

Environmental and Social Impact Assessment for Raxio Data Centre, ICT Park, Addis Ababa, Ethiopia



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Acronyms

AEDC plc	AMLENA Environment and Development Consulting Private Limited Company
AIDS	Acquired Immune Deficiency Syndrome
CEFCC	Commission of Environment, Forest and Climate Change
EIA	Environmental Impact Assessment
EPE	Environmental Policy of Ethiopia
ESMP	Environmental and Social Management Plan
FDRE	Federal Democratic Republic of Ethiopia
GHG	Green House Gas
HIV	Human Immune-Deficiency Virus
JSA	Job Safety Analysis
KAs	Kebele Administrations
PPE	Personal Protective Equipment
STIs	Sexually Transmitted Infections

EXECUTIVE SUMMARY

Project Background

This is the ESIA document for Raxio Data Centre that will be established in the Information and Communication Technology (ICT) Park located on the outskirts of Addis Ababa. It is prepared by AEDC plc, a CEFCC certified company, as part of contractual agreement with Yema Architecture plc.

First Brick Holdings (“FBH”) is a Roha Group Company that intends to build the foundation of the digital economy across Eastern and Southern Africa. FBH intends to develop 10 to 12 carrier-neutral, co-location data Centres of international (Tier III) standard, operating under the ‘Raxio’ brand in East and Southern Africa (“the Project”). The project will have a phased approach where the general approach is for the first phase to be 500kW, followed by phases 2 and 3 which will each add an additional 500 kW of IT load (with localized variations where required).

Objective of the ESIA

The objective of preparing this ESIA is to review the legal framework and policy issues, provide details about the baseline environment, activities of the project and their potential impacts on the receiving environment. Moreover, the document helps to address and minimize the potential environmental and social impacts and enhance the positive ones through the implementation of environmental and social mitigation measures.

ESIA Methodology

The document is prepared by collecting and reviewing relevant documents including policy, previous study documents, use of Google Earth, site reconnaissance, consultation, transect walk and checklist were used.

Legal and Policy Framework

Ethiopia has a well-organized and structures environmental management legal system that is supported all the way from the Federal constitution through the proclamations, policies and guidelines. In addition to this, the recent investment proclamation encourages the investment that boost digitization of Ethiopian economy. Details on each of these legal and policy framework are described in chapter 3 of the document.

Description of the Project

The telecom sector in Ethiopia has shown significant growth over the past decade as continued investment in ICT infrastructure, availability of services and increasing purchasing power have contributed to expanding the customer base.

The proposed Raxio Data Centre is essential to assist the ever increasing strong and broad-based economic development in Ethiopia. In addition to this, at present, the government of Ethiopia is engaged in aggressive infrastructure development projects such as roads, railways, power production and distribution, airports and industrial parks.

Baseline of the Impact Receiving Environment

The government of Ethiopia has already allocated 200 ha of land and established ICT Park on the outskirts of Addis Ababa. The selected site is ideal for the establishment of data Centre as it is approximately 10 to 15 km away from the Centre of the city. It is located on a relatively flat topographic formation.

The climate of the town of Addis Ababa has a subtropical highland climatic condition with precipitation varying considerably by the month. The city has a complex mix of alpine climate zones, with temperature differences of up to 10 °C, depending on elevation and prevailing wind patterns. The high elevation moderates temperatures year-round, and the city's position near the equator means that temperatures are very constant from month to month. As such the climate would be maritime if its elevation was not taken into account, as no month is above 22 °C in mean temperatures.

The site does not contain any form visible biological resources above the ground other than few shrubs and grasses. During the site visit the team witnessed the site consists of few stockpiles of spoil material dumped on the site. Moreover, the site is possessed by ICT Park after compensating the previous land users. At present, no agricultural activity takes place on the site other than animals grazing on the site. Thus, the land use change took place a couple of years ago when the park possessed the site and converted it as part of the park as can be witnessed from the attached letter of possession.

The park provides two kinds of services for its clients. The first service is building rental services, where there are fourteen companies receiving this service at present and the second service is sub-lease land service where companies build their own infrastructures depending on their interest. At present, there are twelve companies engaged in the second service line. Most of the service recipients are engaged in manufacturing of ICT equipment, software developers, consultancy service providers, and few are data Centres.

Public Consultation

The proposed project site is located within the boundary of the previously delineated ICT Park. Based on the preliminary site investigation and information obtained from the park administration and local residents, the government had already provided compensation for the project affected people 15 years ago. Consultation with the park administration revealed that the park doesn't have the exact number of previous land users who received the monetary compensation. Recently, the government attempted to distribute tractors for the youth of the project affected people that was still contested for lack of clarity on the criteria used to include the youth.

On the other hand the previous land users confirmed that consultation was conducted following the Expropriation of Land Holding for Public Purposes and Compensation Payment (Proclamation No. 455/2005), although the monetary compensation was 3 Birr pre meter square.

In addition to this, no grievance redress mechanism was in place to address issues related to the process and outcomes of the compensation for the project affected people. According to these project affected people, the land acquisition and compensation process destroyed their livelihoods once and for all.

At present, none of the promises made for the project affected people during consultation session did materialized. Furthermore, the team noticed encroachment into the park compensated areas by the previous land users. Hence, the assessment team have deep concern about reemerging complaints and friction with the project affected people cognizant of the current political condition of Ethiopia unless immediate intervention are made via a well-organized and critically prepared plan to restore and sustain the livelihood of the project affected people.

Impacts of the Project on the Environment

The construction and management of the data Centre is an important and critical infrastructure that boosts data management facility that supports the digitalization of Ethiopian economy, create job for the local skilled and unskilled labor, and create income generating activities. On the other hand, the adverse impacts of the project on the receiving environment includes: soil compaction, pollution and management of spoil material, air pollution by dust and emission from construction machineries, water pollution from release of hazardous substances, health hazard from communicable diseases such as HIV/AIDS and expansion of crime, accident on the workforce during construction period, competition for local resources (such as water, electricity, etc. services) during operation phase, solid waste and domestic wastewater during operation phase during operation phase and the spread of COVID 19 virus. Finally, it brings about change in the land use and land cover in the area from the current vegetative cover that insulates the land and deprive its capacity from permeable to water to sealed land cover.

Impacts Mitigation and Management

The mitigation measures for the impacts associated with soil compaction, pollution and management of spoil material; the assessment included preserving top soil for later rehabilitation purposes, loosen the compacted soil after completion of the site activities, provide adequate drainage structures so as to maintain the normal flow direction and attempt to maintain uniform water distribution over surfaces; and avoid dumping spoil material near rivers or wetlands as much as possible. Include vegetative cover areas such as grassing and tree planting in the design of the project.

For the impacts associated with air pollution by dust and emission from construction machineries, mobilize machineries that are efficient and release small amount of emission and low fuel consumption; establish low dust policy with the construction premise such as speed limit for vehicles, speed breaks along vehicular routes, give orientation to drives to respect traffic signals within the construction area; and ensure regular and periodic maintenance of vehicles and machineries so as to reduce pollution related to motor exhausts.

For the impacts associated with communicable diseases such as HIV/AIDS and expansion of crime, create awareness raising sessions, provide condoms, VCT and periodically conduct general

capacity building trainings. In order to tackle the problems associated with accidents conduct awareness, based on job safety analysis provide PPE and monitor proper use. For competition for resources establish own sources of water and establish rainwater harvesting structures and domestic wastewater treatment setups. Implement all protocols for COVID prevention and control.

Last but not least, this ESIA must be updated thought the course of construction and implementation time to accommodate unexpected environmental and social issues that might happen to appear along with the construction activities. In case no new circumstances appear, the ESIA will be updated annually.

1. INTRODUCTION

1.1. Project Background

The twenty first century is characterized by the flow of colossal amount of data that requires smart data management facilities termed data centres. A data Centre is a facility that centralizes an organization's shared IT operations and equipment for the purposes of storing, processing, and disseminating data and applications. Because they house an organization's most critical and proprietary assets, data Centres are vital to the continuity of daily operations. Consequently, the security and reliability of data Centres and their information are among any organization's top priorities.

In the past, data Centres were highly controlled physical infrastructures, but the public cloud has since changed that model. Except where regulatory restrictions require an on-premises data Centre without internet connections, most modern data Centre infrastructures have evolved from on-premises physical servers to virtualized infrastructure that supports applications and workloads across multi-cloud environments.

Raxio Data Centre Ltd (Ethiopia) ("Raxio Ethiopia" or "Raxio") will be established under First Brick Holdings, a company focused on investing in and building world class Tier III data Centres across Eastern and Southern Africa. Currently, subsequent to its first investment and development of a data Centre in Uganda ("Raxio Uganda"), First Brick Holdings will establish and invest in Raxio Ethiopia to build and operate the first state-of-the-art, privately owned data Centre in Ethiopia.

The data Centre will be built and operated as a Tier III standard facility meeting the uptime, redundancy and maintainability requirements established under the standard. The facility will also adhere to the principle of neutrality, both for carriers and ISPs as new players begin to enter the Ethiopian market, and for cloud service providers, that will be able to operate freely from within the data Centre.

Raxio will offer primarily data Centre colocation services where customers can house their computing, networking, storage and critical IT infrastructure in an optimally operated and secure environment. By co-locating in Raxio's facility, customers will benefit from a "shared

infrastructure” model, and substantially reduce their operational and capital costs while improving application performance and flexibility. Raxio will supplement its core colocation offering with several additional services, including cross connection and remote hands.

It is believed that this project addresses the large and underserved demand for high-quality colocation data Centre services in Ethiopia. This is in line with a regional trend of increased demand for high quality environments for local storage, business critical systems and data hosting solutions (such as local cloud services), and the need for external data recovery sites for business continuity.

In Ethiopia, businesses currently house their IT equipment in facilities they build, operate and maintain themselves—mostly in a suboptimal fashion. These facilities range in size from small 1-4 rack server rooms to medium size 8-16 rack rooms built by larger and more financially able companies like banks. Most companies we have approached as part of our analysis are conscious that investing in and operating data Centre facilities is a costly exercise, and an activity that is not core to their business. Most expressed a strong preference for co-locating in a third party facility if the option was available. The key target industries for Raxio Ethiopia will be financial services, cloud service providers, IT companies, carriers and internet service providers, content delivery networks, media companies, and large enterprises.

With the favorable developments in the Ethiopian regulatory environment and in the market dynamics, it is believed that the time is right to expand First Brick Holding’s data Centre network into Ethiopia. Thus, the data Centre will have a transformational effect on the Ethiopian digital economy by providing a critical and missing part of digital infrastructure in the country. It will enable Ethiopian companies to operate more effectively locally, to compete in a regional and global context and will provide an environment where new companies focused on the digital economy can thrive. We believe the facility will have significant knock-on effects, creating opportunities for technology savvy employment and broader technological exchange.

As per the legal requirement of Ethiopia, projects such as this require undergoing rigorous environmental and social impact assessment process in order to avoid and mitigate undesirable impacts and maximize their beneficial impacts. Accordingly, Raxio mobilized AMLENA Environment and Development Consulting plc, CEFCC certified company to prepare Environmental and Social Impact Assessment (ESIA). Thus, this is the ESIA of the Raxio project

that will be realized on one ha of land within the premise of information communication and technology (ICT) park in Addis Ababa, Ethiopia.

The document describes all the required procedures (screening, scoping, impact identification, impact analysis and evaluation, impact mitigation, analysis of alternatives, monitoring and management plan) followed in the preparation of the ESIA documents. Moreover, consultations were made with all project stakeholders.

1.2.Scope and Objectives of the ESIA Service

The scope of ESIA study emphasizes on Raxio Data Centre Project including assessment of the baseline environment in the project area; environmental scoping to identify major environmental impacts; consideration and analysis of alternatives; identification and analysis of impacts; development of mitigation measures and preparing an environmental management and monitoring plan for the project.

The objective of preparing this ESIA is to provide details on the environmental management activities, site procedures and practices which are followed during the construction activities. Moreover, it helps to address and minimize the potential environmental and social impacts and enhance the positive ones through proper implementation of environmental and social mitigation measures. Thus, the preparation of this ESIA helps to:

- Establish baseline environmental data of the project and surrounding environment, including physical, ecological, socio economic and any other relevant factor;
- Undertake environmental impacts assessment and analyses to identify impacts (positive and negative) and propose mitigation and enhancement measures to be incorporated in the design and construction activities of the data Centre project;
- Carry out public consultations regarding the potential environmental benefits accruing from the construction of the data Centre project;
- Prepare an environmental mitigation management plan and an environmental monitoring plan along with indication of the required implementation cost estimates and responsible implementing agencies; and

- Indicate environmental training and induction requirements for Raxio personnel, Construction Contractor, sub-contractor and other stakeholders responsible for implementation of proposed Environmental and Social Management activities;

1.3.ESIA Preparation Approach and Methodology

The technical approach for the preparation of this ESIA involved two aspects. The first aspect involves in-house data collection, review and field data collection tool development and the second aspect is the field based (in-situ) data collection, analysis and report writing. Consultation with environmental experts and local administration, site visual inspection, google data, transect walk and checklists were used.

The methods used for the ESIA study include collection and review of relevant documents including policy and previous study documents, use of Google Earth, onsite environmental investigation, consultation with environmental experts and local administration, site visual inspection, transect walk and checklists were used. The details of the methodologies adopted for the study are briefly described as follows:

- **Collect and review relevant policy and study documents:** The most important policy documents include Environmental Policy of Ethiopia (1997), Environmental Impact Assessment Proclamation No 299/2002, Environmental Pollution Control Proclamation No 300/2002 and Investment Proclamation No 1180/2020. Apart from these national legal documents the ESIA process involved the review of the World Bank Safeguard Policy and guideline
- **On-site observations:** A multi-disciplinary environment study team conducted the site twice to generate the required baseline environmental data. During site visit, data collection was done both from primary sources and secondary sources using checklists and observation. During these site visits, physical observation of the environmental settings of the selected site was done. Parallel to the physical observations, consultations and interviews were also made.

