PROPOSED 400kV UGANDA-TANZANIA INTERCONNECTOR PROJECT(UTIP) FROM IBADAKULI SUBSTATION IN SHINYANGA REGION VIA GEITA REGION, NYAKANAZI AND KYAKA SUBSTATIONS IN KAGERA REGION TO MASAKA WEST IN UGANDA (548.91 km)




BIODIVERSITY MANAGEMENT PLAN (BMP)

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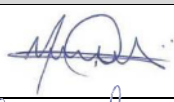
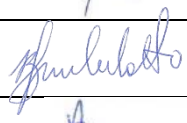
1	Maurício Eugenio Zamboin	Team Leader	
2	Bruno Del Grossi Michelotto	EIA Expert / Co-leader	
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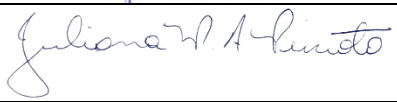
4	Juliana Peixoto	Biodiversity Expert	
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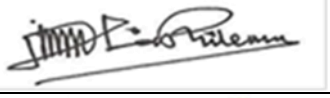
2	Elias P. Magesa	Land Surveyor	
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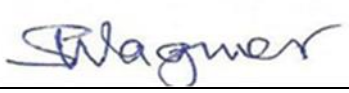
5	Susan M. Wagner	Gender Expert	
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LIST OF ACRONYMS AND ABREVIATIONS

AVS	Active Visual Search
BAP	Biodiversity Action Plan
BBOP	Business and Biodiversity Offsets Programme
BCNP	Burigi Chato National Park
BMP	Biodiversity Management Plan
BS	Biodiversity Sampling
CBD	Convention on Biological Diversity
CEP	Construction Environmental Plan
CH	Critical Habitat
CITES	Convention on International Trade in Endangered Species
CO2	Carbon Dioxide
CR	Critically Endangered
CSBI	Cross-Sector Biodiversity Initiative
DAA	Direct Affected Area
DAI	Direct Area of Influence
dB	Decibel
DEFRA	Department for Environment, Food and Rural Affairs
EAC	East African Countries
EAPP	Eastern Africa Power Pool
EMA	Environmental Management Act
EN	Endangered
EOO	Extent of Occurrence
ESA	European Space Agency
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
ESS	Environmental and Social Standard
FBF	Firefly Bird Flapper
GBIF	Global Biodiversity Information Facility
GMP	General Management Plan
GN	Government Notification
GPS	Global Positioning System
IBA	Important Bird Area
ICMM	International Council on Mining & Metals
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
kV	kilovolt
LC	Least Concern
LR	Lower Risk
MNRT	Ministry of Natural Resources and Tourism
MoU	Memorandum of Understanding
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NNL	No Net Loss
NP	National Park
NPI	Net Positive Impact
NT	Near Threatened

PAC	Prior Active Capture
PBV	Priority Biodiversity Values
PS	Performance Standard
PVC	Polyvinyl Chloride
QH	Quality Hectares
RACI	Responsible, Approver, Consulted, Informed
RGB	Red, Green, Blue
RPF	Resettlement Policy Framework
SCBD	Secretariat of the Convention on Biological Diversity
SER	Society for Ecological Restoration
SS	Substation
TANAPA	Tanzania National Parks
TANESCO	Tanzania Electric Supply Company Limited
TANRIC	Tanzania Natural Resources Information Centre
TANROADS	Tanzania National Roads Agency
TBC	The Biodiversity Consultancy
TFS	Tanzania Forest Service
TL	Transmission Line
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

1.0
Introduction

This document presents the management plan for biodiversity and ecosystem services within the Project area. It includes a comprehensive assessment of the project's impacts on priority biodiversity values and proposes mitigation and compensation measures to achieve no net loss (NNL) for impacts on natural habitats and net positive impact (NPI) for impacts on critical habitat trigger species. This refers to the goal of ensuring that the biodiversity gains from a project outweigh the losses. For critical habitats, this means implementing measures that result in a net gain in biodiversity values. This will be achieved through an implementation of a set of six management programs. These programs are:

- P.05 - Biodiversity Offset Plan
- P.06 - Ecosystem Services Impact Mitigation Plan
- P.07 - Fauna and Flora Rescue and Relocation Plan
- P.08 - Invasive Species Control Program
- P.09 - Landscape Protection Program
- P.10 - Operation Biodiversity Management
- P.11 – Flora Active Search Program

The main objectives of this Biodiversity Management Plan are:

- Minimize and mitigate impacts on ecosystems, habitats, and species along the transmission line corridor and its areas of influence.
- Restore disturbed areas, and promote reforestation or rehabilitation efforts.
- Ensure adherence to environmental laws, international conventions, and lender requirements.
- Design and implement measures to reduce habitat fragmentation and maintain wildlife connectivity.
- Verify the occurrence, in the area directly affected by the project, of critical habitat trigger flora species known to occur only in the Indirect Area of Influence of the project.
- Implement measures to reduce electrocution, collisions, and other risks to birds.
- Establish a system for continuous biodiversity monitoring and adapt management strategies based on findings.
- Develop biodiversity offsets where residual impacts cannot be fully mitigated, including goals for biodiversity gains .

1.1
Project Background

Over the last decade, considerable efforts have been undertaken to allocate a stronger importance to power trade among East African countries. The EAC Master Plan (2003, ACRES), EAPP Masterplan of 2011 (SNC Lavalin) (update concluded in 2014), NELSAP power trade studies considered power trade among member countries. The

overall objective of the studies was to determine whether further interconnection of the power systems of Uganda, Kenya, Tanzania and the Great Lake Countries is technically feasible and economically viable as growth in demand has occurred since the early 2000 which is expected to last over the next 20 years.

Several technical feasibility studies, environmental and social studies were undertaken on the national, regional and sub-regional level and the voltage levels considered and recommended included 220 kV, 330 kV and 400 kV transmission lines. Therefore, the Governments of the East Africa Community Member States agreed to interconnect their power systems by constructing a high voltage TL system, aiming to: link generation in the area to load centres; enhance cross border regional electricity trade; improve security and reliability of electricity supply; and foster economic development and regional integration. Previously,

One of the priority projects has been the transmission interconnection between Uganda and Tanzania along the Lake Victoria. Hydropower potential in that area as well as low access to power services by the population have underscored the interest for such power transmission facilities which would also cover power distribution services. Uganda and Tanzania are currently implementing various programmes to increase their generation resources and transmission networks. Therefore, interconnection between countries will provide the opportunity to balance electricity demand and supply on a larger scale. By sharing electricity resources, countries can optimize their power generation to match demand patterns more effectively, reducing the reliance on fossil fuel power plants, resulting in lower CO_2 emissions.

1.2 Project Overview and Description

The 400 kV Tanzania (Kyaka-Nyakanazi-Ibadakuli) – Uganda (Masaka-Mutukula) Transmission Line (TL) has 548.91 kilometres in total, divided into 3 segments

- Mutukula-Kyaka, with 31.01 km length
- Kyaka-Nyakanazi, with 235.65 km length
- Nyakanazi-Ibadakuli, with 282.25 km length

The total project footprint is 2,851.52 hectares, including the towers and wayleave of 52 metres. Nevertheless, not the entire wayleave will be cleared to implement the project. Clearing will be carried out in the service strip, which is 14 metres-wide with a total area of 767.67 hectares (300.37 ha of natural habitats and 466.08 ha of modified habitats). Access will mainly be via the service strip, and new access will only be built where the topography does not allow transport via this strip. Construction sites will mainly be located in degraded areas. Additionally, expansion works will be needed for the existing substations (SS), the SS Nyakanazi, the SS Kyaka and the SS Ibadakuli, providing space for the TL and transformer bays and for future expansion.

For the construction, is estimated for the construction of the TL, it is estimated that 9 (nine) construction sites will be set up for the project, 3 (three) of them on the sites of the

SSs to be expanded, in the villages of Kyaka, Nyakanazi and Ibadakuli, 1 (one) in the village of Mutukula, on the border between Tanzania and Uganda, and another 5 (five) distributed along the route, at average distances of 70 to 80 km from each other. The exact location of these camps is not yet available.

It will also be necessary to open new accesses to the tower locations at specific points around the route where the topography does not allow access through the easement, and their interconnection to existing roads. For the TLs that are part of this project, should be few stretches of access outside the easement, as the topography is quite favourable. Improvements of existing accesses, involving small-scale earthworks, widening of roads without intervention in native vegetation and improvement of pavements, are also predicted.

2.0
National and International Framework

National framework

- Protected Places and Areas Act (1969): Part of the proposed transmission line traverses some village and district forest areas in various parts of the alignment. The transmission line design should include appropriate mitigation measures to minimize any possible impacts to the wildlife and in particular before approaching the key sensitive habitats.

- The National Policies for National Parks in Tanzania (1994): The policy aim to preserve national parks and to ensure that national parks retain a high degree of integrity in wildlife conservation. Part of the TL will pass through Burigi-Chato National Park. The act requires that an Environmental Impact Assessment be carried out prior to any actions, developments and activities within and adjacent to parks' boundaries. The act also establishes the legal basis for the ESIA process and its main requirements. Requires the NEMC to determine whether a developer is required to prepare an ESIA before a proposed project, establish whether a project is likely to have a significant impact on the environment, and recommend projects to the Minister for approval and issuance of an ESIA certificate.

- Plant Protection Act (1997): The Act prevent the introduction and spread of harmful organisms (invasive species), ensures sustainable plant and environment protection, controls the importation and use of plant protection substances, regulates the export and imports of plants and plant products and ensures the fulfilment of international commitments, to entrusts all plant protection regulatory functions to the Government, and for matters incidental thereto and connected therewith.

- National Forestry Policy (1998): Part of the project will pass through Forest Reserves, and the implementation of the TL will lead to a reduction in natural habitats. One of the main goals of the National Forest Policy is to ensure sustainable management and use of natural resources for the benefit of present

and future generations. To achieve this goal, the states that: ecosystem preservation will be ensured through conservation of forest biodiversity, water catchments and soil fertility; new forest reserves will be established in biodiversity-rich areas for biodiversity conservation and then will be upgraded to nature reserves for more effective protection; in-situ and ex-situ conservation programs including gene banks for endangered species will be established; sustainable supply of forest products and services will be ensured through effective management of forest reserves under local and central government, critical watersheds, forest areas with high biodiversity, forest on public lands, and traditional forests..

- The Forest Act No. 14 (2002): Part of the project will pass through the Biharamulo Forest Reserve. Section 18 of the Act states that any proposed development in a forest reserve, private forest or sensitive forest area including watersheds, whether that development is proposed by, or is to be implemented by a person or organization in the public or private sector, the developer of the development shall prepare and submit to the Director an Environmental Impact Assessment of the proposed development.

- The National Parks Act (2002) Chapter 282, revised as of July 31, 2002, provides the legal framework for the establishment, control, and management of national parks in Tanzania. The legislation outlines the process for establishing national parks, including the powers of the President to declare areas as national parks and the creation of a Board of Trustees responsible for managing these parks. The Trustees are tasked with maintaining and conserving the wildlife and vegetation within national parks, as well as overseeing visitor facilities and pursuing investments related to park functions. The Act also imposes strict controls on national parks, including prohibitions on unauthorized entry, hunting, mining, and other activities without appropriate permits. Financial provisions are detailed, including funding, budgeting, and auditing processes for the Trustees. It also highlights penalties for violations, the responsibilities of the Trustees in managing the parks, and the Minister's authority to issue directions to ensure compliance with the Act.

- The Environment Management Act (2004): Section 63, 66, 67 and 68 promotes the protection of ecosystems, forest resources, and natural habitats and the maintenance of viable populations of species in natural surroundings. The Act promote environmentally sound and sustainable development in an area adjacent to protected areas intending to further protection and conservation of these areas. This act is relevant to the project, considering the impacts on natural habitats and the loss of flora individuals due to vegetation clearing.

- The Wildlife Policy of Tanzania (2007): The Wildlife Policy of Tanzania guides the protection and conservation of wildlife and wetlands, sustainable utilization of wildlife and wetlands, management and development of wildlife and wetlands resources, strengthening resource monitoring and research and enhancing communication, education and public awareness. This act is relevant to the

project, considering that part of the route passes through the Burigi-Chato National Park, the Biharamulo Forest Reserve, and natural habitats.

- Wildlife Conservation Act, No. 5 (2009): This Act makes provision for the protection, conservation, development, regulations and control of fauna products and matters incidental thereto. It stipulates the conditions upon which areas could be declared protected zones and restrictions on entry, use and residence within such areas. It also gives restrictions on grazing livestock within game reserves and regulates hunting within the controlled game reserves. Part IV of the Act states that every significant physical development in a protected wildlife area, whether such development is prepared or implemented by a person or organisation in the public or private sector, the potential developer must prepare and submit to the Minister responsible for the environment a report on the Environmental Impact Assessment of the proposed development, and no development shall commence unless and until an Environmental Impact Assessment certificate has been issued by the Minister responsible for the environment. This is relevant to the project considering that part of the TL will pass through the Buriti-Chato National Park, a wildlife protected area.

- National Environmental Policy (2021): The policy promotes the environmental management of water sources; strengthens the conservation of wildlife habitats and biodiversity; and enhances conservation of forest ecosystems for sustainable provision of environmental goods and services. This policy is relevant to the project, considering that there will be direct impact on natural habitats.

