;
- Preserve the natural environment by limiting any destructive actions on site;

- Ensure that suitable records are kept and that the appropriate documentation is available to the PM;
- Take into consideration the legal rights of the local communities and ICTA's staff;
- Ensure quality in all work done, technical and environmental;
- Underwrite the ICTA's Environmental Policy, if any, always; and
- Ensure that all sub-contractors and other workers appointed by the Contractor are complying with and implementing the ESMP during the duration of their specific contracts.

The responsibilities of the Contractor will be to:

- Discuss implementation of and compliance with this document with staff at routine site meetings;
- Designate, appoint and/or assign tasks to personnel who will be responsible for managing all or parts of the ESMP. The Contractor must appoint or designate a Safety, Health, Environment and Quality Officer (SHEQO) to monitor daily implementation of the ESMP on the Contractor's behalf as a minimum;
- Monitor environmental performance and conformance with the specifications contained in this document during site inspections;
- Report progress towards implementation of and non-conformances with this document at site meetings with the PM;
- Advise the PM of any incidents or emergencies on site, together with a record of action taken;
- Report and record all accidents and incidents resulting in injury or death (report to PM within 24 hours and DOSHS withing 48 hours); and
- Resolve problems and claims arising from damage immediately to ensure a smooth flow of operations.

Reporting Structure

The Contractor will report to the PM and EHS Specialist, as and when required.

9.5.2.5 Sub-contractors

The Contractor may from time to time appoint sub-contractors.

The role of the sub-contractors shall be to:

- Perform certain services and/or provide certain products on behalf of the Contractor. The subcontractors will be contractually required to undertake their activities in an environmentally and socially responsible manner, as described in the ESMP; and
- Ensure environmental and social awareness among employees so that they are fully aware of and understand the ESHS specifications and the need for them.

The responsibilities of the subcontractor will be to:

- Be familiar with the contents of the ESMP, and his/her roles and responsibilities as defined therein;

- Comply with the ESHS specifications in the ESMP and associated instructions issued by the Contractor to ensure compliance;
- Notify the Contractor verbally and in writing, immediately in the event of any accidental infringements of the ESHS specifications and ensure appropriate remedial action is taken; and
- Notify the Contractor, verbally and in writing at least 10 working days in advance of any activity he/she has reason to believe may have significant adverse environmental impacts, so that mitigation measures may be implemented timeously.

Reporting Structure

Subcontractors will report to and receive instructions from the Contractor.

9.5.3 Monitoring

9.5.3.1 Undertaking Audits

The PM shall work with EHS Specialist to ensure implementation of and adherence to the ESMP. The EHS Specialist shall conduct audits to ensure that the system for implementation of the ESMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The ESMP and the Method Statements being used are the up-to-date versions;
- Variations to the ESMP, Method Statements and non-compliances and corrective actions are documented; and
- Emergency procedures are in place and effectively communicated to personnel.

The audit programme shall consist of the following at a minimum:

- First audit no later than 1 month after construction commences;
- Thereafter audits at monthly intervals, at a minimum;
- An audit one week prior to practical completion of the Project is granted; and
- A post construction audit within 1 week after the Contractor has moved off site.

The contractor and ICTA will also be required to meet at least biweekly to discuss and check progress of implementing the ESMP.

9.5.3.2 Compliance with the ESMMP

Contractor and/or his agents are deemed not to have complied with the ESMP and remedial action if:

- There is evidence of contravention of the ESMP clauses within the boundaries of the site or extensions;
- Environmental damage ensues due to negligence; and
- The Contractor fails to comply with corrective or other instructions issued by the PM, within a period specified by the PM.

10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The ESIA process undertaken has identified and assessed a range of potential impacts to the physical, biological and socio-economic environments. Where impacts have been identified, mitigation measures to manage those impacts have been provided in this ESIA FSR. All the identified impacts are either of moderate or minor significance even prior to the application of the appropriate mitigation measures except those noise and labour which are major. With proper implementation of the recommended mitigation/management measures, the significance of the residual impacts will be reduced to a minor or negligible level which is mainly attributed to the fact that:

- Subprojects are within road wayleaves. These roads are owned by KeNHA, KURA, KeRRA, and County Governments;
- Civil works for the OFC backbone installation are incorporated as ducts into road construction. Isiolo-Mandera Road construction is quite advanced in several sections;
- Construction and installation of community centers and last mile will be done at sites that are highly modified; and
- The project will utilize renewable energy (solar) to power all installed equipment as complement to local grids.