1.4. Structure of the Report

This ESIA study report is prepared for Raxio Data Centre Project and the report is structured as follows:

- Chapter 1 presents background information on the project, scope and objectives of the ESIA study, methodology adopted for the ESIA study;
- Chapter 2 discusses relevant policy and legislative standards and the administrative framework including the World Bank Environmental Policy and Guideline;
- Chapter 3 presents a description of the proposed Raxio Data Centre Project that includes description of location, the data Centre project components and characteristics;
- Chapter 4 presents the baseline environment under three categories; namely physical environment, biological/ecological environment and socio economic environment;
- Chapter 5 presents summary of findings of public and other stakeholders consultations;
- Chapter 6 Describes Potential Environmental Impacts
- Chapter 7 Presents description and analysis of the alternative project options;
- Chapter 8 Environmental and Social Management Plan;
- Chapter 9 Conclusion and Recommendations

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

Development programs and projects should comply with available policies, legislative and institutional frameworks and standards for proper execution and implementation. Knowledge of the policy and legal frameworks within which the project is going to be implemented would facilitate the project performance and helps to ensure sustainable development. There are several policy and legal documents both at federal and regional level as regards to environmental management and development projects. This chapter review and discuss on relevant national policy, strategy, legislative and institutional framework as well as the World Bank's policy and funding procedure in context to the proposed data Centre project implementation and sustainable service.

2.1 Relevant Policies and Strategies

2.1.1 Environmental Policy of Ethiopia (EPE 1997)

The Environmental Policy of Ethiopia (EPE) was approved by the Council of Ministers in April 1997 (EPA/MEDAC 1997). It is based on the CSE which was developed through a consultative process over the period 1989-1995. The EPE's overall goal may be summarized in terms of improvement and enhancement of the health and quality of life of all Ethiopians, and the promotion of sustainable social and economic development through the adoption of sound environmental management principles. Specific policy objectives and key guiding principles are set out clearly in the EPE, and expand on various aspects of the overall goal. The goal of the policy is to "...improve and enhance the health and quality of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, man-made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs." The policy contains sectoral and cross-sectoral policies and also includes provisions required for the appropriate implementation of the policy itself.

The sectoral environmental policies are:-

- Soil husbandry and sustainable agriculture,
- Forest woodland and tree resources,
- Genetic species and ecosystem bio-diversity,

- Water, energy and mineral resources,
- Human settlement, urban environment and environmental health,
- Pollution from industrial waste and hazardous materials,
- Atmospheric pollution and climatic change,
- Cultural and natural heritage.

The cross-sectoral environmental policies cover the following:

- Population and the environment,
- Community participation and the environment,
- Tenure and access rights to land and natural resources,
- Land use plans,
- Social and gender issues,
- Environmental economics, information systems and research,
- Environmental impact assessment,
- Environmental education and awareness.

The section of the EPE concerning ESIA sets out a number of policies, the key elements of which may be summarized as follows:

- Recognition of the need for ESIA to address social, socio-economic, political and cultural impacts, in addition to physical and biological impacts and for public consultation to be integrated within ESIA procedures,
- Incorporation of impact containment measures within the design process for both public and private sector development projects and inclusion of mitigation measures and accident contingency plans within environmental impact statements (EISs),
- Creation of a legal framework for the ESIA process, together with a suitable and coordinated institutional framework for the execution and approval of ESIAs and environmental audits,
- Development of detailed technical sectoral guidelines for ESIA and environmental auditing,

- Development of ESIA and environmental auditing capacity and capabilities within the Commission for Environment, forest and Climate Change, sectoral ministries and agencies, as well as in the regions.

The thorough and holistic approach taken to development of the policy and, in particular, the recognition of the importance of addressing cross-sectoral environmental issues, has led to a national approach to environmental management, which is not only comprehensive, but also provides a sound and rational basis for addressing the environmental problems faced by the country now and those which are anticipated over the next decade.

In accordance with the EPE principles the proposed Raxio Data Centre Project considers environmental and social impact assessment study, and this ESIA report incorporate impact containment measures to be implemented at different phases of the project Centre development.

The EPE sectoral and cross-sectoral environmental policies have been followed by preparation of detailed policy and legislative framework, and the most relevant and available policies that can be triggered by the proposed project implementation are briefly presented in the following section.

2.1.2 Water Resource Policy (1999) and Proclamation No. 197/2000

The then Ministry of Water Resources has formulated the Federal Water Resource Policy for a comprehensive and integrated water resource management. The overall goal of the water resources policy is to enhance and promote all national efforts towards the efficient and optimum utilization of the available water resources for socio-economic development on sustainable bases. The policies are meant to establish and institutionalize environmental conservation and protection requirements as integral parts of water resources planning and project development.

The proposed Raxio Data Centre Project is located inside ICT Park area free from settlement lot allocated for such projects in Addis Ababa. The project construction activities may result in increased soil erosion and sediment, pollution from lubricant chemicals affecting quality of water resources in the project area.

2.1.3 Forest Policies and Strategies

The Proclamation on Conservation, Development and Utilization of Forests was issued in 1994 (Proclamation No. 94/1994) to provide for the Conservation, Development and Utilization of

Forests. The objective of this Proclamation is to provide the basis for sustainable utilization of the country's forest resources. The Proclamation categorizes types of forest ownership (State, Regional and Private Forests). It provides the power for designation, demarcation and registration of forests to the Ministry of Agriculture and Regional Governments. According to this proclamation, state and regional forests shall be utilized in accordance with approved management plans. The Proclamation then goes on to give some specific direction for the utilization of State and Regional Forests and lists prohibited activities within protected forests.

The construction of Raxio Data Centre will involve removal of few scattered trees and during construction the alignment development will take utmost care to minimize impacts in accordance with this policy.

2.1.4 Ethiopia's Green Development Initiatives

Building on the positive development of recent years, Ethiopia aims to achieve middle-income status by 2025 while developing a green economy. To this end, boosting agricultural productivity and strengthening the industrial base will be essential to reach this goal.

Following the conventional development path would, among other adverse effects, result in a sharp increase in greenhouse gas (GHG) emissions and unsustainable use of natural resources. To avoid such negative effects, the government has developed a strategy to build a climate-resilient green economy (CRGE).

The CRGE initiative follows a sectoral approach and aims at overcoming the challenges of developing a green economy. This strategy focuses on four pillars (including renewable and clean sources of power) that will support Ethiopia's developing green economy:

- Adoption of agricultural and land use efficiency measures;
- Increased GHG sequestration in forestry, i.e., protecting and re-establishing forests for their economic and ecosystem services including as carbon stocks;
- Deployment of renewable and clean power generation; and
- Use of appropriate advanced technologies in industry, transport, and buildings.

It is believed that establishing these pillars within the relevant parts of the economic development plan will prevent the economy from being locked into an unsustainable pathway and can help to attract the investment required for their development.

The construction of Raxio Data Centre is required to comply with this initiative as the project is constructed in a previous farmland and current grazing area predominantly and emissions like GHG shall be addressed properly.

2.1.5 Health Policy

Ethiopia's health policy was issued in 1993 with the aim of giving special attention to women and children, to neglected regions and segments of the population and to victims of man-made disasters.

The priority areas of the policy are in the field of Information, Education and Communication (IEC) of health to create awareness and behavioral change of the society towards health issues, emphasis on the control of communicable diseases, epidemics, and on diseases that are related to malnutrition and poor living condition, promotion of occupational health and safety, development of environmental health, rehabilitation of health infrastructures, appropriate health service management system, attention to traditional medicines, carrying out applied health research, provision of essential medicines and expansion of frontline and middle level health professionals.

Construction of Raxio Data Centre might have direct and indirect impacts on health during construction and operation. The mitigation measures and awareness of the impacts shall be carried out in line with this policy.

2.1.6 Education and Training Policy

The Education and Training Policy of Ethiopia aims at achieving universal education by the year 2015. The general objective of the policy is to develop physical and mental potential of individuals who can take care of and utilize their resources and to bring up citizens who respect human rights.

2.1.7 National Policy on Population

Ethiopia developed its Population Policy in 1993. The rationale behind the policy is that with increased human numbers, the population carrying capacity of the land decreases. Forest cover is estimated to have declined from 40 to 3 percent. Large expanses of land with large herds of livestock are said "to play havoc with the environment". The policy has as its major goal:

“The harmonization of the rate of population and the capacity of the country for development and rationale utilization of natural resources to the end that level of welfare of the population is maximized over time”.

One of the general objectives of the population policy is Maintaining/improving the carrying capacity of the environment by taking appropriate environmental protection/conservation measures.

2.1.8 National Policy on Women

The Constitution of the FDRE recognizes equal rights for women and men; however, the traditional societal structure keeps women in a very low position and vulnerable situation. Women occupy a very small percentage of key political and government decision making positions.

Harmful traditional practices are common in the country; about 80 percent of women have undergone Circumcision and other harmful traditional practices. Early marriage of young girls is a common occurrence among most cultures in Ethiopia. Some studies and reports suggest that violence against women is quite high and increasing every year.

Ethiopian women also experience heavy workloads and mainly domestic work. It is estimated that on average women work 15-18 hours per day. Women also do not have access and control to resources. According to the 2003 Agricultural census only 18.6% women among farming communities were able to have ownership of agricultural land. On the other hand, women among the pastoral communities can own property only if they have a male guardian.

2.1.9 National Policy on HIV/AIDS

The HIV/AIDS pandemic is spreading worldwide and hitting hard poor countries. Sub Saharan Africa with only 10% of the world population is having 80% of the world HIV infection and AIDS cases. Among the Sub Saharan African countries, Ethiopia stands fifth in HIV/AIDS infection rates.

Ethiopia is one of the countries in the world that is facing HIV/AIDS pandemics, and about 3.5% of the population is said to be HIV/AIDS positive. HIV/AIDS has now become a major social and economic problem of the country. Having understood the magnitude of the problem, the Government issued a HIV/AIDS policy in 1998.

The general objective of the policy is “to provide an enabling environment for the prevention and control of HIV/AIDS in the country”. The policy also urges government ministries and the civil society to assume responsibility for carrying out HIV/AIDS awareness and prevention campaigns.

The policy outlines the large social, psychological, demographic and economic impact that HIV/AIDS will have and introduces a number of issues relating to HIV/AIDS. These are:

- HIV/AIDS is not only a health problem but also a developmental problem,
- Gender inequality contributes to further spreading HIV/AIDS,
- Women, including those living with HIV/AIDS, need access to information and services regarding HIV/AIDS and to family planning provision to help them make reproductive choices and decisions,
- The magnitude of the problem will need considerable resources and a multi-sectoral effort to control the HIV/AIDS epidemic
- There is a need for a holistic approach in the provision of care to people living with HIV/AIDS,
- Human rights of people living with HIV/AIDS need to be recognized,
- HIV/AIDS has the potential for a catastrophic impact.

The National AIDS Council was established in 2000 under the Chairmanship of the FDRE President; and in 2002 the HIV/AIDS Prevention and Control Office (HAPCO) was established to address the problem.

2.2 The World Bank Safeguard Policies

The World Bank has developed 10 environmental, social and legal safeguard policies to help promote socially and environmentally sustainable approaches to development as well as to ensure that Bank operations do not harm people and the environment. These safeguard policies have been considered in relation to the proposed **Raxio Data Centre Project** and their applicability is summarized as follows:

OP/BP 4.01 Environmental Assessment (EA)

Environmental Assessment is one of the 10 environmental, social and legal Safeguard Policies of the World Bank. Environmental Assessment is used in the World Bank to identify, avoid and mitigate the potential negative environmental impacts associated with Bank lending operations. In World Bank operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable and that potentially affected people have been properly consulted.

The Bank classifies a proposed project into one of four categories, depending on the type, location, sensitivity and scale of the project and the nature and magnitude of its potential environmental impacts. The four categories of project are briefly described as follow:-

Category A: If a proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EA for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" situation), and recommends any measures needed to prevent, minimize, mitigate or compensate for adverse impacts and improve environmental performance. The Category A designation may be equated to the Schedule 1 designation in the Ethiopian EIA guideline document (EPA, 2000).

In relation to public consultation, the borrower is required to consult with stakeholder groups throughout project implementation as necessary to address ESIA-related issues that affect them. Annexes of the OP define the required structure of the ESIA report and the structure of the Environmental Management Plan (EMP) with which the ESIA report must comply.

Category B: Project is classified as Category B if its potential adverse impacts on human populations or environmentally important areas - including wetlands, forests, grasslands and other natural habitats - are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible and in most cases, migratory measures can be designed more readily than for Category A projects. The scope of EA for a Category B project is narrower than that of Category A EA. Like Category A EA, it examines the project's potential negative and

positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate or compensate for adverse impacts and improve environmental performance.

Category C: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.

Category FI: A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

The proposed Raxio Data Centre Project would fall under Category A because it is expected to bring a number of negative environmental and social impacts. Hence, it has been subjected to an ESIA study in order to identify potential impacts and propose mitigation measures in order to avoid or reduce the potentially significant adverse impacts to acceptable levels. In addition an Environmental Management Plan (EMP) that encompasses the mitigation, monitoring and institutional measures to be implemented during the project construction and operation phases has been prepared and included in the ESIA Report.