<u>International policies</u>

- World Bank Environmental and Social Standards (ESS): set out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts associated with projects supported by the Bank through Investment Project Financing. Among the World Bank's standards, the ESS 6 stablishes requirements related to Biodiversity Conservation and Sustainable Management of Living Natural Resources. The ESS6 recognises that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development, the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support, addresses sustainable management of primary production2 and harvesting3 of living natural resources, and recognizes the need to consider the livelihood of project-affected parties

- IFC International Performance Standards (PS): IFC Performance Standards (PS) defines responsibilities for managing environmental and social risks, *which* consists of 8 principles. *Similar to ESS6, IFC PS6* recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in *IFC PS6* have been guided by the Convention on Biological Diversity, which defines biodiversity as “the variability among living

organisms from all sources including, inter alia, *t*errestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.

- The Convention on Biological Diversity (CBD): is the international legal instrument for the conservation of biological diversity. It provides for sustainable use of its components as well as fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The CBD covers biodiversity at all levels: ecosystems, species and genetic resources. It also covers all possible domains that are directly or indirectly related to biodiversity and its role in development, ranging from science, politics and education to agriculture, business, culture and much more. The CBD is relevant to the project and RAP processes to ensure the ecosystem services are preserved and any damage that occurred is restored.

- UNESCO - World Heritage Convention: Tanzania is a signatory to several UNESCO conventions that appeal to the safeguarding of cultural heritage. Among these is the 1972 UNESCO Convention concerning the Preservation and Protection of World Cultural and Natural Heritage ratified in 1977, the 2003 UNESCO Convention on the Safeguarding of Intangible cultural heritage ratified in 2011 and the 2005 UNESCO Convention on the Protection and Promotion of the Diversity of cultural expressions that was ratified in 2011. The process of land acquisition for the establishment of the proposed project shall observe the provision of the World Heritage Convention.

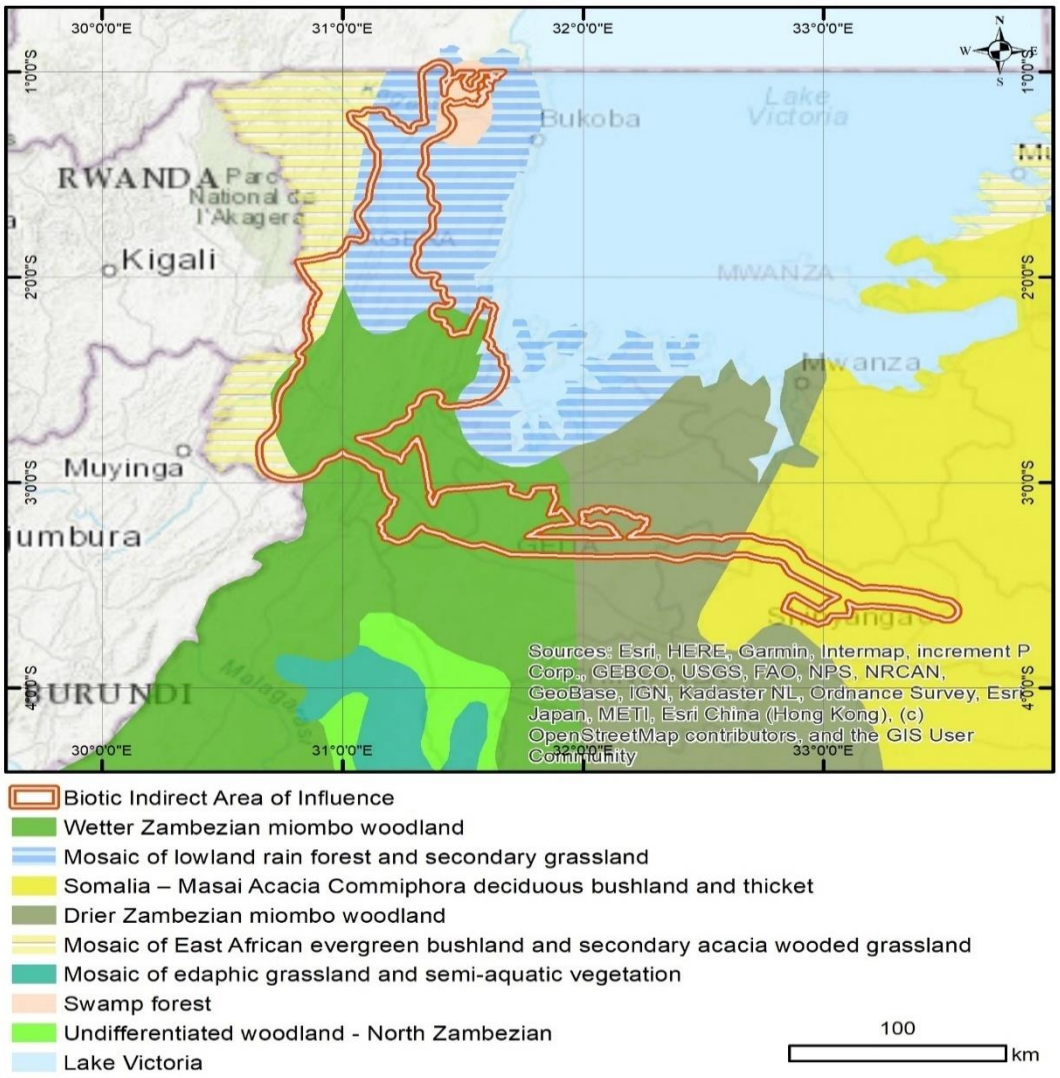
3.0
Biodiversity Baseline

3.1
General Characterization

Ecosystems and habitats

According to White's vegetation map of Africa (White, 1983) the project is located in three main phytogeographical types, most part are concentrated in the Guinea-Congolia/ Zambezia regional transition zone and in the Lake Victoria regional mosaic. A minor part overlaps with the SomaliaMasai regional centre of endemism. According to the Tanzania Vegetation Map, based on the map elaborated by White (1983), the ecosystems associated with this phytogeographical types, that occur in the study area, are: Mosaic of lowland rain forest and secondary grassland, Wetter and Drier Zambezian miombo woodland, Somalia – Masai *Acacia Commiphora* deciduous bushland and thicket, Mosaic of East African evergreen bushland and secondary *Acacia* wooded grassland and Swamp Forest (**Figure 3.1.a**).

Figure 3.1.a
Tanzania vegetation map by F. White (1983)



Source: Adapted from Tanzania Natural Resources Information Centre (TANRIC), University of Dar Es Salaam. Data Source: The Vegetation of Africa by F. White published by UNESCO 1983

None of these phytophysiognomies are threatened with extinction (IUCN[1]) and occurs in other parts of the continent. However, although these ecosystems are not classified as threatened, many are under threat from the conversion of natural habitats, mainly for the establishment of agricultural crops, the use of savannas as grazing land for cattle and the (sometimes indiscriminate) use of fire to renew pastures, and the extraction of timber and other plant products.

According to official land use and land cover maps (ESA, 2021), the anthropized areas are mostly located in the Shinyanga and Geita regions, along the east-west alignment of the TL. This region is more intensely anthropized, with the remaining natural habitats

[1] IUCN Ecosystems (iucnrle.org)

basically inside the protected areas and in specific places where the terrain is steeper. Areas with more open vegetation (such as savannah, grasslands, shrublands), located on flat terrain and outside protected areas, are predominantly occupied by anthropogenic land uses, especially the areas close to water bodies, which are intensively used for agricultural activities, mainly rice cultivation

Along the Kyaka- Nyakanazi segment, there is a more significant presence of preserved natural habitats, mainly within the Burigi-Chato National Park. However, in the region closest to Lake Victoria there are several urban centres and a large population agglomeration, with modified habitats predominating.

Protected Areas and Internationally recognized areas

There are 8 Protected Areas in the Project's region: 3 of which are intercepted by the Project, the Burigi-Chato National Park, intercepted by the and the 400 kV Kyaka – Nyakanazi TL; the Biharamulo Forest Reserve and the Uyovu Forest Reserve, both intercepted by the 400 kV Nyakanazi - Ibadakuli TL. The other 5 Protected Areas are Forest Reserves located within the Project's Indirect Area of Influence (Lubaga, Minziro, Nindo, Ruamagazi, Ruiga River and Uyovu).

As for the internationally recognized area, there are 3 Important Bird Areas (IBA) in the project region. Two of these areas also coincide with Protected Areas, the Burigi - Biharamulo Game Reserves, which has a similar boundary to the Burigi-Chato National Park, and the IBA Minziro Forest Reserve, whose area coincides with that of the Minziro Nature Forest Reserve.

Flora and fauna biodiversity

Regarding flora, the database consulted indicates a total of 807 species with the potential to occur in the project region, belonging to 410 genera and 122 families. Among the records collected through primary data, a total of 173 plant morphospecies were recorded, of which 01 were pteridophytes and 172 angiosperms. Among all the species recorded by secondary and primary data, 25 species are classified as EN and 3 as CR. Of the 28 species, 20 have a restricted range, i.e., with an EOO of less than 50,000 km².

Regarding fauna, the assessment of the terrestrial mammals detected 55 species from 10 orders and 23 families. The orders Artiodactyla (even-toed ungulates) and Carnivora (carnivores) presented the highest richness of species, while the orders Eulipotyphla (insectivores and true shrews), Macroscelidea (elephant-shrews), Perissodactyla (horses and rhinoceroses), Proboscidea (elephants) presented only one species each. The family Bovidae (antelopes, cattle, gazelles, goats, sheep, and relatives) presented 13 species, followed by Cercopithecidae (Old World monkeys), with six species, while 13 families presented one species each. Regarding threatened species, 6 species are classified as Vulnerable, like the Lion (*Panthera leo*), the Leopard (*Panthera pardus*) and the Masai Giraffe (*Giraffa tippelskirchi*), Another three species area classified as Endangered, as the African Savanna Elephant (*L. africana*) and the Ashy Red Colobus (*Piliocolobus tephrosceles*). Concerning the endemism, most of the species detected in field and

through interviews present large distribution ranges and are not habitat specialists.

There are two important wildlife corridors, classified as important for African Elephants herds (*L. africana*), the Burigi-Chato - Akagera (Rwanda) and Kigosi Moyowosi - Burigi Chato (MNRT, 2022).

The primary bird survey resulted in a total of 3,756 records, covering 219 species distributed in 20 orders and 55 families. Four species are threatened with extinction, with the Hooded Vulture (*Necrosyrtes monachus*) listed as 'Critically Endangered'. None of the species are on Appendix I of CITES, although 24 are on Appendix II, suggesting the need to control international trade to avoid their possible future threat. As for endemism, although species such as the Swahili Sparrow (*Passer suahelicus*) and the Ashy Starling (*Lamprotornis unicolor*) are considered endemic to East Africa, they are widely distributed within their areas and are not threatened. The analysis of migratory routes revealed the presence of 11 migratory species and 23 partially migratory species, highlighting the relevance of the East Atlantic, Mediterranean/Black Sea, and East Asia/East Africa Flyways for the region's avifauna. In addition, the project will intercept two Important Bird Areas (IBAs) - Minziro Forest Reserve and Burigi-Biharamulo Game Reserves.

For the herpetofauna, the primary data resulted in a total of 23 taxa. The amphibian group was the most abundant and diverse, accounting for around 52 per cent of the total number of taxa. None of the species recorded are classified as endangered, with only the Central African Rock Python (*Python sebae*) standing out as 'Near Threatened'. Three other species, the Nile Monitor (*Varanus niloticus*), the Central African Rock Python (*Python sebae*) and the Leopard Tortoise (*Stigmochelys pardalis*) are listed in CITES Appendix II (2024). No species endemic to Tanzania or invasive species were recorded either.

3.2
Priority Biodiversity Values

Priority biodiversity values are those that, due to their degree of threat, distribution and/or ecological significance for natural populations, fall within the definitions of items (a) to (e) of paragraph 23 of ESS6. Because of these characteristics, these values need special attention when designing the project's mitigation hierarchy.

Based on the project's biodiversity baseline, taking into account the data obtained from primary sources, and the species with potential occurrence in the region (secondary sources) **130 priority biodiversity values (PBV)** have been identified in the entire area of indirect influence of the project, including the following (detailed in Table 7.2.4.3.c of Section 7.2.4.3.of the ESIA):

- 21 Threatened species (EN or CR)
- 21 Threatened (EN or CR) and restricted-range species
- 4 Threatened (EN or CR) and migratory species
- 6 Vulnerable migratory species
- 75 Migratory species

- Ecological functions needed to maintain the viability of the biodiversity values (1)
- Important habitat for species congregation (1)
- Natural habitats (1)
- 5 priority ecosystem services: 3 provisioning services and 2 regulation, all of them type 1

Of these 130 priority values, 12 PBVs triggered the thresholds for activating CH:

- Criteria (a) and (b): 7 flora species triggered criteria a and b: *Albertisia exelliana, Blotiella trichosora, Emilia cryptantha, Oxyanthus ugandenses, Thunbergia laborans, Tinnea physalis and Vernonia tinctosetosae*. All are classified as EN or CR and have an EOO of less than 50,000 km². None of the 7 species were found in the Project's DAI, they were only recorded through secondary data. Of these, 5 species (*E. cryptantha, V. tinctosetosa, B. trichosora, A. exelliana* and *O. ugandensis*) have a very similar distribution, occurring in the Minziro FR region and the Sago Bay IBA, on the border between Tanzania and Uganda, near the shores of Lake Victoria. The species *T. laborans* has only 4 records, 3 of them around Lake Victoria (to the east, south and west of the lake, the latter within Burigi-Chato NP), and the fourth record in Rwanda. The records of *T. physalis* are concentrated in the Shinyanga region. As demonstrated in **Section 7.2.4** (**Figures 7.2.4.3.**a to **7.2.4.3.c**) and **8.2.3.2** (Item 7) of the ESIA, the project will not directly intercept the critical habitat delimited for these species, there are no existing records in the area of direct influence of the project (considering online databases), and these species were not evidenced during the primary data survey. Therefore, it is unlikely that significant populations will occur in the affected area. However, as the project intersects phytophysionomies where some of these species may occur (mainly *A. exelliana, T. physalis* and *T laborans*), there is a potential risk.