10.2 Recommendations

Ambuya John, EIA Lead Expert, is confident that every effort will be made by the Project Proponent and Contractor to accommodate the mitigation measures recommended during the ESIA process to the extent that is practically possible, without compromising the economic viability of the Project or having a lasting negative impact on the environment. The implementation of the mitigation measures detailed in Chapter 7 and listed in the ESMP (Chapter 9) will provide a basis for ensuring that the potential positive and negative impacts associated with the project are enhanced and mitigated, respectively, to a level which is deemed adequate for the development to proceed.

In summary, based on the findings of this assessment, there is no reason why the Project, should not be authorized, contingent on the mitigations and monitoring for potential environmental and socio-economic impacts as outlined in the ESMP.

APPENDICES

Appendix A: Ambuya John – NEMA Practicing License for 2025

EAE 23063909

FORM 7 (r.15(2))

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/23050

Application Reference No: NEMA/EIA/EL/30175

M/S **Ambuya John**
(individual or firm) of address
P.O. Box 22433-00100 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert General**

registration number **8618**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **3/7/2025** Expiry Date: **12/31/2025**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

Appendix B: NEMA Correspondence and Approval

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Mobile Lines: 0724 253 398, 0723 363 010, 0735 013 046
Telkom Wireless: 020-2183718, 020-2101370
Incident Lines: 0786 101 100, 0741 101 100

P.O. Box 67839 - 00200
Popo Road, Nairobi, Kenya
Email: info@nema.go.ke
Website: www.nema.go.ke

REF: NEMA/TOR/5/2/868 **DATE: 12th March, 2025**

Chief Executive Officer,
ICT Authority,
Teleposta Towers 12th Floor, Kenyatta Avenue,
P.O. BOX 27150-00100,
NAIROBI.

RE: TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED INSTALLATION OF A HIGH CAPACITY FIBRE OPTIC CABLE & RELATED SERVICES ALONG THE ISIOLO MANDERA ROAD.

We acknowledge the receipt of your TOR for the above proposed project.

Pursuant to the Environmental Management and Coordination Act, 1999, the Environmental (Impact Assessment and Audit) Regulations 2003 and Legal notice 31 & 32 of 2019, your terms of reference for the Environmental Impact Assessment (EIA) for the **PROPOSED INSTALLATION OF A HIGH CAPACITY FIBRE OPTIC CABLE & RELATED SERVICES ALONG THE ISIOLO MANDERA ROAD** has been approved with the following conditions:

1. You shall undertake a detailed climate change risks and vulnerability assessment to inform the appropriate adaptation and mitigation measures to climate proof the project in line with provisions of Climate Change Act, 2016.
2. You shall undertake detailed baseline environmental and social conditions on security situational analysis, water demand and supply analysis, waste management, noise and excessive vibrations, air quality, traffic impacts, geotechnical and existing land use character within the proposed project site.
3. You shall undertake inclusive and detailed Public Participation with the Project Affected Persons (PAPs) in full compliance to Regulations 17 of the EIA/EA Regulations 2003 and provide evidence of Published Notices for the meeting dully signed minutes and attendance lists of least three consultation meetings.

You shall submit ten (10) copies of the EIA study report accompanied by the above specialized assessment reports upon payment of the applicable EIA processing and monitoring fees being 0.1% of the total project cost, a soft copy of the summarised ESMP in **WORD** format for preparation of public notice and one electronic copy of the report prepared by the team of experts to the Authority.

You are advised to comply accordingly.

JOSEPH MAKAU
FOR: DIRECTOR GENERAL

Background Information Document (BID)

Environmental and Social Impact Assessment (ESIA) Study for the Proposed Installation of a High-Capacity Optic Fibre Backbone (OFB) Network and Related Services along Isiolo-Mandera Road by Information, Communication & Telecommunication Authority (ICTA).

Introduction

This Background Information Document (BID) provides information to assist stakeholder participation in ESIA for the Proposed Installation of a High-Capacity Optic Fibre Backbone (OFB) Network and Related Services along Isiolo-Mandera Road. This BID contains the following:

- Project Proponent;
- ESIA Overview;
- Description of the Project;
- Location of the Project;
- The potential benefits and impacts posed by the Project;
- The processes that will be followed to engage with stakeholders; and
- How and when stakeholders can participate in the ESIA process to be followed for this Project.