Safeguard Policies triggered

OP/BP 4.01, Environmental Assessment (EA)

- States that all projects proposed for World Bank Group funding require EA review/analysis to ensure that they are environmentally and socially sound/sustainable;
- An EA evaluates a project's potential environmental impacts; examines project alternatives; identifies ways of preventing, minimizing, mitigating or compensating for adverse environmental impacts and enhancing positive impacts;
- EA considers: the natural environment (air, water and land); human health and safety; social aspects (involuntary resettlement, cultural property); as well as, trans-boundary and global environmental aspects;
- Projects are categorized based on environmental significance. Category 'A' projects require a full ESIA undertaken by independent EA experts;

- Project sponsors for Category A projects must prepare a Public Consultation and Disclosure Plan (PCDP) and an Environmental Action Plan (EAP). Project sponsor must consult project-affected groups and local NGOs at least twice: before TORs for EA are finalized and once a draft EA report is prepared; and
- During project implementation, the project sponsor reports on compliance with (a) measures as agreed upon with World Bank, including implementation of an EAP; (b) status of mitigation measures; and (c) the findings of monitoring programs.

2.3 Legal Framework

2.3.1 The Constitution of the FDRE

The Constitution of the Federal Democratic Republic Ethiopia (FDRE), adopted in August 1995, forms the fundamental basis for enactment of specific legislative instruments governing environmental protection matters at national level. The Constitution has several provisions which have direct policy, legal and institutional relevance for appropriate implementation of environmental protection and rehabilitation action plans targeted to avoid, mitigate or compensate the adverse effects of development actions.

The Constitution thus contains a number of articles which are relevant to environmental matters in connection with development projects, as well as to the environment in general, and the prominent Articles relevant for the proposed Raxio Data Centre Project include:

Article 43: The Right to Development

This article states that “the people of Ethiopia have the right to participate in a national development schemes to improve living standards through promoting sustainable development. Above all when programs and projects are designed to be undertaken, people have the right to be consulted as their lives may be directly or indirectly affected by them”.

Relevance

Establishing the project in will provide job opportunity for a certain number of citizens through which their living standards can be improved and the project takes part in reducing unemployment in the city.

Article 44: The right to safe environment

This article declares that “all persons have the right to live in a clean and healthy environment. Moreover, people that have been adversely affected as a result of development schemes should be fairly compensated by monetary or other alternative means”.

Article 92: Environmental objectives

These articles give rights to citizens and assign duties and objectives to the government. The Constitution states that all persons have the right to a clean and healthy environment, and the government has a duty to ensure that all Ethiopians live in a clean and healthy environment as far as it is able, which includes access to and use of clean water, sanitation and hygiene facilities.

Safeguarding the environment from any human-made damage is covered by Articles 92/2 and 92/4 which state that projects, investments or developments should not destroy and pollute the environment (water, air and soil).

Relevance

These two articles (44 and 92) are mainly focusing on the rights of the people to live on safe environment and obligations of development projects to harmonize their work with environment. People should not be affected by the development or development should not be promoted at the expense of environment through minimizing quality of life. In relation with, this project prior plunging to implementation has recognized the environmental issues to be incorporated in the project cycle. As a result, all possible impacts have been identified, alternatives are examined, the extent and magnitude of impacts are predicted, the significance of impacts are evaluated and at last mitigation measures have set for adverse impacts, which will serve as the coherent environmental management plan, to correct problems as early as possible. The project confirms that its operation will be agreeable or is not out of the declaration of the above articles.

Undertaking of such actions helps the project to early estimate the cost benefit analysis by including environmental costs and able to project the actual profit margin. It also increases the sustainability of the project and general development process by integrating social, economic and environmental components. It also provides an environmental security to the community.

2.3.2 Establishment of Environmental Protection Organs (Proclamation No. 295/2002)

The objective of this Proclamation is to assign responsibilities to separate organizations for environmental development and management activities on one hand and environmental protection regulations and monitoring on the other hand, in order to ensure sustainable use of environmental resources thereby avoiding possible conflicts of interest and duplications of effort. It is also intended to establish a system that fosters coordinated but differentiated responsibilities among environmental protection agencies at federal and regional levels.

The EPA has been re-established as an autonomous public institution of the Federal Government of Ethiopia by this Proclamation.

2.3.3 Environmental Impact Assessment (Proclamation No. 299/2002)

The Environmental Impact Assessment Proclamation (proclamation No. 299/2002) has been issued on the 3rd of December 2002. The main objective of the Proclamation is to make the EIA mandatory for specified categories of activities undertaken by public or by private sectors. Undertaking EIA was not a legal requirement before the formation of this Proclamation. The general provisions of the Proclamation include:

- Implementation of any project that requires an EIA (as determined in a directive) is subject to an environmental clearance or authorization from the EPA or Regional Environmental Agency (REA);
- The EPA or the relevant REA depending on the magnitude of expected impacts may waive the requirement for an EIA;
- Any licensing agency shall, prior to issuing an investment permit or trade or an operating license for any project ensure that the EPA or the relevant REA has authorized its implementation;
- A licensing agency shall either suspend or cancel a license that has already been issued, in the case that the EPA or the REA suspends or cancels the environmental authorization;
- Approval of the ESIA report or the granting of authorization by the EPA or the REA does not exonerate the proponent from liability for damage;
- The EPA has prepared EIA procedural guidelines towards the realization and implementation of this proclamation.

The proposed Raxio Data Centre Project is a Schedule I Project according to EPA environmental guidelines; hence requires a full ESIA, since it is constructed as part of the ICT Park with permanent structures and involves several activities including asphalt sealed internal access roads.

2.3.4 Environmental Pollution Control (Proclamation No. 300/2002)

The Proclamation is developed on the obligation to protect the environment of the Country as a whole and it aims at securing the right of each citizen to a healthy environment. It provides the basis from which the relevant environmental standards can be developed and enforces the standards set based on the polluter pays principle. Environmental Inspectors are to be assigned by the EPA or regional environment offices, whereas thresholds have been set for industrial, agricultural and domestic wastes (EPA 2003). The Council of Ministers in 2008 approved a regulation to prevent pollution from industrial facilities. The EPA established a provisional standard limit of effluents for different category of industries in the country (no standard yet developed exclusively for construction; but some of the applicable [common] standards such as noise, total dust and carbon monoxide from combustion sources and motor vehicles have been used at relevant sections of Chapter 7 of the report).

2.3.5 Proclamation on Public Health (Proclamation No. 200/2000)

The government of Ethiopia issued the Public Health Proclamation in March 2000. It is an important step for the promotion of the health of the society and for the creation of a healthy environment for the present and future generations. The proclamation has addressed important issues which are directly or indirectly related to the conservation of environment and occupational health. Major environmental health issues (mainly applicable to camps in this case) emphasized in the proclamation includes the following:

- Prohibit providing water supply services from springs, wells or through pipes unless its quality is verified by health authorities;
- Prohibit discharging untreated liquid waste generated from septic tanks, seepage-pits and industries into water bodies or water convergences;
- Employers shall ensure the availability of occupational health services to employees;
- The use of any machinery or instrument which generates excessive noise is prohibited. Any person who uses such machinery or instrument shall install noise reducing apparatus or

instruments;

- No person shall dispose solid, liquid or any other waste in a manner which contaminates the environment or affects the health of the society; (Applicable to construction camps)
- Any institution or organization providing public service has the obligation to organize clean, adequate and accessible toilet facilities for its customers.

2.3.6 Expropriation of Land Holding for Public Purposes and Compensation Payment (Proclamation No. 455/2005)

Proclamation no. 455/2005 states that a landholder whose holding has been expropriated shall be entitled to payment of compensation for his property situated on the land and for permanent improvements he made to such land. The amount of compensation for property situated on the expropriated land shall be determined on the basis of replacement cost of the property. Regarding displacement compensation the proclamation states that a rural landholder whose landholding has been permanently expropriated shall in addition to compensation paid for property situated on the expropriated land, be paid displacement compensation which shall be equivalent to ten times the average annual income he/she secured during the five years preceding the expropriation of the land.

The Data Centre project will be established on the possession of the ICT Park. Previously, the site was agricultural land where the land users are already compensated during land possession for the whole park purpose. Therefore, the project doesn't create the resettlement of individuals as they are already compensated and resettled.

2.3.7 Forestry Conservation, Development & Utilization (Proclamation No. 94/2007)

The Proclamation on Conservation, Development and Utilization of Forests was issued in 2007 to provide for the Conservation, Development and Utilization of Forests. The objective of this Proclamation is to provide the basis for sustainable utilization of the country's forest resources. The Proclamation categorizes types of forest ownership (State, Regional and Private Forests) and provides the power for designation, demarcation and registration of forests to the Ministry of Agriculture and the Regional Governments. According to this proclamation, state and regional forests shall be utilized in accordance with approved management plans. The Proclamation then provides specific direction for the utilization of State and Regional Forests and lists prohibited activities within protected forests.

2.3.8 National Proclamation on Water Resource Management (Proclamation No. 197/2000)

The available water resources in the region and the country at large have not yet been exploited adequately to serve the economic and social needs of the nation's population. The Water Resources Management and Administration in the country is based on the Ethiopian Water Resource Management Policy and on the Water Resources Laws of the country as indicated in Proclamation No 197/2000. The Ministry of Water and Energy and the Regional Water and Energy Bureau are entrusted with broad powers of 'planning, management, utilization administration and protection of water resources'. According to the Proc. No.197/2000, the duties of the MoWE include inventory of water resources, allocation of water resources, establishing standards for design and construction of waterworks (including hydropower dams), issuing guidelines and directives for the prevention of pollution of water resources as well as for water quality and health standards, establishing water users' associations, and settlement of disputes. However, relevant legislation and standards to support sustainable abstraction of water from different water sources (lakes, rivers, etc.) have not been prepared yet. Unlike irrigation or water supply projects, the data Centre development project does not envisage major water demand, although there may be some water requirement for various construction related activities.

2.3.9 Solid Waste Management Proclamation

The Solid Waste Management proclamation was issued in 2007 as Proc. No. 513/2007 with a primary objective *“to enhance at all levels capacities to prevent the possible adverse impacts while creating economically and socially beneficial assets out of the solid wastes”*.

As applicable to the Project under consideration:

- The Solid Waste Management Proclamation requests for recycling (for instance, it is stipulated that: *“the manufacturer or importer of glass containers or tins/cans shall develop and implement a system that enables it, on its own or through other persons, to collect and recycle used glass containers or tin/cans”*); and
- It is stipulated in the Solid Waste Management Proclamation that solid wastes in general and household wastes, food-related wastes and construction debris should be disposed in an environmentally sound manner.

2.3.10 Proclamation of Conservation of Cultural Heritage Proclamation No. 209/2000

Proclamation No. 209/2000 provides legal framework for Research and Conservation of Cultural Heritage. The Proclamation establishes the Authority for Research and Conservation of Cultural Heritage (ARCCH) as a government institution with a juridical personality. In addition, it has provisions for management, exploration, discovery and study of Cultural Heritage and miscellaneous provisions. The Proclamation defines the objectives, powers and duties of the Authority (ARCCH). It also has provisions on Management of Cultural Heritage. Among these are provisions on Ownership and Duties of Owners, Classification, Registration, Conservation and Restoration, Removal, the Use, and Expropriation of Cultural Heritage, Preservation of Cultural Heritage Situated on Land given in Usufruct, and Establishment of Museum.

Furthermore, the Proclamation provides Articles on Exploration, Discovery and Study of Cultural Heritage. Article 41 is on Fortuitous Discovery of Cultural Heritage and Sub-Article (1) states that, any person who discovers any Cultural Heritage in the course of an excavation connected to mining explorations, building works or other similar activities or in the course of any other fortuitous event, shall forthwith report same to the Authority and shall protect and keep same intact, until the Authority takes delivery thereof. Connected to this, Sub-Article (2) states that, the Authority shall, upon receipt of a report submitted pursuant to Sub-Article (1) hereof, take all appropriate measures to examine, take delivery of and register the Cultural Heritage so discovered. Under Miscellaneous Provisions, the Proclamation states that, any person who holds permit to conduct construction works in a reserved area [an area declared to be containing an assemblage of immovable Cultural Heritage or an archaeological site] and who discovers Cultural Heritage in the course of construction activities shall stop construction & shall forthwith report same in writing to the Authority.

2.3.11 Investment proclamation No. 1180/2020

The proclamation aims to create an economic framework that fast tracks the global competitiveness of the National economy, increases export performance, generates more and better employment opportunities, and facilitates sustainable and entwined linkage among various economic sectors, to further increase and diversify foreign investment inflow to accelerate inward transfer and diffusion of knowledge, skill, and technology, maximize linkages between foreign and domestic investments, promote equitable distribution of investments among regions, and leverage foreign capital to

promote the competitiveness of domestic investors to be transparent, predictable, & efficient to increase investment attraction, retention, & expansion.

Relevance

It allows the investment projects to be encouraged and established to enhance the economic and social development of the nation and it provides projects with prior information to carry out environmental assessments and implement as per the environmental plans.

2.3.12 Industry Parks Proclamation 886/2015

The proclamation to accelerate the economic transformation and development of the country through the establishment of Industrial Parks in strategic locations to promote and attract productive domestic and foreign direct investment thereby upgrading industries and generate employment opportunity, to enhance export promotion, protection of environment and human wellbeing, economic land use and establishing and expanding planned urban Centres.

Relevance

The data Centre has already secured place in ICT Park which is administrated by IPDC. Hence, it important to respect the proclamation during establishment, construction and operation phase.