- Criterion (a): 3 species of fauna triggered the classification under criterion (a), the mammals Common African Pangolin *Phataginus tricuspis*, Ashy Red Colobus *Piliocolobus tephrosceles* and the African Savanna Elephant *Loxodonta africana*. Only the elephant *L. africana*, were recorded in the project's DAI, in the Burigi-Chato NP region. The primate *P. tephrosceles* was only registered in the studied alternative near Lake Victoria, as described in the species' geographical distribution available on IUCN website. The pangolin *P. tricuspis* was recorded through interviews, and it occurs mainly in the Minziro FR region. As demonstrated in **Figures 7.2.4.3.g** to **7.2.4.3.n**, the project will only intercept the critical habitat of the elephant *L. africana*.

- Criterion (c): conservatively and considering the potential of lakes and other wetlands to congregate animals, especially in dry vegetation environments, Lake Burigi was considered a CH under criterion (c). The project will not intercept this critical habitat (see **Figure 7.2.4.3.m**, **Section 7.2.4.3**).

- Criterion (e): the region between Akagera National Park (in Rwanda), through Burigi-Chato NP to Moyowosi - Kigosi Game Reserve is an important ecological corridor in the region, used as a migratory route mainly by elephants, but also by other species of fauna. It has been classified as one of the 10 most important ecological corridors in the country and is important for maintaining the ecological balance of the region, favouring the exchange of gene flow between different populations. The project will directly intercept this critical habitat (see **Figure 7.2.4.3.n**, **Section 7.2.4.3**).

4.0
Engagement with Stakeholders

Biodiversity and ecosystem service stakeholders can be persons or groups both internal and external to the Project, and exist at a global, national and local level. They can range from company staff and local communities to scientists and non-governmental organisations national and internationally. Stakeholders of particular relevance to this project are persons or groups who are directly or indirectly involved with, who may have interests in and/or the ability to influence: (i) the rehabilitation outcomes of the Project, and (ii) achieving NNL scale of compensation/offsets.

A stakeholder mapping and consultation exercise, which included biodiversity-related stakeholders, was carried out as part of the ESIA. The details of the stakeholder identification and consultation is presented in **Section 7.5**. The list of the Project's priority biodiversity and ecosystem services stakeholders and any engagement undertaken during the development of the BAP is presented in **Table 4.a**. Documents received are presented in **Annex 13.1**.

An additional consultation was held with TANAPA and TFS representatives on 13 November 2024. The focus was to present the Project and verify their impressions about the impacts on biodiversity and possible mitigation measures. TANAPA, TFS and TANESCO will develop a Memorandum of understanding between them on operational modalities (will be subject of further discussions), in response to the recommendations made by TANAPA, TFS and the MNRT for the mitigation measures of the project. This will include, for example, the installation of support structures for the Park Rangers and camera traps, to help monitor the wildlife within the park and, also any illegal activities. TANAPA and TFS will share an official document with the agreement made between them and TANESCO.

Another consultation was held with flora and fauna experts to verify the possible occurrence of trigger species in the area directly affected by the project, as well as more up-to-date and accurate information on abundance, population and distribution. The consultations included experts in African biodiversity and experts in assessing threatened species according to IUCN criteria, both from Tanzania and from international research institutes with extensive experience in Africa. The consultations were carried out remotely between the end of January and the beginning of February of 2025 (**Table 4.0.b**).

Table 4.0.a
Project's priority biodiversity and ecosystem services stakeholders and engagement undertaken during the development of the BAP

Name of stakeholder	Date of consultation	Level of interest in the Project (high/medium/low)	Level of influence in Project (high/medium/low)	Description of engagement during BAP development	
				Concerns	Recommendations
Government agencies					
Burigi Chato National Park TANAPA Offices in Biharamulo	Consultation held in January 2024, during the field survey	High	High	- They appreciate the Project, as it will connect Kagera to the national grid, solving power outages in the region. - They provided security guards to accompany the JGP/Bene Consult team during the surveys inside the park, for safety reasons, as Bushmen hunt in the area. - As a national park, they are concerned about infrastructure development, such as powerlines and roads, which could negatively impact the park's ecology.	- The park is a major tourism attraction in the country, so mitigation measures must be carefully planned to reduce any adverse impacts. - Consult TANROADS in Kagera as they are also working on a project in Benaco. - Powerline towers could disturb animal habitats and increase mortality rates. What mitigation measures will be implemented to prevent these risks? - Secondary data on the park's biodiversity is available at the Ecology Office for your reference.
Ministry of Natural Resources and Tourism Dra Siima Bakengesa	Consultation held in August 2024	High	High	- The Protected area (Burigi Chato NP) currently faces impacts such as uncontrolled extraction of forest products (timber, medicinal plants and mushrooms), and wild fires. - The implementation of the Project may cause habitat loss and fragmentation, and loss of flora species	- Involvement of the Ministry of Natural Resources and Tourism in all steps of project implementation from the initial plan to implementation. - Support in surveillance programmes to curb illegal extraction of forest products, wildfires and invasive species. - The main currently needs of the BCNP are: restoration of degraded areas; control of human activities; lack of trained personal and equipment (such as drones). - Support to surrounding communities on alternative sources of income.
Tanzania Forest Services Agency (TFS)	Consultation held in November 2024	High	High	- The main conservation objectives of the protected areas from Makotopora to Tabora are: (a) Biodiversity conservation in general as well as promotion of sustainable use of the area's natural resources. In the mentioned area there is an endemic species of Itigi thickets which requires a special protection model for its existence and sustainability; and (b) Curbing anthropogenic activities to the lowest level in the protected areas. - The main environmental impacts faced by the protected áreas are: a) Illegal extraction of forest products especially timber species and charcoal; and b) Encroachment of forest reserves for cultivation, mining and grazing in protected areas. - The implementation of the project will cause loss of flora and fauna species and biodiversity in general where the clearance of vegetation will be done to give way to the construction of transmission lines.	- It is proposed that where there is too much vegetation/high concentration of biodiversity the way of the line could be shifted a bit so as to reduce too much removal/clearance of the vegetation hence reduce loss of biodiversity. - Compensation for negative impacts caused by the construction of transmission lines within protected areas, as required by the Forestry Act No. 14 of 2002 and Government Notification (GN) No. 59/28/2022, which establishes the fees to be paid for such destruction of forest resources caused by the project within a forest reserve. This will be determined through a resource assessment in collaboration with TFS officials, and the compensation fee will be determined and paid in accordance with the Act and the GN. - The main needs of the protected areas today are but not limited to: Creation of awareness of the importance of protected areas to the surrounding communities and the general public; Restoration of degraded areas by planting trees; Law enforcement hence control and minimizing illegal activities (fires, charcoal burning, timber harvesting, agricultural encroachment, pastoral activities and human settlement ect); Inadequate trained personnel and working facilities like vehicles, motorcycles and modern photographic equipments (drones) for protection; Ranger posts within protected áreas; Political will. - Regarding restoration of degraded areas and Land tenure regularization the priority areas for carrying out the restoration activities will be in those areas whereby the transmission lines are passing through and neighbouring areas.
TANAPA and TFS	Consultation held in November 2024	High	High	- As a government institution they have no objection to the implementation of the Project, as it is of great national interest.	- Support has been requested for the establishment of ranger posts in the Burigi-Chato National Park.

Table 4.0.a
Project's priority biodiversity and ecosystem services stakeholders and engagement undertaken during the development of the BAP

Name of stakeholder	Date of consultation	Level of interest in the Project (high/medium/low)	Level of influence in Project (high/medium/low)	Description of engagement during BAP development	
				Concerns	Recommendations
				- The identified wildlife corridor is active and plays an important role for biodiversity.	- Transmission towers need to be higher than 40m, to allow giraffe and elephant migration.
Community associations and cooperatives					
Representatives of the wards intercepted by the project	During the field surveys	High	Low	Interviews conducted on the main biodiversity and ecosystem services attributes, and their importance to the population. Details are presented in the Social Baseline	
Representatives of the villages intercepted by the project	During the field surveys	High	Low	Interviews conducted on the main biodiversity and ecosystem services attributes, and their importance to the population. Details are presented in the Social Baseline	

Table 4.0.b
Flora and fauna experts consulted on critical habitat trigger species

Name	Location	Position	Feedback
Ian Darbyshire	Kew Botanical Garden	Research Leader	Provide feedback on *Thumbergia laborans*: Darbyshire reported that it is possible that this species is poorly recorded, as most botanists have historically carried out their research in this area (NE Tanzania) during or at the end of the rainy season. However, the expert believes that it is a really scarce species, considering the small number of existing collections.
Quentin Luke	National Museums of Kenya, East African Herbarium	Senior Research Associate / Chair of the East African Plant Red List Authority	Provided general feedback on restricted range and threatened species in Tanzania. In general, the expert stated that: The Red Listing of plants in the East African region is still very incomplete. The only reliable source (for Kenya, Uganda & Tanzania) is to look at the Flora of Tropical East Africa (FTEA), which gives many more endemic and restricted range species for these countries. The questions on the trigger species can be answered by looking at the Red List page for each. Because the assessments were quite recent, and all these species have very few locations you can assume they have not been located anywhere other than the points shown on the RL assessment.
Neduvoto P Mollel	National Herbarium of Tanzania	Curator	Provide feedback on general distribution of the 7 flora trigger species. Provided a table which is presented in Annex 13.1.
Pierre Meerts	Meise Botanic Garden	Contributing to the writing of the Flore d'Afrique Centrale at Meise Botanic Garden	Provide feedback on *Tinnea physalis*: '*Tinnea physalis* is indeed a narrow endemic of NE Tanzania, the existing records corresponds to very few different localities and the most recent gathering on GBIF dates back to 1958, Flora of Tropical East Africa (FTEA) states that several specimen labels describe this as rare or local'.
Frank Mbago	National Herbarium of Tanzania/ member of East African Red Listing Of Threatened Plant Species Committee	Retired Curator / Project consultant for Bene Consult	Provide feedback on general distribution of the 7 flora trigger species. Provided a table which is presented in Annex 13.1. Stated that obtaining accurate information related to population, distribution or even whether or not they are present in the project area would require more intensive field studies.
Emmanual Mbige	College of Forestry, Wildlife and Tourism Sokoine University of Agriculture	Researcher / Project consultant for Bene Consult	It provided general feedback on fauna species that triggered the critical habitat trigger, and information on the elephant population and the wildlife corridor. He reported that the elephant population in Burigi-Chato Park is approximately 89 individuals (but this number is not confirmed by the TWR, the official agency responsible for census). Stated that elephants move randomly in the north within

Table 4.0.b
Flora and fauna experts consulted on critical habitat trigger species

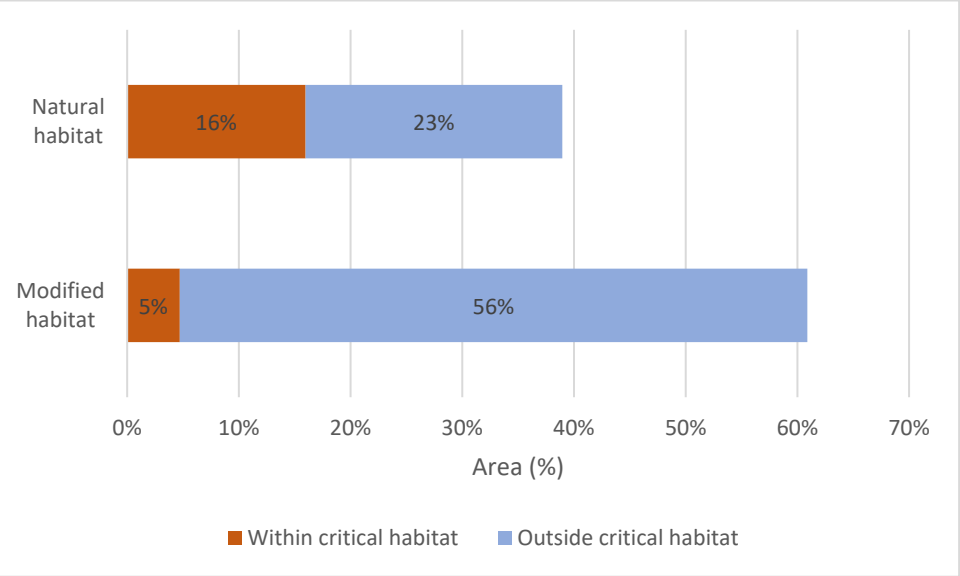
Name	Location	Position	Feedback
			Kyaka areas and the other populations are within the southern Burigi-Chato National Park. And construction of various components of the project will not interfere nor possibly block wildlife movement across the project area.
Fandey Mashima	Tanzania Forest Services Agency	Flora specialist	Provide feedback on general distribution of the 7 flora trigger species. Provided a table which is presented in Annex 13.1.