Project Proponent

The project proponent is ICT **Authority (ICTA)**. ICTA is a statutory body within the State Department for ICT and Digital Economy under the Ministry of ICT and Digital Economy (MICDE). The authority was established through the Gazette Supplement No. 118, Legal Notice No. 183 of 16th August 2013. ICTA's broad mandate entails enforcing ICT standards in government, establishing, developing and maintaining secure ICT infrastructure systems, supervision of electronic communications, as well as promoting digital literacy, capacity, innovation and enterprise.

What is an ESIA?

The Project requires Environmental Authorization (EA) from the National Environment Management Authority (NEMA), through an Environmental and Social Impact Assessment (ESIA) process. NEMA is the competent authority under these regulations and has authority to approve the development or refuse it.

This document provides background information on the project and the ESIA process. It helps Project Stakeholders understand the project and provides guidance on getting involved. Project Stakeholders play a very important role in the ESIA process. We encourage you to register, this will enable Ambuya John to keep you informed throughout the ESIA processes. By doing so you will be able to engage in Environmental Assessment Practitioner for the ESIA. The ESIA will determine anticipated impacts and risks and propose measures on how these should be managed. Measures to enhance Project positive impacts will also be proposed. The ESIA Project Report will then inform an environmental authorizations decision to be taken by NEMA.

Project Description

The proposed Project involve design and installation of a 740-kilometer high-capacity Optic Fibre backbone network along the Isiolo-Mandera Road as part of Horn of Africa Gateway Development Project (HoAGDP). The total length of the road is 740 kilometers (Km) with connecting spurs estimated at 200 km long:

- Backbone Network - 741.75 Km (Main route);
- Metro Networks - 62.018 Km (Towns); and
- Access Network - 194.517 Km (Connectivity to Institutions). A total of 341 Institutions have been identified for connection, these include Government Institutions, Health Facilities, Schools, TVETs and Community Centers.[68]

The OFB project, inter alia, supports Kenya's economic development strategy and addresses the need to enhance internet connectivity to the Northeastern part of the country as well as to the neighboring countries of Ethiopia and Somalia, and the larger HoA region. This connectivity will extend to the Port of Mombasa, and join other high-capacity submarine cables, such as Djibouti Africa Region Express (DARE) and the Pakistan and East Africa Connecting Europe (PEACE) to further improve the regional digital connectivity. The OFB network will traverse five (5) counties namely Isiolo, Meru, Garissa, Wajir and Mandera. An integrated infrastructure development approach has been adopted for implementation of this project. The civil works relating to laying of Fibre Optic Cable ducts will be integrated in the road by the Kenya National Highways Authority (KeNHA). The ICT Authority (ICTA) is responsible for design and supervision of the installation of active equipment, fiber blowing, connections to schools, hospitals, other strategic locations including pastoralist roadside markets, export processing zones, rest stops, community centers and service

[68] Preliminary Project Design Document

centers along the corridor as part of the smart roads network (SRN). Actual installation of the OFB and active equipment is done by contractors.

Project Location

The below map shows the proposed OFB network Project locations

Project Activities

Since civil works relating to laying of Fibre Optic Cable ducts are integrated in the road by the KeNHA except for incomplete road sections, ICTA shall undertake the following activities:

- Design an OFB network;
- Relocation and rehabilitation of existing NOFBI;
- Installation of OFB network via fiber blowing and related active equipment;
- Connections to schools, hospitals, other strategic locations including pastoralist roadside markets, export processing zones (EPZ), rest stops, community centers and service centers.
- Operation and maintenance of the optic fiber cable infrastructure; and
- Decommission of the optic fiber cable infrastructure at the end of their useful life.

Potential Project Impacts & Risks

A summary of potential impacts is provided below. The potential impacts are discussed for each of the physical, biological and socio-economic aspects during the construction, operational and decommissioning phases. These impacts will be assessed in detail during the on-going ESIA process and the results included in the ESIA Report prior to seeking approval from NEMA.

Physical

Air Quality

Dust creating activities during the construction phase will largely be associated with land clearing and earthworks in non-bitumen road sections. Air quality considerations during the operation phase will be associated with staff movements and the in-frequent operation of a backup generator for power.

Ambient Noise

Noise will primarily be a consideration during the construction phase and at sections with human settlement. During operation phase noise will be associated with the in-frequent operation of a backup generator for power.