2.3.13 Labor Proclamation (Proclamation No 1156/2019)

It is a proclamation that substitutes the former labor proclamation of 377/2003. It aims to ensure worker-employer relations are governed by basic principles of rights and obligations with a view to enabling workers and employers to secure durable industrial peace; sustainable productivity and competitiveness through cooperative engagement towards the all-round development, it has been found necessary to lay down a working system that guarantees the rights of workers and employers to freely establish their respective associations and to engage, through their duly authorized representatives, in social dialogue and collective bargaining, as well as to draw up procedures for the expeditious settlement of labor disputes, which arise between them, to create favorable environment for investment and achievement of national economic goals without sacrificing fundamental workplace rights by laying down well considered labor administration; and determine the duties and responsibilities of governmental organs entrusted with the power to monitor labor conditions; occupational health and safety; and environmental protection together with bilateral and

tripartite social dialogue mechanisms, political, economic and social policies of the Country, to reformulate the existing labor law with a view to attaining the aforementioned objectives and in accordance with the and in conformity with the international conventions and other legal commitments to which Ethiopia is a party.

Relevance

This proclamation is relevant for the proposed project and must give due attention to the obligations and the rights of workers of the project. This proclamation enforces the owner of the project to early understand and implement the rights of labor so that minimizes the rate of conflicts, assists to get better living conditions, creates better working situations, increases production efficiency and in general leading to mutual benefits of the workers and the project.

2.3.14 Hazardous waste management Disposal Control proclamation1090/2018

The proclamation aims to prevent & control problems of environmental pollution caused by the mismanagement & disposal of hazardous waste, to creating a system to control the generation, storage, treatment, recycling and reuse, transportation, disposal & movement of hazardous wastes, to prevent harm to human and animal health as well as the environmental due to the mismanagement of hazardous waste.

Relevance

As a result, the proponent of this project is fully aware about hazardous waste legal frameworks and is accountable to the hazardous waste problems emanated from the project during or after its operation. It also provides a clue about the hazardous waste management and helps to design appropriate disposal and to minimize an environmental pollution and human health hazards. Specially, the electronic waste consider on of the hazard waste and the data Centre might generate quite electronic waste

2.3.15 Multilateral Agreement

The Federal Democratic Republic of Ethiopia has ratified several international conventions and protocols and the following can be related with the proposed data Centre project implementation:

- United Nations Convention to Combat Desertification;
- Convention on Biodiversity (Rio convention) (1997);

- Framework Convention of United Nations on Climate Change (1997);
- Convention on the Control of Trans-boundary Movement of Hazardous Substance.
- Convention on International Trade on Endangered Species(1998)
- The Cartagena Protocol on Biosafety ratified on September 22, 2003
- The Convention for the protection of World Cultural and Natural Heritage.

2.4 Relevant EIA Guidelines

2.4.1 EIA Guidelines of EPA

Environmental Impact Assessment Procedural Guideline has been issued by EPA in 2003, detailing the required procedures for conducting an EIA in Ethiopia and the requirements for environmental management. These requirements are presented on a step-by-step basis and the guideline specifies tools that may be considered when engaging in the EIA process. In addition, the EIA Guideline provides the categories, the relevant requirements for an EIA, and lists project types under each category. On this basis, projects are categorized into three schedules:

- **Schedule 1** - projects which may have adverse and significant environmental impacts and therefore require a full Environmental Impact Assessment.
- **Schedule 2** - projects whose type, scale or other relevant characteristics have potential to cause some significant environmental impacts but are not likely to warrant a full EIA study.
- **Schedule 3** - projects which would have no impact and do not require an EIA.

2.5 Institutional Framework

2.5.1 Federal Democratic Republic of Ethiopia and Administrative Regions

The Federal Democratic Republic of Ethiopia (FDRE) was formally established on August 21, 1995. The FDRE comprises of nine Regional State members. The relative roles of government at the different levels (Federal, Regional and Local) in terms of power and duties, including fiscal matters, have been defined by the Constitution, Proclamations Nos. 33 of 1992, 41 of 1993, and 4 of 1995. Under these proclamations, duties and responsibilities of Regional States include planning, directing and developing social and economic programs as well as the administration, development and protection of natural resources of respective regions.

2.5.2 The Federal Commission for Environment, Forest and Climate Change

The Environmental Protection Authority (EPA) was established in August 1995 under Proclamation No.9/1995 and is an autonomous government body reporting directly to the Council of Ministers. It has a broad mandate covering environmental matters at federal level. The Proclamation sets out the main responsibilities and broad organizational structure of the EPA. After the establishment of the EPA, ERA has established the ESMT and the ONRS established the OBoLEP in order to handle environmental matters in the Region. The key functions of CEFCC are defined in Proclamation 9/1995 and may be summarized as follows:

- preparation of environmental protection policies and laws and ensuring that these are implemented;
- preparation of directives and implementation of systems necessary for the evaluation of the impact of projects on the environment;
- preparation of environmental protection standards and implementation of directives concerning soil, water and air;
- conduct of studies on desertification and co-ordination of efforts to combat it;
- preparation of recommendations regarding measures needed to protect the environment;
- enhancement of environmental awareness programs;
- implementation of international treaties concerning the environment signed by Ethiopia;
- provision of advice and technical support to the regions on environmental matters

As indicated above the new Proclamation on Institutional Arrangements for Environmental Protection envisages a widening of the EPA's mandate. Most of the proposed additional powers and duties relate to co-ordination and monitoring aspects. Key elements include:

- to establish a system for EIA of projects, policies, strategies, laws and programs;
- to enforce implementation of this EIA process (i.e. review EIA reports) and the recommendations which result from it for projects that are subject to Federal licensing, execution or supervision;
- to determine environmental standards and ensure their compliance;
- to enter any land, premises or any other places that falls under the Federal jurisdiction, inspect and take samples as deemed necessary in view of ascertaining compliance with environmental protection requirements;

- to ensure implementation of environmental protection laws.

In view of the multi-sectoral nature of the EPE and the number of government agencies involved in various aspects of environmental management, overall co-ordination and policy review and direction is the responsibility of an Environmental Protection Council (EPC) within EPA, whose members represent the key agencies concerned with policy implementation. With these powers, EPA has the mandate to involve itself with all environmental issues and projects that have a federal, inter-regional (involving more than one Region) and international scope.

2.5.3 Regional Environmental Protection Authorities

In line with the proclamation for establishment of environmental protection organ, the regions have established their respective independent environmental organ. The proposed data Centre project falls, exclusively under Addis Ababa City Administration has established the Environmental Protection Authority responsible to environmental management aspects in the administration. The environmental structure goes down to Woreda level.

3. DESCRIPTION OF THE RAXIO DATA CENTRE PROJECT

First Brick Holdings (“FBH”) is a Roha Group Company that intends to build the foundation of the digital economy across Eastern and Southern Africa. FBH intends to develop 10 to 12 carrier-neutral, co-location data Centres of international (Tier III) standard, operating under the ‘Raxio’ brand in East and Southern Africa (“the Project”). A standardized design is to be produced for a 1.5MW IT load data Centre using modular construction. The design is to be suitable for deployment across multiple locations in Eastern and Southern Africa with minimal localization required. The project will have a phased approach. The general approach is for the first phase to be 500kW, followed by phases 2 and 3 which will each add an additional 500kW of IT load (with localized variations where required).

3.1.1 Location

The proposed Raxio Data Centre project will be located on the outskirts of Addis Ababa Town, Bole Sub – City within the premise of Information and Communication Technology (ICT) Park. The data Centre will be established on one hectare land. The ICT park meets the majority of the key requirements of design, including:

- From a power perspective, the site currently has a dedicated 10 MW line and is in progress (75% complete) to add sub-stations to supply two 230 MW line on a redundant ring, within 6 – 12 months to be used between 3 industrial parks;
- From a connectivity perspective, the site sits along the national fiber back bone and given the proximity to the new Ethio-telecom HQ we expect that connectivity to the ICT Park will be reliable and redundant;
- The land is essentially flat minimizing the land preparation requirements, and does not seem to present a flooding risk;
- The ICT Park has been demarcated, so that the data Centre could be in an area that is not affected by heavy industry;
- The distance from Addis Ababa is far enough to be a viable disaster recovery location for businesses operating in the central business district, but also close enough to attract business to locate their primary sites there;

- The ancillary services and infrastructures that typically come with a business park as it develops will serve Raxio's needs in the future;

3.1.2 Purpose and Justification of the Project

Under a public monopoly, the ICT sector in Ethiopia has seen substantial growth over the last five years. In addition, the telecom sector has shown significant growth over the past decade as continued investment in ICT infrastructure, availability of services and increasing purchasing power have contributed to expanding the customer base.

Over the past years, the government has embarked on a process that will lead to the privatization of Ethio-telecom and has also announced a broader liberalization of the telecom sector where new operators will be allowed to enter the market. This liberalization, expected to drive down the costs and improve the quality of service, will serve as a further growth catalyst for the sector. Plans also seem to be underway to upgrade the national backbone and the international gateway, both of which will also lower the cost and facilitate IP transit around the country and to the outside world.

Most of all, the proposed data Centre is essential to assist the ever increasing strong and broad-based economic development in Ethiopia. In addition to this, at present, the government of Ethiopia is engaged in aggressive infrastructure development projects such as roads, railways, power production and distribution, airports and industrial parks.

3.1.3 The Role of the Data Centre

The data Centre is an integral part of the enterprise, designed to support business applications and provide services such as:

- Data storage, management, backup and recovery
- Productivity applications, such as email
- High-volume e-commerce transactions
- Powering online gaming communities
- Big data, machine learning and artificial intelligence

3.1.4 Project Duration

The construction of the data Centre will take 18 months including mobilization period which is estimated to be 547 days. In addition, the project includes defect liability period of 365 days and 2 years warranty period.

3.2 The Core Components of a Data Centre Project

Data Centre architectures and requirements can differ significantly. For example, a data Centre built for a cloud service provider like Amazon satisfies facility, infrastructure and security requirements that significantly differ from a completely private data Centre, such as one built for a government facility that is dedicated to securing classified data.

Regardless of classification, an effective data Centre operation is achieved through a balanced investment in the facility and the equipment it houses. In addition, since data Centres often house an organization's business-critical data and applications, it's essential that both facility and equipment are secured against intruders and cyberattacks.

The primary elements of a data Centre break down as follows:

- **Facility** – the usable space available for IT equipment. Providing round-the-clock access to information makes data Centres some of the world's most energy-consuming facilities. Design to optimize space and environmental control to keep equipment within specific temperature/humidity ranges are both emphasized.
- **Core components** – equipment and software for IT operations and storage of data and applications. These may include storage systems; servers; network infrastructure, such as switches and routers; and various information security elements, such as firewalls.
- **Support infrastructure** – equipment contributing to securely sustaining the highest availability possible. The Uptime Institute has defined four tiers of data Centres, with availability ranging from 99.671% to 99.995%. Some components for supporting infrastructure include:
 - **Uninterruptible Power Sources (UPS)**–battery banks, generators and redundant power sources.
 - **Environmental control** – computer room air conditioners (CRAC); heating, ventilation and air conditioning (HVAC) systems; and exhaust systems.
 - **Physical security systems** – biometrics and video surveillance systems.
- **Operations staff** – personnel available to monitor operations and maintain IT and infrastructure equipment around the clock.

Data Centres have evolved significantly in recent years. As enterprise IT needs continue to move toward on-demand services, data Centre infrastructure has shifted from on-premises servers to

virtualized infrastructure that supports workloads across pools of physical infrastructure & multi-cloud environments.

3.2.1 Land Requirement

The approximate minimum land required to build the planned three phases of the data Centre facility is a 1 hectare plot. This area will sufficiently accommodate the data hall; data Centre offices, equipment, customer parking and access driveways. Planning of amenities and access for phase 3 will be put in place in phase 1 so as to allow frictionless scaling of the data Centre capacity.

Other features of the land suitable for data Centre construction should be:

- essentially a flat plot to minimize cost of leveling, back filling, etc.;
- not on direct flight paths of landing or departing aircraft;
- not in a flood plain area or near water courses that have the possibility to overflow or flood;
- not close or adjacent to heavy or hazardous industries that may cause vibration, dust, pollution, etc.;
- good road infrastructure access to the site;
- around 10-15 km from the Central Business District to be able to serve as a disaster recovery site;

3.2.2 Water

Water is one of the most important inputs for cooling equipment, depending on the choice of cooling technology. In the case Indirect Adiabatic Cooling technology is used, it will be critical for the facility to have access to redundant sources of reliable water supply. Ideally, piped water supply and also borehole water supply will be used for the said purpose. As an example, if Indirect Adiabatic Cooling technology is used, the maximum water consumption at 100% load in Phase 3 would be approximately 4,700 L/hr.

4. BASELINE OF THE RECEIVING ENVIRONMENT

The baseline environmental features in the project area are presented under three parts, namely physical, biological and socio economic environment.

4.1 Physical environment

4.1.1 Topography

The data Centre project is located in the outskirts of Addis Ababa Town within the premise of the ICT Park that is characterized by flat land. Generally, the elevation in the data Centre project area is 2200 m asl. The topography of the project is dominantly flat plain.

4.1.2 Climate

Addis Ababa has a subtropical highland climate with precipitation varying considerably by the month. The city has a complex mix of alpine climate zones, with temperature differences of up to 10 °C, depending on elevation and prevailing wind patterns. The high elevation moderates temperatures year-round, and the city's position near the equator means that temperatures are very constant from month to month. As such the climate would be maritime if its elevation was not taken into account, as no month is above 22 °C in mean temperatures.