5.0
Key Risks and Impacts

Table 5.0.a presents the main risks and impacts associated with the implementation and operation of the project, and which priority biodiversity values may be affected.

According to the land use and cover map elaborated for this study (**Map 7.2.2.1.1.a**, **Annex 4** of the ESIA), the area directly affected by the project, which corresponds to the 52-metre-wide of the wayleave (totaling 2,851.52 hectares), has 1.110,97 hectares of natural habitats, 39% of the total area. Of this total, 21% (589.84 ha) is in critical habitat, with 16% (455.54 ha) being natural critical habitat and 5% (134.30 ha) being modified critical habitat (**Figure 5.0.a**). It is important to emphasise that not the entire wayleave will be cleared.

Figure 5.0.a
Habitat quantification in the Project wayleave (52 metre-wide)



The area delimited as CH also corresponds to the region in the best state of preservation of native vegetation, and the lowest intensity of landscape fragmentation, on the stretch of the TL Kyaka-Nyanakanazi (**Figure 5.0.b**).

Table 5.0.a
Main risks and impacts of the project on priority biodiversity values and ecosystem services

Main risk/impact	Description	Biodiversity values potentially affected	Project phase
Reduction of natural habitats	The vegetation clearing for project implementation will lead to a reduction on the availability of natural habitats, including critical natural habitats.	Threatened and restricted range flora and fauna species Ecological corridor Important habitat for species congregation Natural habitat	construction and operation
Loss of vegetation cover and reduction of individual plants	The implementation of the project will require the suppression of areas of native vegetation to install the towers, service strip and some new accesses, causing the loss of flora, potentially including threatened and endemic species.	Threatened and restricted range flora and fauna species Ecological corridor Natural habitat	construction
Increased landscape fragmentation and edge effect incidence	The suppression of native vegetation for the implementation of the project will lead to the creation of new edges and, consequently, habitat fragmentation or the intensification of the edge effect in already anthropised areas.	Threatened and restricted range flora and fauna species Ecological corridor Natural habitat	construction and operation
Disturbance of fauna during construction	Disturbance to fauna during construction is related to the increase in noise caused by construction activities, especially the vegetation clearing, as well as the increased movement of workers and machinary. This impact tends to cease as soon as the noise stops.	Threatened fauna species	construction
Increased risk of fire in adjacent vegetation	As well as there being a risk of fire due to the construction activities themselves, the use of fire is common practice in the region, and opening up access to new areas can increase the risk of fires in new areas.	Threatened and restricted range flora and fauna species Ecological corridor Important habitat for species congregation Natural habitat	Construction and operation
Risk of expansion of invasive flora species	In some places in the project region, exotic species have been recorded in abundance, especially Lantana camara. The mobilisation of machinery and people during the works, and the opening up of new accesses, could facilitate the dispersal of these species.	Threatened and restricted range flora and fauna species Natural habitat	Construction and operation

Table 5.0.a
Main risks and impacts of the project on priority biodiversity values and ecosystem services

Main risk/impact	Description	Biodiversity values potentially affected	Project phase
Risk of increased illegal exploitation of natural resources	Agricultural and extractive activities are common in the region, and opening up access to new areas of native vegetation could drive these activities into areas currently occupied by natural habitats	Threatened and restricted range flora and fauna species Ecological corridor Natural habitat	Operation
Risk of an increase in hunting	Just as there is an increase in the risk of exploitation of areas, the opening of new accesses can lead to an increase in animal hunting. Although this practice does not seem to be common (in the interviews conducted with the population, only 1 interviewee mentioned hunting activities), it is possible that it is a common activity, but due to the legal restrictions involved, the population does not mention that they practice it.	Threatened fauna species	construction and operation
Risk of birds' collision	Collision risks between avifauna and transmission lines are well known. A risk assessment carried out for the ESIA (Section 8.4.2) categorised the fauna sampling units based on the risk of bird collisions. Based on these results, sample area BS1 is the most important in terms of bird collision risk. However, areas BS2, BS5, BS8 and BS9 also revealed a significant wealth of species with a high risk of collision (Figure 5.0.c).	Threatened and migratory bird species	Operation

Figure 5.0.b
Total critical habitat in the project region

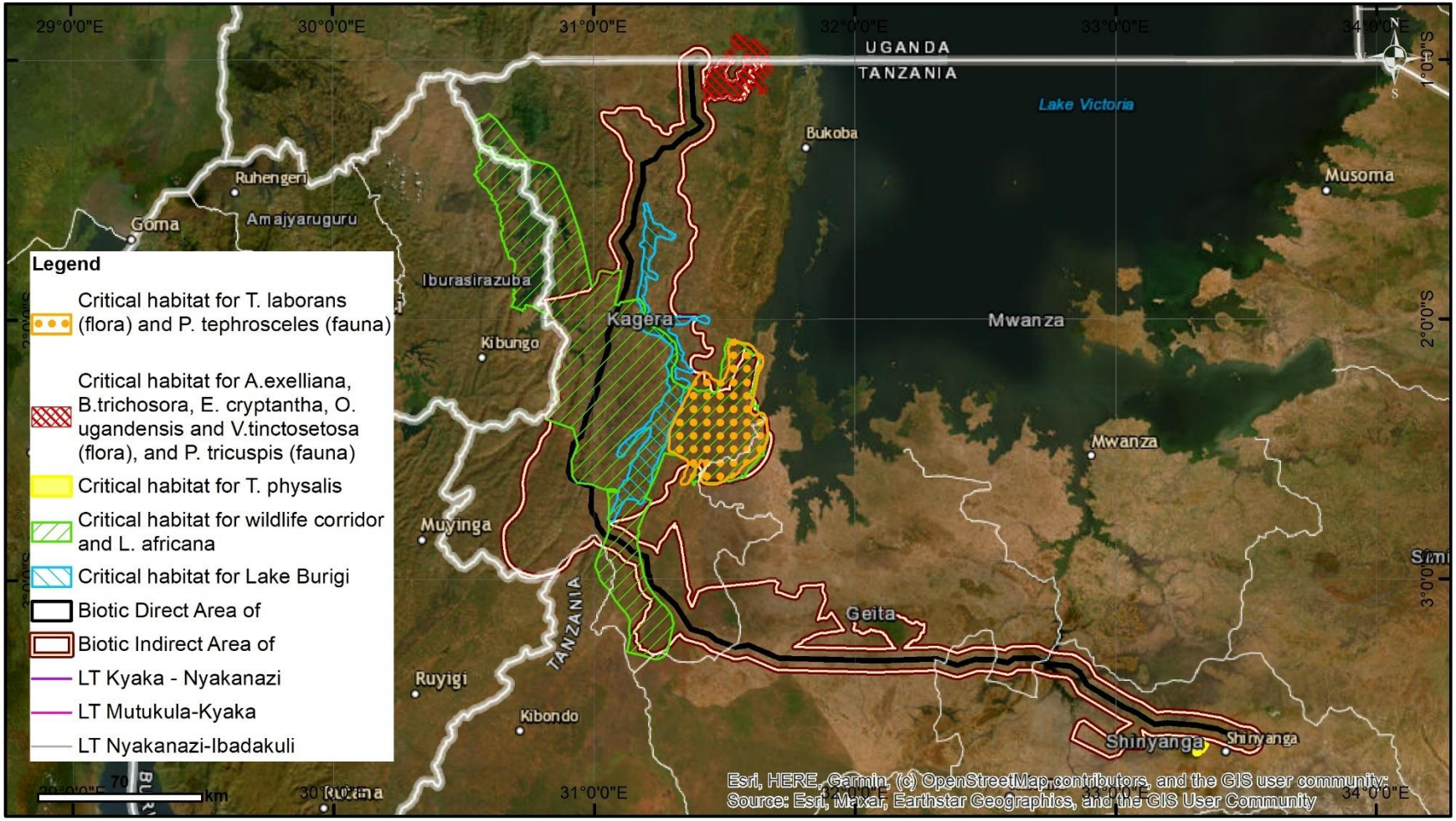


Figure 5.0.c
Location of the Biodiversity Sampling points

6.0
Mitigation Strategy of the Project

When there is critical natural habitat, paragraph 24 of ESS6 states that no project activity that has potential adverse impacts can be implemented unless certain conditions are met:

Requirement paragraph 24 of ESS6	Project compliance
(a) No other viable alternatives within the region exist for the development of the project in habitats of less biodiversity value	The east-west stretch of the project will not directly interfere with CH. On the north-south stretch, the critical habitat region is broad, stretching from the shore of Lake Victoria to the Akagera region in Rwanda, and it is not possible to avoid CH in any of the alternatives evaluated (see Chapter 5 of the ESIA). In addition, as shown in the figures presented in Section 7.2.4.2 (Chapter 7 of the ESIA), although 12 biodiversity values triggered the CH trigger, the project route directly interferes with the EAAA of only 2 triggers, the elephant *L. africana* and the ecological wildlife corridor of which the BCNP is an integral part. Additionally, as part of the analysis of alternative routes for this project, and to achieve the lowest socio-environmental impact, the Kyaka-Nyakanazi segment was adjusted to follow the parallelism and sharing of the right-of-way of the existent TL Nyakanazi-Benako and its future extension to Kyaka, reducing the cumulativeness of some impacts. Although sharing with this TL under construction does not make it possible to avoid the vegetation clearing (due to the need for safety distance), parallelism makes it possible to avoid and minimise the fragmentation of new areas of native vegetation by concentrating infrastructure works in the same corridor. Parallelism with this TL will run along the entire length of the project within the BCNP and the CH boundary. Proximity to a project under construction will make it possible to use structures such as camp sites, support areas and accesses, minimising the need to open new ancillary facilities. Both projects were also designed parallel to the B182 road, with an average distance of ~ 400 metres between the TL and the road, minimising the length of new access that need to be built in areas with a steeper slope.
(b) All due process required under international obligations or national law that is a prerequisite to a country granting approval for project activities in or adjacent to a critical habitat has been complied with	This environmental impact study is being prepared following the work plan approved by the NEMC and local legislation. The study will go through the approval process as required by national legislation and is also being carried out following the requirements of the World Bank's socio-environmental standards. After obtaining non-objection for NEMC and projects sponsors, Tanesco, through the Ministry of Energy to the Ministry of Tourism and Natural Resources, will seek a formal

Requirement paragraph 24 of ESS6	Project compliance
	agreement from TANAPA/TFS to allow the commencement of construction activities within protected areas.
(c) The potential adverse impacts, or likelihood of such, on the habitat will not lead to measurable net reduction or negative change in those biodiversity values for which the critical habitat was designated; (d) The project is not anticipated to lead to a net reduction in the population of any Critically Endangered, Endangered, or restricted-range species, over a reasonable time period:	As demonstrated in the impact assessment (Chapter 8 of the ESIA), the conversion of natural habitats for the implementation of the project, although it implies direct and disturbing impacts on the local fauna and flora, will not lead to the local extinction of species or a significant reduction in the population. Considering the correct implementation of the mitigation measures adopted, such as a reduction in the service strip for the implementation of the TL (reducing the need for vegetation clearing), measures to control the suppression of vegetation, actions to rescue and relocate fauna and flora, as well as actions to restore areas degraded by the project and compensatory planting for suppression, the impacts on the CH trigger biodiversity values can be mitigated. Additionally, the known records in the literature for 6 trigger species of flora, in addition to the primate *P. tephrosceles*, are close to the shore of Lake Victoria. During primary data collection, the primate *P. tephrosceles* was also recorded in the sampling plots close to Lake Victoria (biodiversity sampling points BS4 and BS5). The common african pangolin *P. tricuspis* were registered in the project area only through interviews and, according to available information, an important habitat for this species would be the Minziro Forest Reserve, which will not be impacted by the project. As for the elephant *L. africana*, according to existing records, the most significant populations (in terms of number of individuals) are located in the boarder between Tanzania and Nairobi (**Figure 7.2.4.3.d**). In other words, most of the known records for the CH triggering species are outside the area directly affected by the project, indicating that there are no significant populations of these species in the Project's DAA. The trigger for criterion (c) is also outside the Project's DAA. As for the trigger for criterion (e), the ecological corridor passes through areas of natural and modified habitats, including a landscape that has already been partially altered in the current scenario. The mitigation measures planned for the project, including those in the Construction Environmental Plan (CEP), Operation Management Programme (OMP) and Biodiversity Management Plan (BMP) make it possible to minimize impacts on the ecological corridor. Regarding criterion (e) the distance between the towers (~400 metres), as well as their height (between 49 and 52 metres), will not impede the passage of elephant herds, the main species that use the wildlife corridor.
(e) The project will not involve significant conversion or significant degradation of critical habitats;	The service strip for the implementation of the TL was reduced to a total width of 14 metres, instead of the 52 metres of the wayleave. This measure makes it possible to decrease the vegetation clearance from 1,110.97 ha to 300.37 ha, a reduction of 810.6 ha (73%). Considering the footprint of the Project that overlaps the critical habitat, the conversion of natural critical