Soils and Geology

Soil quality could be impacted through compaction created by construction, operations, and stockpiling. Soil quality and properties could be altered through the release of potential contaminants to land because of an unplanned event or accident.

Water Resources

The size of the Project Site and planned earthworks are very unlikely to result in impacts to water resources. Full utilities and drainage are already included in the road design.

Waste Management

Various wastes will be generated during Project development and operation.

Biological

Terrestrial Habita Alteration

KeNHA is upgrading the road to bitumen standard. The OFB network Project construction will be done within the developed road corridor. Anthropogenic changes will have already occurred in most areas. It is not anticipated that there will be any further loss of habitat or disturbance that is not short term (e.g. related to the construction phase). There is the possibility that in the process of construction works, fauna (e.g. livestock, wildlife) could be impacted or the temporary removal of vegetation (e.g. for trenching, etc.) could impact on potential habitats. The habitats surrounding the road corridor are primarily shrubs.

Socio-economic

Community Health & Safety (CHS) and Security

Movement of vehicles during construction and operation will pose a risk to CHS. Labour influx is unexpected since required labour will. Be recruited locally.

Construction staff may be targeted by robbers or bandits during construction. This risk is highest during pay days. Moreover, members of the local community can also be the aggressors whenever they perceive to not have been adequately engaged.

Worker Health & Safety

Construction or operational activities poses occupational health and safety (OHS) risks to the workforce including those associated with working with Project machinery and equipment and working at heights.

Traffic and Transportation

Potential traffic congestion, creation of hazardous driving conditions and obstruction of access to homes, businesses and community services during trenching and cable laying operations.

Partial Loss of Productive Assets

Excavation and backfilling operations required to install underground optical fiber cable may: (i) Impact partially agricultural crops and fruit trees, as well as ornamental vegetation; and (ii) Temporarily impede access to commercial and institutional establishments, and to residential buildings.

Steps for the ESIA Process

ESIA is part of the Project development process and is usually done at the initial stages of the Project planning and development. It is a decision-making tool and should guide whether a Project should be implemented, abandoned or modified before implementation.

The objectives of the ESIA are to assess the significance of all identified impacts and to formulate mitigation measures. After the different aspects of the ESIA have been completed, an ESIA Project Report including an Environmental and Social Management Plan (ESMP) will be compiled and submitted to NEMA for licensing.

Public Participation

Public participation is a legal requirement in the ESIA process; the key principle of consultation is to ensure that the views of stakeholders are considered and reported throughout the ESIA process. The objective is to ensure that the assessment is robust, transparent and has considered the full range of issues or perceptions, and to an appropriate level of detail. Stakeholder participation will assist in identifying environmental and social consequences of the proposed Project and ensure that these are evaluated in the process.

Public Participation in the ESIA

The stakeholder engagement process is designed to conform to the NEMA Regulations and global best practice. Key objectives for stakeholder engagement for this Project are:

- Share information about the Project and gather local knowledge to improve understanding of the environmental and social context and understand locally important issues;
- Enable stakeholders to raise concerns/questions about the Project and incorporate stakeholder views into the design and management measures;
- Respond to concerns and questions and report back on the findings of the ESIA and proposed management measures; and
- Lay foundation for future stakeholder engagement.

Any party that is interested or potentially affected by the Project is invited to participate in the ESIA process. Please make use of the following opportunities to be involved in the stakeholder engagement process:

- Study the information in the BID;
- Contact the Project Team for further information or raise issues and concerns;

  Ambuya John – ESIA Lead Expert

  Tel: 0721852934/0733852934

  Email: John@greyfos.co.ke

  Physical Address: 4th Floor, Transnational Plaza, Mama Ngina Street

- Complete the Comment Sheet (attached) and return by hand, mail, fax or e-mail; and
- Attend planned stakeholder meetings. More information about the meetings will be circulated through letters, community leaders, and through the Project website.

Comments Form (Please feel free to use an extra form if you have more comments)

What are the primary comments/questions/concerns that you or your organization have about this Project?

What positive impacts do you expect to emanate from the development of the proposed Project?

What negative socio-economic impacts do you anticipate from the development of the proposed Project?

What negative environmental impacts do you anticipate from the development of the proposed Project?

Kindly propose mitigation measures that ICTA needs to put in place during and after the development of the proposed Project

Do you support the development of the proposed Project?

Other Comments