Mid-November to January is a season for occasional rain. The highland climate regions are characterized by dry winters, and this is the dry season in Addis Ababa. During this season the daily maximum temperatures are usually not more than 23 °C, and the night-time minimum temperatures can drop to freezing. The short rainy season is from February to May. During this period, the difference between the daytime maximum temperatures and the night-time minimum temperatures is not as great as during other times of the year, with minimum temperatures in the range of 10–15 °C. At this time of the year, the city experiences warm temperatures and a pleasant rainfall. The long wet season is from June to mid-September; it is the major winter season of the country. This period coincides with summer, but the temperatures are much lower than at other times of year because of the frequent rain and hail and the abundance of cloud cover and fewer hours of sunshine. This time of the year is characterized by dark, chilly and wet days and nights. The autumn that follows is a transitional period between the wet and dry seasons. The highest temperature on record was 30.6 °C February 2019, while the lowest temperature on record was 0 °C recorded on multiple occasions.

Table 1: Average temperature of Addis Ababa

Month		J	F	M	A	M	J	J	A	S	O	N	D
Av. Temp in °C	Max.	24	25	25	25	25	23	21	21	22	24	23	23
	Min.	7	9	11	11	11	11	11	11	11	9	7	7
Precipitation in mm	13	30	58	82	84	138	280	290	149	27	7	7	13

Table 2: Weather condition of Addis Ababa

Data for Addis Ababa (1981–2010, extremes 1898–present)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C	28.8	30.6	30.0	30.2	29.5	29.0	29.1	28.0	25.6	27.1	29.5	26.5	30.6
Average high °C	24	24	25	24	25	23	21	21	22	23	23	23	23
Daily mean °C	16.0	16.8	17.8	17.8	18.2	16.8	15.5	15.6	16.1	16.1	15.4	15.2	16.4
Average low °C	8	9	10	11	11	10	10	10	10	9	7	7	9
Record low °C	0.0	0.1	0.0	2.5	4.0	4.2	5.4	5.7	3.9	0.0	0.0	0.0	0.0
Average rainfall mm (inches)	13	30	58	82	84	138	280	290	149	27	7	7	1,165
Average rainy days (≥ 0.1 mm)	3	5	7	10	10	20	27	26	18	4	1	1	132
Average relative humidity (%)	52	51	53	59	55	68	78	80	75	57	53	53	62
Mean monthly sunshine hours	266.6	206.2	241.8	210.0	238.7	174.0	111.6	133.3	162.0	248.0	267.0	288.3	2,547.5
Mean daily sunshine hours	8.6	7.3	7.8	7.0	7.7	5.8	3.6	4.3	5.4	8.0	8.9	9.3	7.0

4.1.3 Land use

The land use and land cover of the location of the data Centre is established through use of Google Earth, onsite observation and checking, supported by information obtained from previous studies. Prevailing land uses include crop cultivation, few acacia woodland and scattered remnant trees of Montana forest. At present, after site is cleared from use of agricultural activities by the ICT Park and being used for grazing area by the nearby farmers. Thus, the land cover during site reconnaissance was found to be vegetative mainly grass and few trees as shown in the Figure 1 to Figure 6 below.



Figure 1: Baseline condition of the site



Figure 2: Baseline condition of the central part of the site



Figure 3: Google image of the site



Figure 4: Baseline situation of the site from front view



Figure 5: Baseline situation of the site from rare view



Figure 6: Baseline situation of the site from left side view

4.2 Bio – Physical and Socio-economic Environment

The site does not contain any form visible biological resources above the ground other than few shrubs and grasses. During the site visit the team witnessed the site consists of few stockpiles of spoil material dumped on the site. Moreover, the site is possessed by ICT Park after compensating the previous land users. At present, no agricultural activity takes place on the site other than animals grazing on the site. Thus, the land use change took place before a couple of years when the park possessed the site and converted it as part of the park from agriculture as can be witnessed from the attached letter of possession.

Since, the proposed project is located within previously delineated ICT Park based on the preliminary site investigation and information obtained from the park administration; the park had already provided compensation for the groups of project affected people particularly for landowners that they lost their land. Since the land is possessed by the park, the study team was unable to assess the adverse/negative social impacts related to the process of land acquisition, compensation and livelihood restorations.

The park has electric power supply, water, internet and mobile network access, and other basic public facilities are available at the proposed area. However in the surrounding environment there have been local farmers and in the long run we expect that they would get benefits from the development of this project.

On the other hand, even though the proposed project is located inside of the park in our attempt to understand the wider impacts of the project we have tried to understand the socio-economic condition of the area. Accordingly, the major part of the project area is categorized as industrial; but the livelihoods of the local people living around the project area are mainly dependent on mixed type of agriculture that includes farming and animal rearing. So, crop production is the major agricultural activity in the corridor followed by livestock keeping.

On the other sides of the project there are also urban residents residing in apartments. Moreover, the livelihood of the population in the urban sections mainly depends on small scale businesses, and employment in public and private sectors. Moreover, the expected positive and negative social impacts are briefly presented below.

4.3 Project Activities

This section describes the activities that take place during construction and operation of the Raxio Date Centre. Like all other construction activities the construction of the center involves site clearance and earthwork, foundation works in the sub–structure, installing of super structure works, and finishing works.

The site clearance and sub–structure works and earthwork involve removing of the top soil, excavating to the required depth for foundation works, loading and transporting of the unnecessary soil (spoil) to the nearest spoil dumping area. This involves earth moving heavy machineries such as excavator, loader and the like along with dump trucks. These activities engage limited number of human power like machinery operators, site foreman, and assistants.

Once the site clearance and earthworks are completed the foundation works follow that utilizes industrial inputs such as reinforcement bar, cement, and crushed aggregate, sand and water. During these activities bar–benders, carpenters, concrete workers, and laborers are largely involved. Concrete mixer and transport machines are highly engaged during site activities.

After the sub–structure works are completed the super–structure works take over along with the finishing works and installation and commission works. During these sessions, a large number of workforces will be engaged with various industrial inputs. In addition to the construction of the data center, the construction involves installation of tower, internal access roads and parking lots. At the end of the construction phase the data center will look like this Figure 7 below.



Figure 7: Final view of the construction

5. PUBLIC CONSULTATION

This project is implemented within the premise of ICT Park owned by the government of Ethiopia. The land acquisition, possession and compensation issues were already completed by the government years back. During site reconnaissance and consultation with the Park administration, the ESIA team witnessed that the site is free from houses and any kind of infrastructure. Moreover, the site does not contain any vegetation other than grass and only one acacia tree around its boundary. It is totally fenced and administered by the ICT Park. The park administration gave the ESIA team the ownership of the site as indicated in annex 3 confirming that the site is within its premises and land users were compensated long ago before Raxio came into the picture.



Figure 8: Consultation with ICT Park administration

Detailed discussion on the background of the land acquisition, possession and compensation process with the park management revealed that the park administration does not have any document concerning the details of the project affected people. Thus, the ESIA team could not get the number of project affected people. On the other hand, consultation with the project affected people confirmed that the farmers who used to get their livelihood from the area through mixed agricultural practices are totally lost due to the park.

Moreover, the park management revealed that these previous land users received the monetary compensation of 3 Birr per meter square land after a number of consultations following the Expropriation of Land Holding for Public Purposes and Compensation Payment (Proclamation No. 455/2005). Grievance redress mechanism was not in place during the whole process of land acquisition and possession.

Through relentless and repeated efforts the ESIA team found few of the previous land users for consultation and came to understand that the farmers have deep grievances about the monetary compensation given to them as very low compared to the benefit they used to get from the farmland. Moreover, the consultees have bad feeling about what is going on with their livelihood after they lost their land. They used to earn their livelihood and led a stable life before the urbanization and industrialization expand to take over their land and jeopardize their livelihoods.

According to these consultees, during consultation sessions there were a number of promises made by the government officials so that they will be convinced and let the process take place. After they gave their consent, none of the promises were turned into reality and no one gave attention to them so that they could maintain at least their livelihood status quo. They were not given job priorities, planned and orchestrated skill building capacity trainings were not given, and no replacement grazing land to take care of their cattle.

Only recently, due to the high pressure from all sorts of directions, the government tried to distribute farm tractors for the project affected people that did not benefit them the way they expected due to lack of clear criteria to include the youth of the farmers. No priority is given for the local youth at least for security services and related works in the park.

Furthermore, the team noticed encroachment into the park compensated areas by the ‘previous land users’. What is more the park administration was trying to settle these issues only through legal means, which might be good for the time but the team has fear of long term effectiveness of such approach. Hence, the assessment team has deep concern about reemerging complaints and friction with the project affected people cognizant of the current political condition of Ethiopia. As technical experts it is important to approach this problem through a well-organized and critically prepared plan to restore and improve the livelihood of the project affected people.



Figure 9: Consultation with Park management team



Figure 10: Consultation with old and youth project affected people

6. POTENTIAL ENVIRONMENTAL IMPACTS

The implementation of the proposed data center project can result in various environmental and social impacts, both beneficial as well as adverse. Majority of the impacts occur during the project construction phase, and can be controlled through careful and appropriate construction procedure and workmanship.

In this section, the potential impacts of the project on the physical, biological and socio-economic environment will be discussed. Appropriate benefit enhancement or mitigation measures will also be identified and recommended for the impacts considered to be major and moderate. Environmental consideration in the proposed project design can go a long way to avoid/reduce many of the identified adverse impacts.

6.1 Impact Category and Characteristics

Environmental impacts caused by construction projects can be categorized into three major impact types. These are direct, indirect and cumulative impacts.

Direct Impacts of the Project – Direct impacts include mainly impacts that are caused by the construction on the soil and land surface, air and water components, and vegetation. The major adverse direct impacts of the proposed data center project are those related to land take and establishment of the ROW and these include loss of productive agricultural land, soil erosion, loss of grazing land, soil and air pollution and impacts related to influx of people to the project area, and groundwater over harvesting for cooling purpose.

Indirect Impacts of the Project – These are chain effects or impacts that result from the construction indirectly or at distant locations from the construction corridor. These include induced development in the project area, sediment load on the nearby water body, cultural influences related to opening up of the area to tourists and interaction with external ways of life and so on. Water quality deterioration and water shortages at downstream areas due to project implementation and related ecosystem changes can also be part of the indirect impacts experienced at farthest distances from the project area.

Cumulative Impacts of the Project

This type of impact results from synergic or cumulative effects of several impacts that end up in environmental or social changes. Cumulative adverse impacts on water quality, erosion and

sedimentation may occur if the present poor conservation measures continue along with implementation of other projects with similar impacts. Moreover, the project will contribute its share in cumulative effect on the local land use and land cover changes that will affect the soil permeability to through-fall and interception storage of rainfall.

6.2 Duration and Scale of Impacts

Major direct impacts on the natural environmental components are caused mainly during the construction phase. Adverse impacts like soil and water resources degradation and erosion, material removal and disposal, accident of the workforce, etc. are caused during the construction period but may linger on if remediation measures are not properly implemented. Socio-economic impacts like loss of grazing area, spread of communicable diseases due to influx of people, and expansion of crime negatively affect the livelihood of the affected people, etc. occur during the project construction period.

6.3 Major beneficial Impacts of the data center project

6.3.1 Contribution to Regional and National Economy

The proposed data center is an important and critical infrastructure that boosts data management facility that supports the digitalization of Ethiopian economy. Therefore, its construction will address issues related to the large and underserved demand for high-quality co-location data center services in Ethiopia. This is in line with a regional trend of increased demand for high quality environments for local storage, business critical systems and data hosting solutions (such as local cloud services), and the need for external data recovery sites for business continuity.

6.3.2 Employment Opportunity for Local Communities

The construction of the data center project is expected to create employment opportunities and jobs for the local communities. The youth and women residing in the project area will benefit from the employment opportunities created due to the construction of the data center. It can be assumed that this will be a considerable contribution to the reduction of poverty at household level during the project construction phase. Moreover, it involves skill transfer during and post construction phase.

Proposed enhancement measures include:

- The contractor should employ work force mainly from the locality where the construction work is undergoing especially in positions that may not require special skill;

- In the process of employment, the contractor should give priority or preference to women especially in less risky jobs, and provide training for women in different skills as this contributes to the ongoing effort towards poverty reduction mainly at local level;
- Employment, wage system, and other administrative measures for the local workforce should be in line with the country's law.

6.3.3 Creation of Income Generating Activities

This would be one of the positive impacts for the local community. There could be income opportunities to be created to residents in the project area during construction works. Businesses such as shops, catering services (or small bars and restaurants) located along the project and near the construction camps could earn additional income due to the presence of large number of construction workers.

The opportunity for generation of income may continue during the project operation phase as long as availability and provision of other services like water supply, electricity etc. prevails in the area. The existing services and infrastructure may be improved contributing to improvement of local economy.

Proposed enhancement measures include:

- The contractor should provide support to local businesses such as vendors of tea, coffee, snacks, etc. close to construction sites (mostly women in Ethiopian context) by providing them with corners or shelters to establish themselves; and avoid any form of abuse from the construction workforce during transaction. This will, in the meantime contribute to ensuring the social responsibility of the contractor.
- The client, in collaboration and cooperation with the park administration, should reserve land (and prevent encroachment) within the RoW of the project so that nearby businesses will flourish along the reserved area
- For businesses during the operation phase of the project, the local administrations should request the respective utility agencies for improving or providing services like water supply, electricity etc.

6.4 Adverse Impact Identification

This section portrays the impact identification and aggregation in the process of the construction of the Raxio Data Centre project. A checklist consisting of 21 major issues that are sub-divided

into 72 items were used to identify the impacts induced due to the construction activities of the data center as illustrated by the following table.