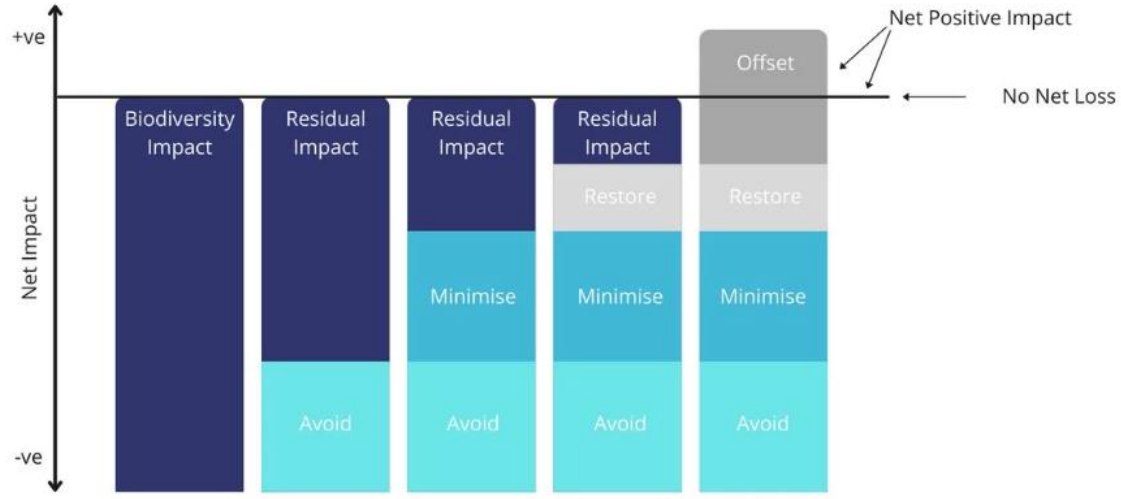
Requirement paragraph 24 of ESS6	Project compliance
	habitat decreases from 455.55 to 109.69 hectares, a reduction of 345.86 (~76%) hectares. Therefore, the vegetation clearance for the project implementation will be 300.37 ha (being 109.69 ha in natural critical habitat), in addition to 16.61 ha in modified critical habitat. However, this value may be slightly higher, as the final location of the accesses and construction sites has not yet been determined. Neverthelles, these structures will be implemented mainly in degraded areas. Considering the total extent of the CH (**Section 7.2.4.3** of the ESIA, **Table 7.2.4.3.b** and **Figure 7.2.4.3.o**), the habitat conversion caused by the implementation of the project represents 0,01% of the total critical habitat, and 1.36% of the total critical habitat within the Project's DAI. The entire stretch within the CH will be in parallel with an TL under construction, making it possible to reuse infrastructure (such as accesses and camp sites) and concentrate the impacts of the edge effect in a single corridor.
(f) The project's mitigation strategy will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated;	The mitigation strategy to achieve gains for the values that triggered the CH trigger is presented in the Biodiversity Offset (P0.5).
(g) A robust and appropriately designed, long-term biodiversity monitoring and evaluation programme aimed at assessing the status of the critical habitat is integrated into the Borrower's management programme:	This Biodiversity Management Plan includes monitoring of fauna, flora and landscape, which should be carried out during the operation of the project, in order to ensure that the mitigation measures adopted are being effective in achieving net gains for the project. See Programmes P0.8, P0.9 and P10.

Additionally, the project mitigation strategy should demonstrate that its implementation and operation will not cause measurable adverse impacts on the biodiversity values that identify or designate that habitat and on the ecological processes that support those values, following the steps of the mitigation hierarchy.

The mitigation hierarchy is a hierarchy in terms of priorities, which involves a precautionary approach to anticipating and avoiding adverse impacts on the environment, and, where avoidance is not possible, minimising. Residual impacts must then be remedied or mitigated to an acceptable level, and what cannot be remedied/mitigated must be compensated for (**Figure 6.0.a**).

As a general rule, this means that the previous components need special emphasis. While all the components of the mitigation hierarchy are important and rigorous efforts to minimise impacts as far as possible, they may also fail to achieve significant reductions in the project's potential impacts (CSBI & TBC, 2015).

Figure 6.0.a
Mitigation hierarchy



Source: TBC (Mitigation hierarchy - The Biodiversity Consultancy)

Thus, the application of the mitigation hierarchy is an iterative and continuous process, applying the necessary measures in the recommended sequence, until the residual impacts are reduced to the minimum possible, following the following four stages:

i. Avoidance - measures taken to modify the spatial or temporal design of a project to protect biodiversity features from impacts.
ii. Minimise - measures taken to reduce the duration, intensity or scale of impacts that cannot be completely avoided.
iii. Restore - measures taken to restore or reverse the degradation of ecosystems impacted by the project, including measures designed to remediate, restore, reestablish, recover, revegetate or otherwise enhance project impacts that cannot be avoided or further minimised.
iv. Offset - a set of actions that produce measurable conservation outcomes, designed to compensate for residual impacts on biodiversity resulting from the activities of an existing or new project and that continue after the implementation of appropriate avoidance, minimisation and restoration measures.

Avoidance

The Project is committed to implementing avoidance measures, i.e., measures to 'design out' an impact or risk to prevent their expected impacts on biodiversity. It has also used optimisation criteria to assess all infrastructure development options and analyse alternatives to avoid significant impacts on biodiversity, including:

- The design of the route was assessed in detail and optimisation proposals were made in order to avoid impacts on large remnants of native vegetation, riparian vegetation and important cultural areas.
- New accesses will only be opened when the slope of the terrain does not allow

access to be made through the TL's own service strip.

- The construction sites will be located primarily in already degraded areas.
- Before carrying out any vegetation clearance activities, Tanesco must carry out an active search programme for flora species that are CH triggers in the project's area of indirect influence. The aim of the programme is to actively search for flora trigger species in certain stretches of the area directly affected by the project (details in Section 5.2 of Programme P11). If any individuals are found, measures to adapt the project should be implemented to avoid impacts on these species. This measure aims to avoid a potential impact of the project on CH trigger flora species. Although they have not been found in the project area, there is a risk that they could occur in some stretches where there are phytophysiognomies characteristic of these species (more details in P.11).

Minimisation

The Project is committed to implementing minimisation measures to reduce the severity of impacts on biodiversity by controlling or limiting the source of impact. Minimisation measures planned for the Project include:

- The service strip for the implementation of the TL has been reduced to a total width of 14 metres, instead of the 52 metres of the wayleave. This measure makes it possible to decrease the vegetation clearance from 1,110.97 ha to 300.37 ha, a reduction of 810.6 ha (73%). Considering the footprint of the Project that overlaps the critical habitat, the conversion of natural critical habitat decreases from 455.55 to 109.69 hectares, a reduction of 345.86 hectares (~76%). Therefore, the vegetation clearance for the project implementation will be 300.37 ha (being 109.69 ha in natural critical habitat), in addition to 16.61 ha in modified critical habitat.
- The Construction Environmental Plan (CEP) provides for a series of measures to prevent and control impacts related to contamination of soil, water and air.
- The CEP also provides for a series of guidelines for vegetation clearance, to minimize impacts in the remaining vegetation around the project.
- The Fauna and Flora Rescue and Relocation plan provides for measures for scaring away fauna before the vegetation clearance, in addition to rescue and relocation of low mobility animals, and rescue and relocation of germplasm, mainly of threatened and endemic flora species.

Restoration/rehabilitation

Rehabilitation measures will include the restoration/rehabilitation of all temporary construction support infrastructure, to restore the area to similar conditions to the original. The restoration of vegetation will be carried out with native species from the region, avoiding the use of exotic species.

Table 6.0.a summarizes the mitigation strategy of the project for the priority biodiversity values

Table 6.0.a
Mitigation strategy for the priority biodiversity values

Main risk/impact	Biodiversity values potentially affected	Mitigation strategy
Reduction of natural habitats Loss of vegetation cover and reduction of individual plants Increased landscape fragmentation and edge effect incidence	Threatened and restricted range flora and fauna species Ecological corridor Important habitat for species congregation Natural habitat	Avoid • Optimising the project route • Use of the service strip for access to the towers during construction and operation • Prioritising degraded areas for support structures • Flora Active Search Program (P.11) Minimize • Reduction of the vegetation clearing area • Construction Environmental Plan (CEP) • Fauna and Flora Rescue and Relocation Plan • Landscape Protection Program Restore • Rehabilitation of areas degraded by the Project (Construction Environmental Plan) • Operation Biodiversity Management
Disturbance of fauna during construction	Threatened fauna species	Avoid and minimize • Construction Environmental Plan (CEP) • Fauna and Flora Rescue and Relocation Plan
Increased risk of fire in adjacent vegetation	Threatened and restricted range flora and fauna species Ecological corridor Important habitat for species congregation Natural habitat	Avoid and minimize • Construction Environmental Plan (CEP) – several measures to avoid and minize risk of fires • Construction Emergency Preparedness and Response Plan • Operation Management Plan
Risk of expansion of invasive flora species	Threatened and restricted range flora and fauna species Natural habitat	Avoid, minimize and restore • Invasive Species Control Program
Risk of increased illegal exploitation of natural resources	Threatened and restricted range flora and fauna species Ecological corridor Natural habitat	Avoid and minimize • Operation Management Programme: Access Control Plan • Landscape Protection Program
Risk of an increase in hunting	Threatened fauna species	Avoid and minimize • Operation Management Programme: Access Control Plan
Risk of birds collision	Threatened and migratory bird species	Avoid and minimize • Operation Biodiversity Management - Monitoring of accidents with avifauna during operation

6.1
Residual Impacts Assessment

As explained above, despite all the measures to avoid and minimise the project's impacts, there will still be a conversion of natural habitats. Thus, a semi-quantified residual impact assessment was undertaken to help understand the scale and magnitude of residual impacts. Residual impacts are those that remain after the implementation of the project's mitigation hierarchy, i.e. after the implementation of measures to avoid and minimise the project's impacts and, after that, measures to restore the impacted biodiversity or part of it (TEN KATE & CROWE, 2014). Impacts that are not mitigated must be compensated for by implementing biodiversity offsetting measures. Due to difficulties intrinsic to the process of quantifying the losses of all biodiversity components (BBOP, 2009), the quantification of the net balance of biodiversity is usually done by means of metrics that use factors that represent different aspects of biodiversity and that can be effectively measured (*surrogates*).

There is no one best way to quantify biodiversity losses and gains and, in recent decades, a variety of metrics have been developed to meet the requirement of preventing the net loss of biodiversity, including measures of area, ecosystem functions or population structure and status (BBOP, 2009). Most use some measure of area (surface) as the basic unit for calculating the final balance, but vary in terms of how the extent of the area is adjusted to take account of differences in the composition, structure and function of biodiversity, i.e. its condition.

An appropriate metric is needed to measure project impacts (or losses) and be able to weigh these up against gains that can be realized through on-site rehabilitation and offsite offsets. Generally, biodiversity values are expressed in terms of their quantity and quality. A suitable metric should account for the type, amount, and condition of the biodiversity that is being lost and gained (ICMM & IUCN, 2013).

As previously mentioned, the project directly intersects the critical habitat triggered by the elephant *L africana* and the wildlife corridor. The other biodiversity values that triggered the CH are in the project's indirect area of influence, and it is understood that there will be no significant impacts on these values. The other two fauna trigger species (the pangolin *P. tricuspis* and the primate *P. tephrosceles*), do not occur in the Directly Affected Area, according to the IUCN geographical range (for *P. tephrosceles*) and the primary data collected (for *P. tricuspis* and *P. tephrosceles*).

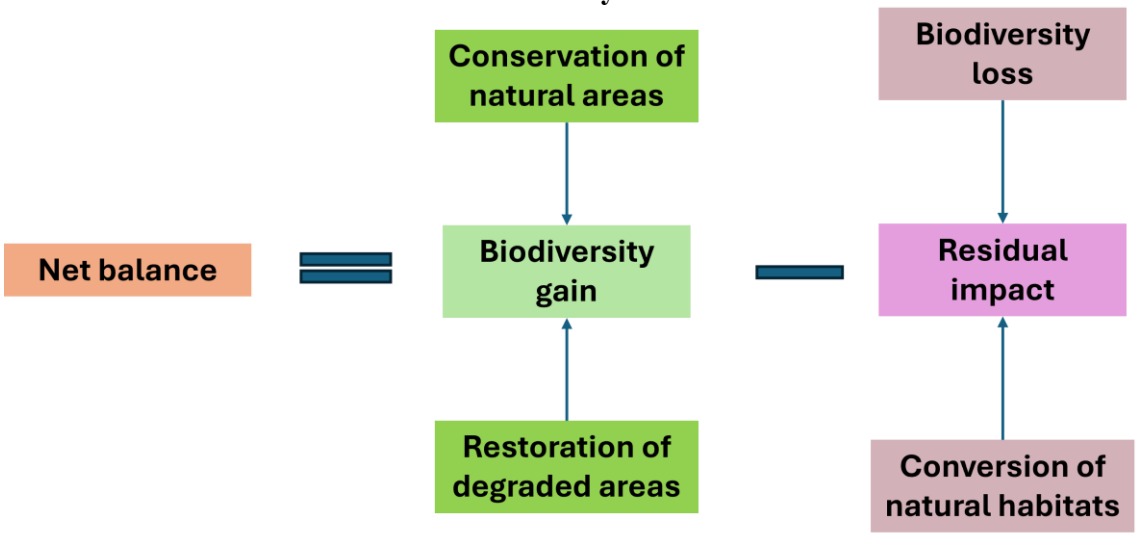
For the CH trigger flora species, it is understood that there is no direct impact on their population, since there are no evidence of their presence in the directly affected area, but a potential risk, due to uncertainties regarding their population and distribution and the existence of phytophysiognomies that could harbour these species.

Thus, the residual impacts were calculated using two different metrics: Quality Hectares, for the critical habitat directly intercepted; and Units of Global Distribution, for the risks to critical habitats in the Indirect Area of Influence.

Residual analysis for direct impact on critical habitats (Quality Hectares)

For the impacts on the CH triggers intercepted by the project, the elephant and the wildlife corridor, the metric of quality hectares, related to the loss of habitats that support these biodiversity values, was used. This was also applied to the elephant, given that it is an animal that occurs in a wide variety of natural and modified habitats. Through this metric, the net balance of the project was estimated based on the usual approach to biodiversity calculations, considering the gains and losses in both the impacted areas and the areas proposed for restoration and compensation (BBOP, 2012), based on the "quality hectares" methodology (or "area x quality" habitat) (Parkes et al. 2012; Temple et al., 2012) (**Figure 6.1.a**).

Figure 6.1.a
Calculation of the net balance of biodiversity



Source: Adapted from BBOP (2012)

Under this approach, biodiversity losses and gains must be quantified taking into account the qualitative aspect (condition) of the habitat or vegetation, which directly affects the CH trigger values species, as well as the other priority biodiversity and ecosystem services values. It is not possible to try and quantify impacts to all aspects of biodiversity individually. Instead, a habitat proxy will be used to estimate residual impacts to priority species. Such an approach is appropriate where a species is evenly distributed within the habitat, and where habitat loss can be used to assess population loss.

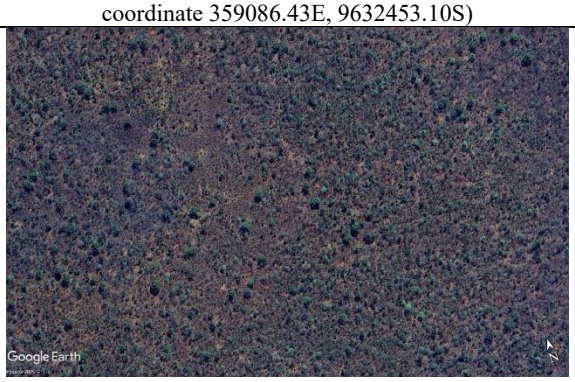
The advantage of the quality hectares methodology is that it is easy to measure and communicate, but there are no standardised metrics, which must be adapted for each project, depending on the characteristics of the site (BBOP, 2012b). Some aspects can be incorporated into the qualification of areas in the form of multiplication factors, such as the difficulty and degree of uncertainty of restoration, which end up reducing the value of the areas (DEFRA, 2012; MOILANEN *et al.*, 2009; LAITILA *et al.*, 2014).

For this residual impact calculation, the factors relating to the condition of the vegetation and the criticality of the habitat were taken into account and applied to the extent (in hectares) of the intervention areas, thus generating values in quality hectares (QH). To calculate the project's impact, the following quantities were taken into account (**Table 6.1.a**), based on the habitat mapping carried out for this EIA, and considering the 14-metre-width strip of vegetation clearing:

Table 6.1.a
Types of habitats and their characteristics considered in the residual impact assessment

Habitat type	Description	Example	Area (ha)
Modified habitat within CH	Predominant degraded areas, characterized by areas with soil devoid of vegetation or with very incipient vegetation, without specific use or that can be identified by means of images. These areas are located within the polygon delimited as critical habitat.	 Example of modified habitat in CH, located in the wildlife corridor in Kagera (reference coordinate 288500.40 E, 9683473.8S)	16.61
Degraded natural habitat outside CH	Areas of natural habitat with signs of anthropisation, such as fire and selective deforestation for the extraction of natural resources. These areas are located ouside the polygon delimited as critical habitat.	 Example of degraded natural habitat outside CH, located near Biharamulo Forest Reserve in Nyantakara (reference coordinate 315755.35 E, 9648263.46S)	37.59

Table 6.1.a
Types of habitats and their characteristics considered in the residual impact assessment

Habitat type	Description	Example	Area (ha)
Preserved natural habitat outside CH	Areas of natural habitat (including areas mapped as water) in a good state of conservation, located outside the polygon delimited as critical habitat. There may be some small signs of anthropisation.	 Example of preserved natural habitat outside CH, located near Uyovu Forest Reserve in Bulega (reference coordinate 359086.43E, 9632453.10S)	154.31
Natural habitat within CH	Areas of natural habitat, preserved and degraded (including areas mapped as water), located within the polygon delimited as critical habitat.	 Example of preserved natural habitat within CH, located near Nyantakara Forest Reserve in Lusahunga (reference coordinate 311606.23E, 9641565.54S)	109.69

PS: Areas mapped as water were included in this calculation as preserved natural habitats.

It is important to note that vegetation clearing due to the opening of new access and construction sites has not been included in this calculation, as the location of these structures has not yet been defined. As a result, actions to restore these degraded areas were also not taken into account in this calculation. Therefore, this assessment should be revised when there is better clarity on these issues.

Regarding the multiplication factor, the following were considered (**Table 6.1.b**):

The residual impact is then calculated by applying the multiplication factors shown in **Table 6.1.b** to the impacted areas (**Table 6.1.a**). The result of this calculation is shown in the table below (**Table 6.1.c**). As shown, the project results in a negative residual impact of **-327.92 QH**.

Table 6.1.b
Multiplier factors according to the type of habitat where the intervention will take place

Habitat type	Multiplier factor	Justification
Modified habitat within CH	0.5	Degraded areas that, in principle, would not need to be compensated (for impacts on biodiversity). However, as these areas are within CH, they were taken into account in the calculation, with a depreciation factor, because they are anthropogenic areas.
Degraded natural habitat outside CH	0.75	Areas of natural habitat that show intense signs of degradation and therefore may not support significant biodiversity. As they are outside the CH, a depreciation factor was considered, assuming that they are areas that lack significant richness and lower carrying support.
Preserved natural habitat outside CH	1	Areas of natural habitat that show few signs of degradation. As they are outside the CH, a 1:1 factor was applied.
Preserved natural habitat within CH	1.25	Include areas of both preserved and degraded natural habitat. As they are within the CH, a enhancement factor was applied.

Table 6.1.c
Calculation of the project's residual impact after avoidance and minimisation measures

Habitat type	Area (ha)	Multiplier factor	Quality hectares
Modified habitat within CH	16.61	0.5	8.31
Degraded natural habitat outside CH	37.59	0.75	28.19
Preserved natural habitat outside CH	154.31	1	154.31
Preserved natural habitat within CH	109.69	1.25	137.11
Total residual impact	**318.2 ha**	**-**	**-327.92 QH**

Assessment of the potential impacts of natural habitat reduction on trigger species identified in the project's IAI

Some species of flora and fauna that triggered the critical habitat were recorded only in the indirect area of influence, and no records of these species were found in the directly affected area, either through field data or data available in the literature. However, this lack of records may be due not only to the absence of individuals, but also to the lack of studies in the region. Considering that the area directly affected by the project includes ecosystems favourable to the occurrence of these species, the potential impact of the project on reducing the population of these species was assessed, should they occur in the area directly affected.

For trigger species included in the analysis, but that the CH is not directly intercepted by the project, losses and gains were calculated in Units of Global Distribution (UD). Units of Global Distribution is a metric conceptually related to Quality Hectares. A Unit of

Global Distribution is equivalent to 1% of a species' global population (or 1% of its global distribution, in the event that population data are unavailable). UGD are calculated as follows: if a species has a global population of 1,000 individuals, and 10 of those are lost, that would be a loss of 1% of the global population or 1 'Unit of Global Distribution' (UGD). Similarly, if a species has a global distribution of 100 ha, and 1 ha of its distribution is lost as a result of habitat loss, that is a loss of 1% of its global distribution or 1 'Unit of Global Distribution' (UGD) (TEMPLE et al., 2012). To convert losses and gains in hectares to Units of Global Distribution, the total global Area of Occupancy (AOO) was used.

For this analysis, the species' naturally occurring phytophysiognomies were assessed (see **Table 7.2.4.2.a** and **7.2.4.2.b**, **Section 7.2.4.2**), as well as whether there are any corresponding ones in the area directly affected by the project (see **Table 8.2.3.2.a**., **Section 8.2.3.2**, item 5).

It should be noted that this is an analysis of the potential impacts, since the project does not intersect the CH delimited for these species, and they have not been identified in the project's DAA or DAI. This analysis was used to assess the risk of a potential net reduction in the population of these species. According to footnote 13 of ESS6, "*Net reduction is a singular or cumulative loss of individuals that affects the species' ability to persist at the global and/or regional/national scales for many generations or over a long period of time. The scale (i.e., global and/or regional/ national) of the potential net reduction is determined based on the species' listing on either the (global) IUCN Red List and/or on regional/national lists. For species listed on both the (global) IUCN Red List and the national/regional lists, the net reduction will be based on the national/regional population.".* This definition was used as a basis for assessing the risk of population decline.

As can be seen in the table, the reduction in UGD for almost all species is less than 1%. The species with the greatest reduction are *T. laborans* and *T. physalis* (**Table 6.1.d**). This is considering the scenario that these species occur in great abundance throughout the phytophysiognomies identified as potentially occurring, which is highly unlikely. According to the IUCN Red List Categories and Criteria (IUCN, 2000), for a species to move from EN to CR it needs a reduction of more than 50% in its population, or a reduction of around 98% in its area of distribution. Therefore, the risk of a significant net reduction in the population of these species is considered to be low.

Table 6.1.d
Assessing residual impacts for risks related to trigger species evidenced in the project's IAI

Family	Species	Distribution	Habitat of occurrence (according to IUCN)	Population trend	IUCN Category	IUCN Criteria	EOO (km²)	AOO (km²)	Restricted range	Similar habitat in the project's ADA	Habitat area in the project's DAA (km²)	UGD
Acanthaceae	*Thunbergia laborans*	This species is native to Rwanda and Tanzania where it is found between 1,150–1,550 m asl.	Woodland, bushland and roadsides.	Decreasing	EN	B2ab (i,ii,iii,iv,v)	11.636,68	20,00	Yes	Miombo woodland, Mixed woodland, Grass wooded savanna, Thicket bushland/shrubland	1,27	6,4%
Asteraceae	*Emilia cryptantha*	Emilia cryptantha is endemic to S Uganda and NW Tanzania.	Swamp grassland	Decreasing	EN	B2ab (i,ii,iii,iv,v)	6.394,34	45,00	Yes	Riverine grassland vegetation	0,02	0,04%
Asteraceae	*Vernonia tinctosetosa*	Endemic to northwest Tanzania and southwest Uganda.	Wetland areas on sandy lake	Unknown	EN	B2ab (iii)	11.093,95	45,00	Yes	Riverine grassland vegetation	0,02	0,04%
Dennstaedtiaceae	*Blotiella trichosora*	The species occurs in Burundi, Tanzania and Uganda.	Semideciduous moist forest, swamps	Decreasing	EN	B2ab (i,ii,iii,iv,v)	28.723,52	63,00	Yes	Evergreen dry forest, Riverine forest, Riverine grassland vegetation,	0,04	0,06%
Lamiaceae	*Tinnea physalis*	This species is endemic to Tanzania where it is found between 1,160–1,350 m asl.	Commiphora scrub, rocky outcrops and inselbergs.	Unknown	EN	B2ab (i,ii,iii,iv,v)	21.112,13	24,00	Yes	Miombo woodland, Mixed woodland, Grass wooded savanna, Thicket bushland/shrubland	1,27	5,3%
Menispermaceae	*Albertisia exelliana*	This species is native to Burundi, Rwanda, Tanzania, Uganda between 600–1,250 m asl.	Riverine forest	Unknown	EN	B2ab (i,ii,iii,iv)	1.023.615,15	40,00	No	Riverine forest	0,02	0,04%
Rubiaceae	*Oxyanthus ugandensis*	The native range of this species is E. Central DR Congo to SW. Uganda and North Tanzania.	Semideciduous moist forest	Unknown	EN	B2ab (iii)	159.777,00	1.597,77	No	Evergreen dry forest, Riverine forest	2,03	0,13%
Mammalia/ Pholidota	*Common African Pangolin Phataginus tricuspis*	In Tanzania, the species is known from the Minziro Forest Reserve on the northwest border with Uganda, and close to Bukoba (Foley et al. 2014).	Moist tropical lowland forests and secondary growth, dense woodlands, along water courses		EN	A2c+4cd	6.415.869	512	No	Evergreen dry forest, Riverine forest, Riverine grassland vegetation,	0,04	0,01%
Mammalia/ Primates	*Ashy Red Colobus Piliocolobus tephrosceles*	In western Tanzania in Biharamulo on the southwestern shores of Lake Victoria	Riverine and gallery forest, forest-miombo savanna mosaic, degraded secondary forests, evergreen forests		EN	A4bc	21.100	3.847	Yes	Evergreen dry forest, Grass wooded savanna, Miombo woodland, Mixed woodland, Riverine forest, Riverine grassland vegetation, Thicket bushland/shrubland	1,31	0,03%

6.2
Mitigation Approach for Residual Impacts

As shown above, after the measures to avoid and minimise the project's impacts, there are still residual impacts. Biodiversity offsetting measures will therefore be necessary to achieve the conservation goals. Biodiversity offsets are a set of actions that make it possible to produce measurable conservation results, designed to compensate for residual impacts on biodiversity resulting from project activities. Biodiversity offsets must adhere to the principle of 'equal for equal or better'.

As already mentioned, critical habitat values are centred on the availability of native habitats in a good state of conservation, which support the region's other biodiversity values. Thus, as detailed in the **P.05. Biodiversity Offset Plan**, the project's biodiversity offset proposal includes the restoration of degraded habitats, in proportions equivalent to the significance of the impacted habitat, as detailed in **Table 6.2.a**, including natural habitats, natural critical habitats and modified critical habitats.