Table 3: Impact identification checklist

	Topical Issue	Y	N	Maybe	Comments
A	Land Form: Will the project result in:				
1	Unstable slopes or embankments?		X		
2	Extensive disruption to or displacement of the soil?	X			
3	Impact to land classified as prime or unique farmland or grazing land?	X			
4	Changes in ground contours, stream channels, or river banks?		X		
5	Destruction, covering, or modification of unique physical features?		X		
6	Increased water erosion of soils?	X			
B	Air: Will the project result in:				
7	Air pollutant emissions which will exceed standards or cause deterioration of ambient air quality during construction and operation phases?	X			
8	Objectionable odors?		X		
9	Alteration of air movements, humidity, or temperature?		X		
10	Emissions of hazardous air pollutants during construction and operation phases?	X			
C	Water: Will the project result in:				
11	Discharge to a public water system?		X		
12	Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?	X			
13	Alterations to the course or flow of flood waters?		X		
14	Impoundment, control, or modifications of any body of water equal to or greater than three ha in surface area?		X		
15	Alter surface water quality?		X		
16	Alteration of the direction or rate of flow of groundwater?		X		
17	Alterations in groundwater quality?		X		
18	Contamination of public water supplies?		X		
19	Violation of Stream Quality Standards, if applicable?		X		
20	Location in a riverine or coastal floodplain?		X		

	Topical Issue	Y	N	Maybe	Comments
21	Exposure of people/ property to water-related hazards such as flooding?		X		
22	Impact on or construction in a wetland or inland floodplain?		X		
23	Leads to continuous use of water resources for operation of the system?		X		
D	Solid Waste: Will the project:				
24	Generate significant solid waste or litter during construction and operation phases?	X			
E	Noise: Will the project:				
25	Increase existing noise levels during construction and operation phases?	X			
26	Expose people to excessive noise during construction and operation phases?		X		
F	Plant Life: Will the project:				
27	Change the diversity or productivity of species or number of any species of plants (including trees, shrubs, grass, crops, and aquatic plants)?		X		
28	Reduce the numbers or affect the habitat of any state or federally designated unique, rare, or endangered species of plants?		X		
29	Introduce new species of plant into the area or create a barrier to the normal replenishment of existing species?		X		
30	Reduce acreage or create damage to any agricultural crop?		X		
31	Remove the currently available trees and shrubs on the site along with associated benefits?		X		
G	Animal Life: Will the project:				
32	Reduce the habitat or numbers of any unique, rare, or endangered species of animals?		X		
33	Introduce new species of animals into an area or create a barrier to the migration or movement of animals or fish?		X		
34	Cause attraction, entrapment, or impingement of animal life?		X		
35	Harm existing fish and wildlife habitats?		X		
36	Cause emigration resulting in human-wildlife interaction problems?		X		

	Topical Issue	Y	N	Maybe	Comments
H	Land Use: Will the project:				
37	Substantially alter the present or planned use of an area (encroachment to farmland/grazing land?)	X			
38	Impact a component of the National Park system, then National Wildlife Refuge system, the National Wild and Scenic River system, the National Wilderness system, or National Forest land?		X		
I	Natural Resources: Will the project:				
39	Increase the use rate of any natural resource during construction phase?	X			
40	Substantially deplete any non-reusable natural resource?		X		
41	Be located in an area designated as or being considered for wilderness, wild and Scenic River, national park, or ecological preserve?		X		
J	Energy: Will the project?				
42	Use substantial amounts of fuel or energy during construction and operation phases?	X			
43	Substantially increase the demand on existing sources of energy?	X			
K	Transportation and Traffic Circulation: Will the project result in:				
44	Movement of additional vehicles?	X			
45	Effects on existing parking facilities or demands for new parking?	X			
46	Substantial impact on existing transportation system(s)?	X			
47	Alterations to patterns of circulation or movement of people or goods?	X			
48	Increased traffic hazards to motor vehicles, bicyclists, or pedestrians?	X			
49	Construction of new roads?		X		
L	Public Service: Will the project have an effect on, or result in, a need for new or altered governmental services in any of the following areas:				
50	Fire protection?	X			
51	Schools?		X		
52	Other governmental services?	X			
53	Water supply?	X			
54	Health facility?	X			

	Topical Issue	Y	N	Maybe	Comments
M	Utilities: Will the project result in a need for new systems or alterations to the following utilities:				
55	Power and natural gas?	X			
56	Communications systems?	X			
57	Water?	X			
58	Sewer or septic tanks?	X			
59	Storm sewers?	X			
N	Population: Will the project:				
60	Alter the distribution of human population in the area during construction?	X			
O	Accident Risk: Does the project:				
61	Involve the risk of explosion or release of potentially hazardous substances including oil, pesticides, chemicals, radiation, or other toxic substances in the event of an accident or “upset” condition?	X			
P	Human Health: Will the project:				
62	Create any health hazard or potential health hazard such as communicable diseases?	X			
63	Expose people to potential health hazards such as spread on malaria?		X		
Q	Economic: Will the project:				
64	Have any adverse effect on local or regional economic conditions, e.g., tourism, local income levels, land values, or employment?	X			
R	Community Reaction: Is the project:				
65	Potentially controversial?		X		
66	In conflict with locally adopted environmental plans and goals?		X		
67	Creating conducive conditions for expansion of crime in the area?	X			
S	Aesthetics: Will the project:				
68	Change any scenic vista or view open to the public?		X		
69	Create an aesthetically offensive site open to the public view (e.g., out of place with character or design of surrounding area)?		X		
70	Significantly change the visual scale or character of the vicinity?		X		
T	Archaeological, Cultural, and Historical: Will the project:				

	Topical Issue	Y	N	Maybe	Comments
71	Alter archaeological, cultural, or historical sites, structures, objects, or buildings, either in or eligible for inclusion in the National Register		X		
U	Hazardous Waste: Will the project:				
72	Involve the generation, transport, storage or disposal of any regulated hazardous waste (e.g., used engine oil)?	X			

Out of seventy two items used to identify impacts of the activities of the data center construction on the environment, 32 (44.44 %) are known to harm the environment. In order to decide on the level of the required mitigation effort, similar impacts will be clustered together and put into the impact aggregation framework. This will help to identify which of the impacts are significant and require serious mitigation measures. In general, the data center construction activities require detailed and serious environmental mitigation plan for each of the impacts identified after impacts aggregation (study of impact significance) process is completed depending on the significance of the items investigated.

According to the above checklist the project has localized impacts on soil, air and water from emission of hazardous chemical substances (such as used engine oil, bitumen, and grease), spread of communicable diseases such as HIV/AIDS, impacts associated with the introduction of use of addict chemicals and expansion of crime, competition for and pressure on social services especially water, occupational related accident.

4.1.Evaluation of Impact Significance

Once project impacts are identified the next step is to identify the significance of each impact on the receiving environment. This is done through the process of evaluation of impact significance. Thus, this section attempts to analyze the project impacts to determine their level of significance. This will help all project actors to focus on the management of the most significant and critical impacts.

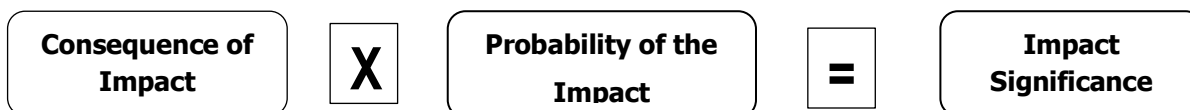
The determination of impacts significance is accomplished using combination impact parameters such as intensity of impacts (I), extent of impacts, (E) and duration of impacts (D). These parameters add-up together to give the quantitative measure of impact consequence that is

converted into qualitative parameter of consequence rating using a range set as shown in the following table below:

Table 4: Impacts aggregation criteria

Combined Score $CS = (I + E + R)$	$CS \leq 4$	$CS = 5$	$CS = 6$	$CS = 7$	$CS \geq 8$
Consequence rating	Low	Medium	High	Very High	Extremely high

The overall significance of a given impact is obtained by crossing consequence rating with the probability (P) of occurrence of the impact as indicated in the table below:



		Probability			
		Improbable	Possible	Probable	Definite
Consequence	X				
	Low	Insignificant	Insignificant	Very Low	Low
	Medium	Insignificant	Very Low	Low	Medium
	High	Very Low	Low	Medium	High
	Very High	Low	Medium	High	Very High
	Extremely High	Medium	High	Very High	Extremely High

- **Insignificant:** The potential impact is negligible and *won't* have an influence on the activity.
- **Low:** The potential impact is very small and *shouldn't* have any meaningful influence on the activity.
- **Moderate:** The potential impact *should* influence on the decision regarding the proposed activity.
- **High:** The potential impact *will affect* the decision regarding the proposed activity.
- **Very High:** The proposed activity should be approved under strict circumstances.
- **Critically significant:** The proposed activity should only be approved under special & strict settings.

Table 5: Impact classification parameters

Quantitative Rates	Extent of impacts (E)	Intensity (severity) of impacts (I)	Duration of impacts (D)
1	Park Level	No effect at all	Very short time (less than 1 year)
2	Kebele Level	the impact affects the environment in such a way that natural, cultural and/or social functions and processes are affected at lower amount	Short-term (1 – 5 years)
3	Woreda level	the affected environment is altered but the natural, cultural and/or social functions and processes are continue albeit in a modified way	Medium-term (5 – 15 years)
4	Zone level	natural, cultural and/or social functions and processes are altered to the extent that it will temporarily ceases	Long-term (More than 15 years, but possible to cease afterwards)
5	National level	natural, cultural and/or social functions and processes are altered to the extent that it will permanently ceases	Permanent

Table 6: Impact significance table

Impacts on the receiving milieu	E	I	D	Cum. Score	Probability	Impact significance
Air pollution by dust and emission from construction machineries	1	2	2	5	Definite	Medium significance
Soil compaction by machineries and pollution from hazardous substances	1	2	2	5	Definite	Medium significance
Removal and disposal of soil from construction site	2	3	2	7	Definite	High significance
Water pollution from release of hazardous substances	1	3	2	6	Probable	Medium significance
Water usage for cooling system during operation phase	3	3	2	8	Definite	High significance
Health hazard from communicable diseases such as HIV/AIDS	4	2	2	8	Definite	High significance
Accident on human from construction activities	1	2	1	4	Probable	Low significance
Accident on animals from construction activities	1	2	1	4	Probable	Low significance
Introduction of addict chemicals and crime in the project area	2	1	1	4	Probable	Low significance
Induce soil erosion in the project area	2	2	2	6	Probable	Medium significance
Competition for local resources (such as water, electricity, etc. services)	1	2	2	5	Definite	Medium significance
Loss of grazing lands	1	2	1	4	Definite	Low significance
Impacts from data center solid waste during operation phase	1	2	2	5	Definite	Medium significance
Impact of data center domestic wastewater during operation phase	1	2	2	5	Definite	Medium significance

The high significance impacts such as removal and disposal of spoil materials, water usage for cooling system during operation phase, and health hazard from communicable diseases such as HIV/AIDS require detailed impact mitigation measures. In addition, local air pollution, soil compaction and pollution, water pollution from release of hazardous substances, soil erosion, competition for local resources, and management of solid waste and domestic wastewater require serious attention. The remaining low significance impacts can be managed with on-site efforts by the project. Finally, clear and flexible impacts mitigation measures must be identified along with appropriate indicators and responsible part to implement them for the successful accomplishment of the Raxio Data Centre.

6.4.1 Impacts during Construction and Operation Phases

a) Soil Compaction, Pollution and Management of Spoil Material

Impacts

The effect on soil resource can occur due to one or a combination of changes on soil resource including soil compaction, soil pollution, and top soil removal due to the various project construction activities. The effect on soil is also influenced by factors such as terrain, land use and cover, soil characteristics and existing conservation practices.

The soil in the area is of expansive type; that is, can easily be exposed to erosion effects due to construction related activities, lack of vegetation cover could facilitate erosion hazard. The removal or clearance of the site for the various project components will all expose the loose soil to erosion effects and hence soil losses.

The other impact on soil can result from compaction due to machinery and vehicular movements. Soil compaction results in poor productivity and poor vegetation growth due to lack of air circulation and lowered infiltration/percolation of rain water. Impact on soil pollution can also occur due to leakage, inappropriate disposal of fuel, oils and other chemicals utilized by construction machineries and garage works.

Site clearance and foundation excavation generates colossal volume of spoil material that needs to be transported and dumped somewhere. This activity of dumping requires identification of appropriate site to avoid impacts of the spoil material due to its management.

Required Mitigation Measures

- Surplus excavated top soil shall be stored and used to rehabilitate degraded grounds;
- Provide adequate drainage structures so as to maintain the normal flow direction and attempt to maintain uniform water distribution over surfaces;
- Line water receiving surfaces or ditches with stone ripraps or concrete;
- Provide adequate drainage lines in order to intercept flows, protect from entering erosion susceptible areas and reduce gulley formation;
- The contractor, following completion of work should loosen the compacted soil;

- Start and complete earthwork before rainy season begin. Avoid earthworks during rainy season and focus on tree planting and grassing during this season;
- Spoil material must be dumped in selected and approved sites where the soil piles shall be leveled or vegetated to avoid erosion.
- Storage of cut material prior to use or permanent storage.
- Excess spoil material left in stable piles covered with vegetation.
- Avoid dumping spoil material near rivers or wetlands as much as possible,
- Plant or reseed native species on all bare ground when construction is complete, monitor until vegetation is self-sustaining.
- Demarcate all construction areas and keep all vehicles and equipment in the demarcated area to avoid soil compaction in unwater areas. Minimal off-road movement; and
- To avoid soil pollution, it is essential to give proper orientation to machinery operators not to replace engine oil within the construction area and contain any kind of accidental spill of hazardous chemicals;

In general, majority of expected impacts can be reduced or controlled through proper implementation of standard method of construction procedure and management.

b) Air pollution by dust and emission from construction machineries

Impacts

Significant adverse impact on air quality can take place during construction phase related to increased dust/particulate level in the atmosphere caused by construction related activities, and also increased emission from heavy construction equipment and trucks. The proposed project may involve dust in the premise of the ICT Park area that mainly results from various earthwork activities such as excavation, material production and construction traffic. It affects human health and may contribute to the incidence of respiratory and other diseases to the workers.