Table 6.2.a
Restoration proposal based on the currently area planned for intervention

Habitat type	Area planned for intervention (ha)	Restoration proportion	Area to be restored (ha)
Modified habitat within CH	16.61	1:1	16.61
Degraded natural habitat outside CH	37.59	1:1	37.59
Preserved natural habitat outside CH	154.31	2:1	308.62
Preserved natural habitat within CH	109.69	3:1	329.07
Total			**691.89 ha**

In the case of *offsets* involving habitat restoration, the biodiversity gain must be assessed and quantified taking into account the initial condition of the habitat (baseline), before the impacts resulting from the implementation and operation of the project and the improvement actions to be carried out (BBOP, 2012a, 2012b). Thus, the biodiversity gain corresponds to the difference between the expected final condition generated by the *offset* actions and the initial condition of the habitat. In these cases, other aspects can also be incorporated into the qualification of the areas in the form of multiplier factors, such as the difficulty and time of restoration and the degree of uncertainty, which end up reducing the value of the areas (DEFRA, 2012; MOILANEN *et al.*, 2009; LAITILA *et al.*, 2014). The restoration difficulty factor is applied to the balance resulting from the difference between the initial and final condition values (in QH).

The following multiplication factors can be considered in these cases:

Table 6.2.b
Restoration difficulty scale and its multiplication factors

Level	Restoration difficulty	Multiplier factor
1	Low: restoration can only be carried out by promoting natural regeneration and removing degradation factors for example by building fences to prevent access by grazing animals, firebreaks to control fire and control of exotic species.	1
2	Moderate: restoration requires planting seedlings at low to medium density (densification, enrichment or cores) and moderate management and monitoring activities, such as watering, fertilising and management of competing species.	0.75
3	High: restoration requires planting seedlings at a medium to high density (full planting) and very frequent management and monitoring activities, such as watering, fertilising, managing competing species and combating pests.	0.5

In addition, another depreciation factor may be applied to the qualification of areas, with regard to uncertainties in conservation guarantees. If all the offset were carried out within existing protected areas (such as national parks and forests), the level of risk to conservation guarantee would be low, since these areas are already protected by national legislation and subject to a certain degree of control and fiscalization. However, precisely because these are already protected areas, one of the offset principles would not be fully met, the principle of additionality of the offset.

Although it is possible to consider that the project may bring some additionality by restoring degraded areas within protected areas, as reported during interviews with TANAPA and TFS, one of the current difficulties for managers of these areas is to control illegal degradation of native habitats within protected areas. Therefore, habitat restoration, together with contributions to improving monitoring mechanisms (to b agreed between Tanapa and Tanesco), could be considered a benefit of the implementation of the offset.

On the other hand, offsetting outside protected areas can increase the additionality of the project by restoring areas that are not planned for restoration, but it increases the level of risk in relation to maintaining the preservation of the natural habitat during and after restoration.

The following multiplication factors can be considered in these cases:

Table 6.2.c
Risk level scale for ensuring the preservation of the restored natural habitats

Level	Restoration difficulty	Multiplier factor
1	High risk: areas located outside protected areas and close to urban settlements, where the risks of invasion and destruction of areas under restoration are greater.	0.5
2	Moderate risk: areas located outside protected areas and far from urban settlements, where the risks of invasion and destruction of areas under restoration are moderate.	0.8

Table 6.2.c
Risk level scale for ensuring the preservation of the restored natural habitats

Level	Restoration difficulty	Multiplier factor
3	Low risk: areas located within protected areas, where the risks of invasion and destruction of areas under restoration are lower.	1

Similarly, a valuation multiplier can be applied with regard to the restoration of natural habitats in a critical region, which will bring greater benefits to biodiversity and trigger values.

Considering the current intervention scenario, a calculation exercise was carried out to assess whether it is feasible to achieve net gains from the proposed offset. The following assumptions were adopted:

- 100% of habitat restoration will be carried out in totally degraded areas, devoid of native vegetation (level 3 of restoration difficulty, **Table 6.2.b**).
- 100% of the restoration areas will be within the critical habitat polygon (the same multiplier factor presented in Table 6.1.c was applied).
- 25% of the areas will be located within a protected area (level 3 of risk, **Table 6.2.c**).
- 75% of the areas will be located outside a protected area, far from urban settlements (level 2 of risk, **Table 6.2.c**).
- 25% of the areas will be located outside a protected area, close to urban settlements (level 1 of risk, **Table 6.2.c**).

The calculation was made considering the initial scenario, in which the target areas will be completely degraded, and the expected final scenario, which considers that the habitat will be restored, i.e., in conditions to continue the ecological succession process on its own, without human interference, and to provide support for native flora and fauna species. Therefore, considering the scenario presented in the **Table 6.2.d** below, it is possible to achieve net biodiversity gains for the project through this restoration proposal:

- Residual impact (Table 6.1.c) = -327.92 QH
- Gain balance (Table 6.2.d) = +335.13 QH
- Net balance = 335.13 – 327.92 = +7.21 QH

However, it is important to mention that these calculations were made based on the information available about the project at this time, and considering some assumptions for realising the offset. These calculations should be reviewed periodically, using the methodology and multiplication factors presented here, each time there is more detail on the uncertainties that exist at the moment, especially in relation to the final amount of intervention in natural and critical habitats. It is also important to consider that the success of the project's net gain depends on the correct implementation and monitoring of the measures planned to avoid and minimise impacts.

Table 6.2.d
Scenario of net gains in biodiversity, based on the proposed offset for restoring degraded areas

Restoration areas	Extension (ha)	Condition of the vegetation (Table 6.1.c)		Within critical habitat		Risk level (Table 6.2.c)		Partial (QH)	Partial balance (QH)	Rehabilitation difficulty (Table 6.2.b)		Final balance (QH)
		Level	Multiplier factor	Level	Multiplier factor	Level	Multiplier factor			Level	Multiplier factor	
Restoration of degraded areas - 25% within protected areas. Initial condition	172.97	1	-	3	1.25	3	1.00	-	216.22	3	0.50	108.11
Restoration of degraded areas - 25% within protected areas. Expected final condition	172.97	4	1.00	3	1.25	3	1.00	216.22				
Restoration of degraded areas - 50% outside protected areas and far from urban settlements. Initial condition	345.95	1	-	3	1.25	2	0.80	-	345.95	3	0.50	172.97
Restoration of degraded areas - 50% outside protected areas and far from urban settlements. Expected final condition	345.95	4	1.00	3	1.25	2	0.80	345.95				
Restoration of degraded areas - 25% outside protected areas and close to urban settlements. Initial condition	172.97	1	-	3	1.25	1	0.50	-	108.11	3	0.50	54.05
Restoration of degraded areas - 50% outside protected areas and close to urban settlements. Expected final condition	172.97	4	1.00	3	1.25	1	0.50	108.11				
Total	691.89 ha											335.13 QH

6.3
Revision Mechanisms

The present BMP and the residual impact and net balance must be revised in the following triggers:

Table 6.3.a
Triggers for the mitigation strategy review mechanism

Revision trigger		Aspect to be reviewed	Stage
1	Record of some of the CH trigger species in the project's DAA during the implementation of the Flora Active Search Program	Project design	Before the executive project is defined
2	Definition of the impacted area: final version of the executive engineering project, with the definition of the quantity and localization of new access and supporting areas.	Project's residual impact	Before the beginning of the construction
3	Definition of the final impacted area	Project's residual impact Project's gain balance	After construction is finished
4	Definition of the location of the areas to be restored	Project's gain balance	Continuous action as long as there are areas to be chosen, up to the limit defined in the calculation of trigger 2
5	Restoration activities execution	Project net balance	Annually, from the start of restoration activities, as long as the gain is not reached
6	Stakeholder engagement: mainly considering the further consultations with TANAPA and TFS to align the common understanding for operational stage. If the stakeholders consulted suggest another offset measure and if the proposal is viable and accepted by the project managers, with the support of biodiversity offset specialists.	Offset Project's gain balance Project net balance	After the decision, to be taken by the project managers, to change the offset proposal

6.4
Biodiversity Monitoring

The project's biodiversity monitoring will be carried out through the programmes listed below. Details of the objectives, monitoring indicators and methodology are presented in each programme.

P.05 - Biodiversity Offset Plan: the project's compensation proposal, with a focus on achieving net gains for critical habitat trigger values.

P.06 - Ecosystem Services Impact Mitigation Plan: includes mitigation measures for impacts on priority ecosystem services.

P.07 - Fauna and Flora Rescue and Relocation Plan: details the fauna and flora rescue and relocation measures to be carried out prior to suppression activities.

P.08 - Invasive Species Control Programme: includes preventive and corrective measures to be implemented continuously both during the construction and operation of the project.

P.09 - Landscape Protection Program: includes landscape monitoring measures, with a focus on minimising the induction of conversion of new areas of natural habitat.

P.10 - Operation Biodiversity Management: includes measures to monitor accidents with avifauna during operation, and measures to implement and monitor compensatory planting.

6.5 Institutional Arrangement

TANESCO is primarily responsible for managing the implementation of the mitigation measures, as well as coordinating the institucional arrangements necessary for the proper execution, monitoring and any necessary review of activities and targets. TANESCO is also responsible for publicising the BMP and its actions to interested parties.

TANESCO will liaise with TANAPA on areas to conduct habitat restoration to compensate vegetation loss within and outside the National Park particularly for the section of Burigi - Chato National Park. Moreover, Tanzania Forest Services Agency (TFS) will also provide guidance on tree species that will be selected according to the nature and geographical location of the areas designated for vegetation offset. This will be done after Forest Resource Assessment and to be done by TFS to determine amount and species of trees which are within the right of way and will be affected by proposed TL project.

Therefore, the development of the executive restoration projects will be carried out after a joint discussion between TANESCO, TANAPA and TFS.

Furthermore, as per experience from other TANESCO projects, TANESCO, TANAPA, TFS and District Authorities will agree on modality of habitat restoration for areas outside protected areas. This will be done within nearest villages and schools surrounding the protected areas. Habitat restoration projects to be conducted outside protected areas, which will be agreed by both parties, will have no impact on land, i.e., no land acquisition will take place.

To enable this coordination and management, one of the first activities to be developed by TANESCO is the creating of a working group to be formed by representatives from TANESCO, TANAPA and TFS to discuss the details and implementation of the offset. This working group should hold regular meetings every two weeks during the first year of project implementation, with the frequency reduced to one monthly follow-up meeting as activities progress.

During the initial meetings, responsibilities should be divided and a memorandum of understanding and commitment should be formalised between the participants. TANESCO will always be responsible for the overall management of the programme's implementation, with TANAPA and TFS assisting with technical issues and the selection and feasibility of target areas.

Hence for institutional arrangement TANESCO will:

- Establish close coordination with leading Authorities (TANAPA & TFS) by having formal agreement or memorandum of understanding (MoU).
- Establish multi-stakeholder coordination committee within the: Ministry of Natural Resource and Tourism, Leading Authority, Local Government Authority, NGOs and Community Level.
- Adhering to Legal and Policy Framework (EMA 2004, National Environmental Policy 2021, Wildlife Conservation Act 2009, General Management Plan (GMP) for Burigi-Chato National Park as well as Forest Act 2002 and relevant regulations and Policy) to align with the requirements of ESS6.
- To seek all the environmental authorizations necessary for the implementation and monitoring of the activities described in the Biodiversity Monitoring Programs mentioned in **Section 9.2.5**.

During Operation, TANESCO will coordinate process and nominate team leader to ensure:

- Timely implementation of Agreed Offset Plan within the selected sites.
- Making internal follow up and reporting progress monthly.

6.6 Capacity Building

The activities provided for in the monitoring programmes should be carried out by specialised consultants, assisted by TANAPA and TFS, with training in areas related to the topic, such as biologists, forestry engineers and veterinarians.

Supervision of the correct implementation of the activities must be carried out by TANESCO's contract managers, who must have training in the environmental field. For this, it is recommended that TANESCO have a permanent coordinating team, consisting of: 1 environmental specialist, 1 biodiversity specialist and 1 social expert (to support with stakeholder engagement actions).

6.7
Performance Indicators

Table 6.7.a
Biodiversity Management Plan performance indicators

Measure	Target	Indicators
Optimising the project route	• Minimise the conversion of natural habitats to the minimum necessary	• Total native vegetation suppressed compared to initial forecasts
Use of the service strip for access to the towers during construction and operation	• Use the service strip for access on all stretches where topography permits	• Utilisation rate of the wayleave • Number of new accesses opened in areas with favourable topography
Prioritising degraded areas for support structures	• All the support areas will be located in already degraded areas	• Number of support areas set up in degraded areas
Biodiversity Offset Plans	• Correct implementation of the programme, according to the deadlines and targets set	• Indicators detailed in the plan
Ecosystem Services Impact Mitigation Plan	• Correct implementation of the programme, according to the deadlines and targets set	• Indicators detailed in the plan
Fauna and Flora Rescue and Relocation Plan	• Correct implementation of the programme, according to the deadlines and targets set	• Indicators detailed in the plan
Invasive Species Control Programme	• Correct implementation of the programme, according to the deadlines and targets set	• Indicators detailed in the programme
Landscape Protection Program	• Correct implementation of the programme, according to the deadlines and targets set	• Indicators detailed in the programme
Operation Biodiversity Management	• Correct implementation of the programme, according to the deadlines and targets set	• Indicators detailed in the programme
Flora Active Search Programme	• Active search carried out on 100% of the determined stretches	• Indicators detailed in the programme

6.8
Implementation Schedule

Implementation of the BMP should begin during project construction and remain active throughout operation.