In the Provisional Standards issued by the EPA mainly for the industrial sector, a provision stated therein is that “the dust emissions contained in waste gas may not exceed a mass flow of 2 kg/h and a mass concentration of 100 mg/Nm³”

Required Mitigation Measures

- Mobilize machineries that are efficient and release small amount of emission and low fuel consumption;

- Establish low dust policy with the construction premise such as speed limit for vehicles, speed breaks along vehicular routes, give orientation to drivers to respect traffic signals within the construction area;
- Ensure regular and periodic maintenance of vehicles and machineries so as to reduce pollution related to motor exhausts;
- Implement occupational health safety measures, especially by project construction employees who are exposed to high dust and vehicular emission;
- Cover truck that transport earthen material to prevent dust, especially while traversing through densely populated urban centers;
- The contractor has to include the necessary cost for implementing mitigation measures to reduce/avoid air pollution impact such as cost for water spraying, machinery maintenance and service, provision of PPE for dust prevention, and safe transport of earthen material filled trucks in urban section;

In general, majority of air pollution impact can be reduced or controlled through proper implementation of standard method of construction procedure and management.

c) Water pollution from release of hazardous substances

Impacts

Water is the most important resource for the construction and operation of the data center. In due process water could get polluted from hazardous chemicals such as engine oil and other substances and leakage from sanitary facilities both during construction and operation phases.

Required Mitigation Measures

- Put stringent measure in the maintenance of machineries not to replace oil within the park area,
- If maintenance is inevitable the mechanical team must use impermeable material on the ground and use drums to collect chemicals into it,
- Minimize work in and near water bodies;
- Ensure adequate sanitary facilities for workers, placed well away from water;
- Limit work in wet weather as much as feasible, especially work near water bodies;
- Mark off all water bodies and prohibit access by workers except for necessary construction work;

- Mark off all boreholes, dug wells, and ponds and prevent damage.
- For water usage during operation, establish own water source from borehole and recycle and reuse domestic wastewater,
- Include wastewater treatment facility to minimize the use of raw water from the source at least for management of facility garden and car wash activities.

d) Health hazard from communicable diseases such as HIV/AIDS and expansion of crime

Impacts

Construction projects encourage the influx of young aged sexually active labor force and truck drivers that are considered as having high potential (or good vectors) for the spread of Sexually Transmitted Diseases (STDs) and HIV/AIDS virus. Contacts and communications created between local communities and construction workers who have come to the project area from different localities and mainly from major towns will expose the local community to new and alien cultures and behaviors that might be against local cultures and behaviors. In addition, young people are easily exposed to addict chemicals that lead them to criminal activities.

Required mitigation measures

- Maximum efforts has to be made towards effective internal as well as external mainstreaming of HIV/AIDS, Gender and Sexual and Reproductive Health particularly Sexually Transmitted Diseases (STD) throughout the span of the project in order to ensure the mainstreaming of cross cutting issues.
- Promote and Distribute Condoms: The condoms that will be distributed are of standard quality and approved by the concerned authority for distribution. Establishment of condom outlets: Effort will be made to make the condom outlets to be accessible and confidential places. Promotion of appropriate use of condoms: the various benefits and appropriate use of condoms will be promoted. Condom distribution and follow up: Condoms obtained through social marketing schemes will be distributed free of charge.
- Periodically avail VCT for the workforce and establish networking with the nearest health facility and conduct awareness sessions for the workforce;
- Conduct training for the workforce and enforce code of conduct to be signed by all workers and communicate the outcome to the local government body especially to labor and social affairs office and local police department.

e) Accident on the Workforce

Impacts

Construction sector involves serious accidents unless proper safety measures are put in place. Several classes of accidents such as fall, entrapment, etc. could take place during the construction phase of the Raxio Data Centre.

Required mitigation measures

- Conduct job safety analysis and prepare method statement,
- Establish safety committee,
- Conduct safety induction trainings,
- Establish system for each working group to practice toolbox talks,
- Avoid workforce that come to the constructing site without proper PPE,
- Establish emergency preparedness system,

f) Competition for local resources (such as water, electricity, etc. services)

Impacts

The establishment of the data center within the premise of the ICT Park can lead to competition to resources such as water and electricity.

Required mitigation measures

- Establish own water borehole;
- Install water treatment and recycling system;
- Put in place rainwater harvesting and storing system
- Use water economically and avoid wastage due to leakage and car wash
- Exploit the orientation opportunity to construct the facility to receive the maximum sunlight penetration to avoid electricity consumption during daytime;
- As long as possible install solar panels to harness solar energy;
- Get electricity from the national grid

g) Solid waste and domestic wastewater during operation phase

Impacts

During the operation phase, the data center generates solid and domestic wastewater. This is both an opportunity and a challenge for the data center. It is an opportunity if the facility included wastewater treatment system. It is a challenge if the facility lets the wastewater go into the Park's septic tank.

Required mitigation measures

- Establish wastewater collection pipeline network,
- Collect the wastewater into septic tank
- Allow the wastewater to get treated and reused
- Give proper orientation to all staff of the data center to use water economically

h) The spread of COVID 19 Virus

Currently, in any development based projects because of the nature of the work; the spread of pandemic COVID 19 virus is considered as the main Occupational health and safety issues. With this regard, the project will strictly follow and implement all the instructions of the WHO, the FDRE Government Ministry of Health, Ethiopian Public Health Institute and the Ethiopian Labor Proclamation.

Accordingly, during the implementation phase of the proposed project; we would apply different prevention techniques to protect our staffs from the pandemic COVID 19 Virus. For instance, we would provide face masks for our staffs, we would take COVID 19 test for our staffs coming from abroad and we will disinfect our office in a regular basis.

7. ANALYSIS OF ALTERNATIVES

The consideration of alternatives to a proposal is one of the requirements of EIA systems. It lies at the heart of the ESIA process to compare alternatives in terms of potential environmental impacts suitability under local conditions. The following section describes the alternatives analyzed to achieve the central objective of the establishment of the Raxio Data Center.

7.1 Activity Alternatives

For the successful achievement of those project activities known to have adverse environmental consequences, such as generation of wastewater, activity alternatives such as reducing the amount of wastewater by reusing water for relatively low quality requiring activities such as gardening and cleaning activity can be used. Moreover, the decomposing solid waste can be sorted and the biodegradable ones can be used to prepare compost that can be used for gardening and tree planting. In case the facility cannot provide the required wastewater treatment system, it can connect the wastewater to the municipal wastewater collection network or to the industrial park wastewater collection and treatment network.

7.2 Location Alternatives

This alternative can be effectively implemented for the whole data center establishment or the wastewater treatment network. In the case of the latter, it is possible to relocate all those lagoons from the sides of rivers and wetlands.

7.3 Process Alternatives

Process alternative includes technological alternative and equipment alternative. The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process. With regards to process alternatives, the project has the opportunity to replace the on – site process of concrete making to organization that will replace the use of water, sand aggregate from their own source and avoid the impacts on the environment from these chemicals and the accidents the workforces could face. Similarly, the construction process can eliminate the impacts related to emission and leakage of pollutants by outsourcing these activities to a licensed and capable company that can handle these activities at its own risk. If the pollution happen on the site the contracting company will be responsible to manage.

7.4 Demand Alternatives

Demand alternatives arise when a demand for a certain product or service can be met by some alternative means. For this project, the demand for electricity using generators could be met using electricity from the national grid than from diesel. Furthermore the demand for constructing own center can be met from the already constructed industrial parks. The problem with this alternative is that the already established parks cannot fulfil the required specification of data center.

7.5 Site Alternatives

Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site. This alternative is one of the most important alternative as the site can be used effectively of the design of the data center in such a way that it will allow the maximum sunlight penetration into the facility so that electric light will not be used during daytime.

7.6 The 'No-Go' Alternative

The '*no-go*' alternative is sometimes referred to as the '*no-action*' alternative and at other times the '*zero-alternative*' or '*null*' alternative. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. This may include changes from the present day situation as a result of other developments taking place in the vicinity and changes in environmental conditions. This alternative is less likely for the projects at hand for two reasons. The first one is that the entire data center is critical for the digitization of Ethiopian economy and second the site is already compensated and allocated for the ICT Park establishment and such activities are going on within the premise of the park.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 Environmental and Social Management Plan (ESMP)

Environmental and social mitigation and management measures are necessary to minimize or offset adverse impacts or enhance beneficial aspects so as to achieve the objectives of the proposed data center project and the ESIA. The purpose of Environmental and Social Management Plan (ESMP) is to set out how the adverse environmental and social impacts identified in the environmental study will be controlled during project implementation phases. Environmental and social management plan specifies mitigation and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined. Therefore, these measures need to be integrated with the overall project implementation during the various development phases of the project.

Environmental impacts mitigation and enhancement measures for the proposed data center project have been out-lined in the previous section. This chapter discusses environmental and social management activities to be carried out in different phases of the proposed project development (pre-construction, construction and operation phases) as well as institutional responsibility and capacity building requirements for the same. Table 8-1 shows EMP consisting project activity, anticipated impact, proposed mitigation and enhancement measure, responsible organ and required cost.

8.1.1 Institutional arrangement for ESMP

The overall data center project and environmental and social management responsibilities are to be shared between several governmental and non-governmental organizations, each with specific executive responsibilities for particular aspects, which are exercised during the various stages of project preparation, implementation and subsequent operation and maintenance. The main organizations that are involved in the project design planning and implementation are Addis Ababa City Administration EPA, Design Consultant, Construction Contractor, and Supervision Consultant.

Table 7: Environmental and Social Management Plan

Project activities	Impact description	Proposed Mitigation and enhancement Measures	Responsible agency	Cost
<ul style="list-style-type: none"> • Site clearance, excavation works and sub-structure works • Construction of super structure 	Soil Compaction, Pollution and Management of Spoil Material	<ul style="list-style-type: none"> • Surplus excavated top soil shall be stored and used to rehabilitate degraded grounds; • Provide adequate drainage structures so as to maintain the normal flow direction and attempt to maintain uniform water distribution over surfaces; • Line water receiving surfaces or ditches with stone ripraps or concrete; • Provide adequate drainage lines in order to intercept flows, protect from entering erosion susceptible areas and reduce gulley formation; • The contractor, following completion of work should loosen the compacted soil; • Start and complete earthwork before rainy season begin. Avoid earthworks during rainy season and focus on tree planting and grassing during this season; • Spoil material must be dumped in selected and approved sites where the soil piles shall be leveled or vegetated to avoid erosion. • Storage of cut material prior to use or permanent storage. • Excess spoil material left in stable piles covered with vegetation. • Avoid dumping spoil material near rivers or wetlands as much as possible, • Plant or reseed native species on all bare ground when construction is complete, monitor until vegetation is self-sustaining. 	Contractor	Part of construction cost

Project activities	Impact description	Proposed Mitigation and enhancement Measures	Responsible agency	Cost
		<ul style="list-style-type: none"> • Demarcate all construction areas and keep all vehicles and equipment in the demarcated area to avoid soil compaction in unwater areas. Minimal off-road movement; and • To avoid soil pollution, it is essential to give proper orientation to machinery operators not to replace engine oil within the construction area and contain any kind of accidental spill of hazardous chemicals 		
Ditto	Air pollution by dust and emission from construction machineries	<ul style="list-style-type: none"> • Mobilize machineries that are efficient and release small amount of emission and low fuel consumption; • Establish low dust policy with the construction premise such as speed limit for vehicles, speed breaks along vehicular routes, give orientation to drives to respect traffic signals within the construction area; • Ensure regular and periodic maintenance of vehicles and machineries so as to reduce pollution related to motor exhausts; • Implement occupational health safety measures, especially by project construction employees who are exposed to high dust and vehicular emission; • Cover truck that transport earthen material to prevent dust, especially while traversing through densely populated urban centers; • The contractor has to include the necessary cost for implementing mitigation measures to reduce/avoid air pollution impact such as cost for water spraying, machinery maintenance and service, provision of PPE for dust prevention, and safe transport of earthen material filled trucks in urban section; 	Contractor	Part of construction cost

Project activities	Impact description	Proposed Mitigation and enhancement Measures	Responsible agency	Cost
Ditto	Water pollution from release of hazardous substances	<ul style="list-style-type: none"> • Put stringent measure in the maintenance of machineries not to replace oil within the park area, • If maintenance is inevitable the mechanical team must use impermeable material on the ground and use drums to collect chemicals into it, • Minimize work in and near water bodies; • Ensure adequate sanitary facilities for workers, placed well away from water; • Limit work in wet weather as much as feasible, especially work near water bodies; • Mark off all water bodies and prohibit access by workers except for necessary construction work; • Mark off all boreholes, dug wells, and ponds and prevent damage. • For water usage during operation, establish own water source from borehole and recycle and reuse domestic wastewater, • Include wastewater treatment facility to minimize the use of raw water from the source at least for management of facility garden and car wash activities. 	Contractor	Part of construction cost
	Accident on the Workforce	<ul style="list-style-type: none"> • Conduct job safety analysis and prepare method statement, • Establish safety committee, • Conduct safety induction trainings, • Establish system for each working group to practice toolbox talks, • Avoid workforce that come to the constructing site without proper PPE, • Establish emergency preparedness system, 		

Project activities	Impact description	Proposed Mitigation and enhancement Measures	Responsible agency	Cost
Ditto	Health hazard from communicable diseases such as HIV/AIDS and expansion of crime	<ul style="list-style-type: none"> • Maximum efforts has to be made towards effective internal as well as external mainstreaming of HIV/AIDS, Gender and Sexual and Reproductive Health particularly Sexually Transmitted Diseases (STD) throughout the span of the project in order to ensure the mainstreaming of cross cutting issues. • Promote and Distribute Condoms: The condoms that will be distributed are of standard quality and approved by the concerned authority for distribution. Establishment of condom outlets: Effort will be made to make the condom outlets to be accessible and confidential places. Promotion of appropriate use of condoms: the various benefits and appropriate use of condoms will be promoted. Condom distribution and follow up: Condoms obtained through social marketing schemes will be distributed free of charge. • Periodically avail VCT for the workforce and establish networking with the nearest health facility and conduct awareness sessions for the workforce; • Conduct training for the workforce and enforce code of conduct to be signed by all workers and communicate the outcome to the local government body especially to labor and social affairs office and local police department. 	Contractor	Part of construction cost
	Competition for local resources (such as water, electricity, etc. services)	<ul style="list-style-type: none"> • Establish own water borehole; • Install water treatment and recycling system; • Put in place rainwater harvesting and storing system • Use water economically and avoid wastage due to leakage and car wash • Exploit the orientation opportunity to construct the facility to receive the maximum sunlight penetration to avoid electricity consumption during daytime; • As long as possible install solar panels to harness solar energy; • Get electricity from the national grid 	Contractor	Part of construction cost

Project activities	Impact description	Proposed Mitigation and enhancement Measures	Responsible agency	Cost
Ditto	Solid waste and domestic wastewater during operation phase	<ul style="list-style-type: none"> • Establish wastewater collection pipeline network, • Collect the wastewater into septic tank • Allow the wastewater to get treated and reused • Give proper orientation to all staff of the data center to use water economically 	Contractor	Part of construction cost

The spread of COVID 19 Virus

Currently, in any development based projects because of the nature of the work; the spread of pandemic COVID 19 virus is considered as the main Occupational health and safety issues. With this regard, the project will strictly follow and implement all the instructions of the WHO, the FDRE Government Ministry of Health, Ethiopian Public Health Institute and the Ethiopian Labor Proclamation.

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8.2 Environmental Monitoring Plan

The environmental monitoring program is essentially formulated based on proposed mitigation measures to arrest/control encountered environmental and social impacts with the proposed data center project implementation. Monitoring indicators are used to verify accomplishment and realization of a given proposed mitigation measure to control or reduce adverse impacts. The very objective of ESIA study and project sustainability cannot be met unless the proposed mitigation measures are implemented and realized. To this effect preparation and implementation of environmental monitoring program plays an irreplaceable role.

Environmental monitoring is an essential tool in relation to environmental management as it provides the basis for rational management decisions regarding impact control. The very purpose of constructing the new data center project is to contribute to the current and upcoming fast economic development of the country, and also to reduce present and potential data management and safety associated adverse impact.

In this regard the main objectives of environmental monitoring program are:-

- To check whether the mitigation and benefit enhancement measures have actually been adopted, and are effective;
- To check the contribution for reduction of present and potential data management and associated adverse impact on the economy and the environment;
- To provide means throughout which any impact are subject to uncertainty at the time of preparation of the ESIA, or was unforeseen, can be identified, and to provide a basis for formulating appropriate additional impact control measures;
- To provide information on the actual nature and extent of key impacts and the effectiveness of mitigation and benefit enhancement measures which, through a feedback mechanism, can improve the planning and execution of future, similar projects implementation in the country.

8.2.1 Monitoring type/forms and institutional responsibility

There are two basic forms of monitoring:-

Compliance monitoring: it checks whether prescribed actions have been carried out, and usually conducted by means of inspection or enquiries.

Effects monitoring: it records the consequences of activities on one or more environmental components, and usually involves physical measurement of selected parameters or the execution of surveys to establish the nature and extent of induced changes. In the case of the proposed data center project, compliance monitoring is given more emphasis since most of the impact controls take the form of measures incorporated in project designs and contract documents, and the extent to which recommendations on these matters, as set out in the ESIA are complied with. It plays a major part in determining the overall environmental performance of the project. Internal and External Monitoring can be recognized in relation to monitoring mechanism and responsible body executing monitoring task.

Internal Monitoring: Internal monitoring process shall begin early at the pre – construction stage and proceeds throughout different phases of the project. The internal monitoring will be conducted mainly by the contractor on duty, and EMU as part of the overall construction supervision consultant.

External Monitoring: An overall supervision and monitoring of the environmental conditions and performances of the project will be made by the Addis Ababa Environmental Protection Authority. The monitoring reports submitted by the project will be assessed and evaluated by EPA and comments and recommendations given as required, enabling or rectifying mistreatment and malpractices in the project implementation processes. EPA experts can require arrangements for site visits and supervision of the environmental conditions whenever it is felt necessary.

Table 8: Environmental and Social Monitoring Plan

Proposed Mitigation Measures	Monitoring Indicator	Method	Location	Frequency
Avoid soil pollution and manage spoil	<ul style="list-style-type: none"> • Volume of stocked topsoil for later use • Established adequate drainage structure • Area of compacted soil loosen • Earthwork completed before rainy season • Volume Spoil dumped and leveled on approved sites • Number of trees planted on leveled spoil material • Volume of hazardous substance collected and properly disposed 	Site observation	Construction site	Every quarter
Prevent air pollution due to emission and dust	<ul style="list-style-type: none"> • Number of modern machineries with better efficiencies; • Number of speed limit signals erected, length of speed breaks along vehicular routes installed and, number of drivers received orientation; • Number of drivers who received regular and periodic maintenance of vehicles and machineries; • Number of trucks that have cover during transport earthen material; • Number of workforce that received the necessary awareness and PPE and using it regularly and properly 	Site observation and consultation with concerned workforce	Construction site	Every quarter
Prevent water pollution	<ul style="list-style-type: none"> • Stringent measure put in place and followed by all; • On-site maintenance is done following all standard procedures for hazardous chemicals; • No spoil is dumped near water bodies; • Adequate sanitary facilities will be there for workers; • Marked and protected water sources except for necessary construction work; • Water is used from own source for construction and operation in addition to recycling and reuse domestic wastewater, • Include wastewater treatment facility to minimize the use of raw water from the source at least for management of facility garden and car wash activities. 	Site observation	Construction site	Every quarter

Proposed Mitigation Measures	Monitoring Indicator	Method	Location	Frequency
Implement HIV/AIDS prevention and control measures	<ul style="list-style-type: none"> • Number of condom distributed • Number of condom distribution outlets established • Number of awareness sessions conducted • Number of people received VCT and counselling service 	Site observation	Construction site	Every quarter
Implement accident prevention program	<ul style="list-style-type: none"> • The outcome of job safety analysis and prepare method statement prepared, • Number of safety committee members, • Number of workforce that received safety induction trainings, • The established system for each working group to practice toolbox talks, • Number of workforce that come to the constructing site with proper PPE, • Working emergency preparedness system established, 	Site observation	Construction site	Every quarter
Establish own water sources	<ul style="list-style-type: none"> • own water borehole established; • water treatment and recycling system installed; • rainwater harvesting and storing system installed • water is used economically and wastage due to leakage and car wash are avoided • structure kept in good orientation • solar panels are installed and solar energy is used • the whole setup gets energy from national grid 	Site observation	Construction site	Every quarter
Manage solid and liquid wastewater scientifically	<ul style="list-style-type: none"> • wastewater collection pipeline network established, • the wastewater collected into septic tank • the wastewater allowed to get treated and reused • orientation given to all staff of the data center to use water economically 	Site observation	Construction site	Every quarter

9. CONCLUSION AND RECOMMENDATIONS

The construction and management of the data center plays pivotal role to boosts secured and efficient data management facility that supports the digitalization of Ethiopia's economy, create job opportunity for the local skilled and unskilled labor, and create income generating activities.

Virtually every human activity has impacts on the natural environment that might contribute towards gigantic environmental changes. Thus, the construction of Raxio data center will bring about soil compaction, pollution from spoil material, release of air pollutants from machineries during construction, health hazard from communicable diseases such as HIV/AIDS and expansion of crime in the project area, accident on the workforce during construction period, and competition for local resources (such as water, electricity, etc. services) during operation phase. This will be in help achieve the principle of protection and promotion of health and safety of the environmental and social management system.

In general, the project will contribute its share in cumulative effect on the local land use and land cover changes that will affect the soil permeability to through-fall and interception storage of rainfall. Moreover, it affects the percolation capacity that requires environmental and social management system to be in place by Raxio.

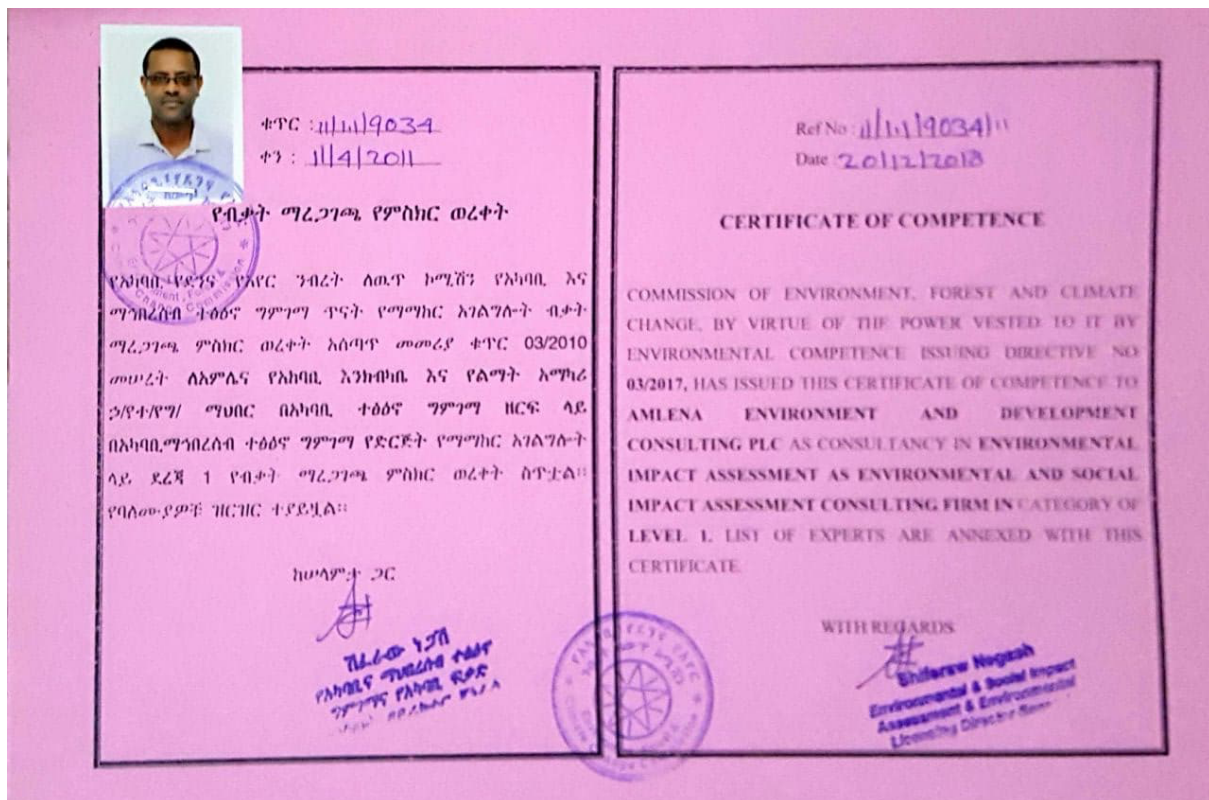
It is critically important for the ICT Park administration and all project proponents in the park to focus on all-rounded livelihood restoration plan for the 'former land users' because there are certain cues of encroachment into the park compensated area from the surrounding residents probably by the project affected people. This will help to prevent unwanted frictions that could be caused by the project affected people and polluters pay principle.

The park provides electricity, water supply and road infrastructure for its clients. It is essential to enforce and put in place ICT Park related all-rounded occupational health and safety and accident prevention system, wastewater recycling and reuse network, and renewable energy utilization framework. Moreover, there must be clear criteria to include the local youth who lost its livelihood to the park in the available job opportunity including knowledge transfer and capacity building training to have smooth relationship with the local community.

Last but not least, it is essential to implement all the recommendations included in this document for the enhancement of each of the positive impacts and mitigate the negative impacts of the project. In order to strengthen the environmental and social acceptance of the project, it is important to put environmental and social management system in place during the operation phase. This can be achieved by focusing on the international good practices and principles that includes the precautionary approach (this can be achieved by including the project affected persons during the construction and operation phases as per their skill and give chance for developing their skill).

10. Annexes

10.1 Annexes 1: Company Competence Certificate



10.2 Annex 2: Professionals Competence Certificate

No	Name	Area of Expertise
1	Gizaw Abera	Company Manager
2	Gizaw Ibsa	Greenhouse Gas Emission Analyst Expert
3	Yohannes Amha	Environmental Health Expert
4	Mekonnen Mekasha	Social Affairs Analyst Expert
5	Tadesse Mumicha	Environmental Pollution Analyst
6	Wossene Gultie	Water Resource Expert
7	Lieltewoyin Nega	Economic Affairs Expert
8	Tekleworld Birhanu	Biodiversity and Ecosystem Analyst Expert