6.9
Reporting

The actions carried out within the scope of the BMP should be publicised annually by drawing up a consolidated report that should be disseminated among the identified

stakeholders.

The report should include the main activities carried out, a summary of the results observed, a partial assessment of the effectiveness of the measures in relation to the targets of zero loss and gain of biodiversity, future actions. In addition, TANESCO shall also prepare monthly internal reports summarising the activities carried out, which shall be shared with TANAPA and TFS to assess the need for any adjustments.

7.0
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P.05 - Biodiversity Offset Plan

1. Justification

As detailed in **Section 7.2.4** of the ESIA, the project will have an impact on critical natural and modified habitats. The assessment of residual impacts presented in the BMP (**Section 5.2**) shows that even after the implementation of measures to avoid and minimise the project's impacts, residual impacts on biodiversity remain, which need to be compensated for in order to achieve the net biodiversity gain targets, as determined by paragraph 16 of ESS6.

Biodiversity offsets are a set of actions that make it possible to produce measurable conservation results, designed to compensate for residual impacts on biodiversity resulting from project activities (BBOP, 2018). Biodiversity offsets must adhere to the principle of 'equal for equal or better'.

The Project will seek to offset its residual impacts in alignment with good industry practice principles for offsets, including those developed by the multi-stakeholder Business and Biodiversity Offsets Programme (BBOP, 2018).

2. Main Objectives

Offset main objectives and principles are:

- **Adherence to the Mitigation Hierarchy**: Offsetting is a last resort and should only be undertaken after appropriate application of the Mitigation Hierarchy (avoidance, minimisation, rehabilitation and offsetting).
- **Equivalence:** Offsets should be designed to address impacts to biodiversity that is ecologically similar or of a higher conservation value.
- **Landscape context**: Offsets will be designed accounting for connectivity across the landscape, avoiding fragmentation, and maintaining flows of ecosystem services.
- **Additionality**: Offset gains should be clearly attributed to the Project's action and can demonstrate going above and beyond what would have occurred if the offset had not taken place.
- **Stakeholder participation**: Offsets should be developed based on appropriate, extensive, and transparent stakeholder consultation.
- **Equity**: A biodiversity offset should be designed and implemented in an equitable manner, which means the sharing among stakeholders of the rights and responsibilities, risks and rewards associated with a project and offset in a fair and balanced way, respecting legal and customary arrangements. Special consideration should be given to respecting both internationally and nationally recognized rights of indigenous peoples and local communities;
- **Long-term outcomes**: Biodiversity offsets will use an adaptive management approach, incorporating monitoring and evaluation, to secure outcomes that last at least as long as project impacts last, and ideally be secured in perpetuity.

- **Transparency**: The design, implementation and monitoring outcomes of a biodiversity offset will be transparent, and communicated to the public in a timely manner.
- **Net positive impact for critical habitats**: when a critical habitat is activated, offset must provide measurable gains for the biodiversity values that triggered the critical habitat.

3. Applicable Legislation

- Protected Places and Areas Act (1969)
- The National Policies for National Parks in Tanzania (1994)
- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)

International

- World Bank Environmental and Social Standards (ESS) 6
- IFC Performance Standard 6

4. Responsibilities

Supervision of the correct implementation of the activities must be carried out by TANESCO's contract managers, who must have training in the environmental field. For this, it is recommended that TANESCO have a permanent coordinating team, consisting of: 1 environmental specialist, 1 biodiversity specialist and 1 social expert (to support with stakeholder engagement actions).

The TANESCO team can count on the help of consultants specialising in biodiversity to help implement the actions and revise the measures and calculations as necessary. In addition, as detailed in **Section 6.5** of the BMP, TANESCO must organise a institutional partnership with TANAPA and TFS, which should provide thecnical assistant and facilitate the identification and feasibility of target areas for habitat restoration. Also, TANESCO must also consult with other public entities and civil society organization, in the selection of the target areas, in order to viabilize arrangements aiming to maitaing the preservation of the restored habitat, and avoid impacts on currently and planned land use, mainly the Ministry of Natural Resource and Tourism, Leading Authority, Local Government Authority, Community Level and NGOs.

5. Methodology

Offsets can be categorised based into two groups (BBOP, 2012[2]):

- Avoided loss (protection): prevents future damage to biodiversity in an unprotected area under threat of loss and/or degradation due to factors unrelated to the project, or in consequence of indirect and cumulative impacts. The protection of this area must be guaranteed through some legal instrument that prevents future land use conversions and must prevent the (very likely) degradation and downward baseline trend of biodiversity.

- Restoration (rehabilitation) offsets: repair damage to biodiversity that was not originally caused by the project. Note the distinction between the restoration stage and the mitigation hierarchy, which deals with the direct and indirect impacts of the project.

Among the groups presented above, the project region already has a diversity of protected areas, both national, such as Burigi-Chato National Park and several other Forests Reserves, and regional, such as local authority forest reserves, village land forest reserves, and community forest reserves. Therefore, the absence of legally protected areas does not seem to be a worrying factor for the project region. The conversion of natural habitats to anthropogenic land uses, on the other hand, is a point of concern for the region, as discussed in **Section 7.2.1**.

Restoring natural habitats recreates favourable environments for biodiversity, allowing the most sensitive species, such as endangered species and those with restricted distribution, to recover their populations, guaranteeing the preservation of the genetic variability that is essential for ecosystem resilience. In addition, reconnecting ecological corridors and fragmented landscapes facilitates the movement and dispersal of organisms, plant pollination and seed dispersal (KEENLEYSIDE *et al*., 2012; ERBAUGH *et al*., 2020; COLE *et al*., 2021).

In addition, the restoration of degraded areas through the recovery of native vegetation cover contributes to the capture of carbon dioxide from the atmosphere, helping to combat climate change (COOK-PATTON & LISTER, 2020).

Ecological restoration is 'the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed' (SER, 2004). It is an intentional intervention that initiates or accelerates recovery of an ecosystem with respect to its structure (e.g., species composition, soil and water properties) and functional properties (e.g., productivity, energy flow, nutrient cycling), including exchanges with surrounding landscapes and seascapes (SER, 2004; SCBD, 2011). The term 'ecological restoration' can generally be taken as synonymous with 'ecosystem restoration' (SER, 2010). Ecological restoration can be confined to reducing pressures and allowing natural recovery, or involve significant interventions, such as planting vegetation, re-establishment of locally extinct

[2] Business and Biodiversity Offsets Programme (BBOP). 2012. Guidance Notes to the Standard on Biodiversity Offsets. Available at: BBOP_Standard_Guidance_Notes_20_Mar_2012_Final (2).pdf

species or the deliberate removal of invasive alien species (KEENLEYSIDE *et al*., 2012).

The restoration of degraded areas is also in line with global and regional interests related to the conservation of biodiversity and living natural resources. The UN Decade of Restoration (2021 to 2030[3]) and the UN Millennium Development Goals (Target 7.A[4]) emphasise the need for integrated and collaborative actions to address environmental issues. They recognise that ecological restoration is key to achieving environmental sustainability, one of the essential pillars for sustainable development and poverty eradication.

Tanzania is also part of the AFR100 initiative, which aims to restore 100 million hectares of forests and landscapes in Africa by 2030. Tanzania has committed to restoring 5.2 million hectares of degraded land as part of this effort[5].

Thus, considering the intense degree of degradation in the project region, and the importance of restoring natural habitats not only to achieve gains in the region's biodiversity values, but also to maintain priority ecosystem services, the offset proposal for the project is based on restoring degraded areas.

The total area to be restored will depend on the calculation of the project's net balance, presented in the BMP (**Section 6.2**), which should be revised following the triggers established in **Section 6.3**. The implementation of the offset will follow the following activities:

1. Definition of the total area to be restored, to be carried out based on the guidelines in **Sections 6.2** and **6.3** of the BMP.
2. Selecting the target-areas for restoration, in partnership with TANAPA and TFS, prioritising modified habitats within the critical habitat polygon.
3. Drawing up specific restoration projects for each group of areas.
4. Define strategies and partnerships with local entities, mainly Ministry of Natural Resource and Tourism, Leading Authority, Local Government Authority and Community Organisations, in order to guarantee the conservation maintenance orf the restored habitat.
5. Implementation and monitoring of the restoration areas.

In order to enable net gains for critical habitat trigger values, the following prioritisation is recommended for the selection of restoration focus areas, in the following order of importance:

1. restoration of modified critical habitat located outside protected areas and far from urban settlements that could jeopardize the maintenance of the restored habitat.
2. restoration of degraded areas to allow connectivity between remnants of native vegetation, especially in the area of the Burigi-Chato - Akagera and Kigosi Moyowosi - Burigi Chato ecological corridors.

[3] UN Decade on Restoration
[4] United Nations Millennium Development Goals
[5] Tanzania | AFR100

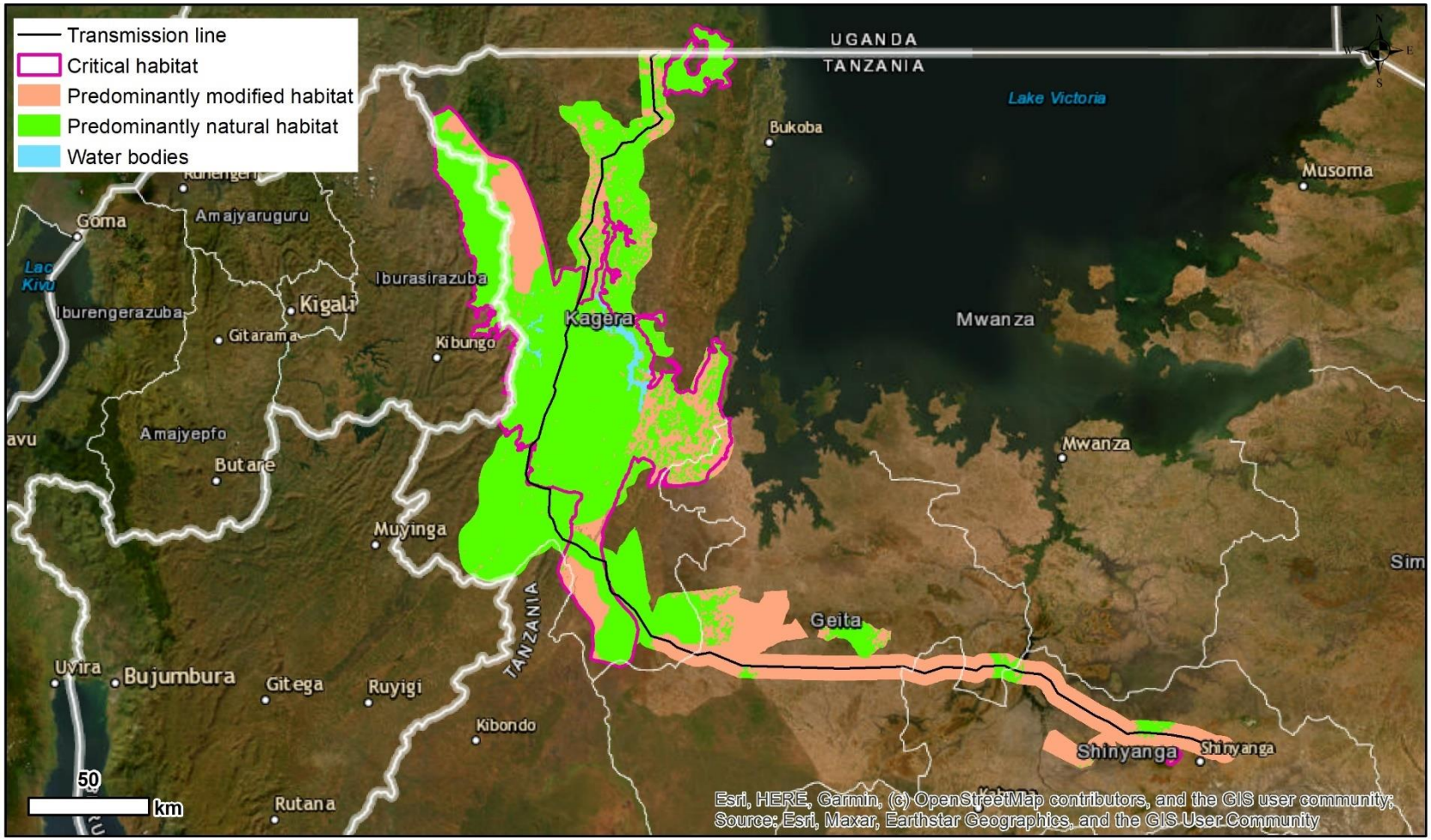
3. restoration of degraded areas located within the region's protected areas, especially forest reserves, which show intense signs of anthropisation and play an important role in terms of the availability of priority ecosystem services.

The **Figure 5.a** shows the modified habitat within the critical habitat that should be prioritised. However, during the implementation phase, this should be detailed, together with TANAPA and TFS, to define the priority areas to be restored.

It is also essential to involve the local community in defining these areas. Forest restoration occupies centre stage in global conversations about carbon removal and biodiversity conservation, but recent research rarely acknowledges social dimensions or environmental justice implications related to its implementation. Forest landscape restoration that prioritizes local communities by affording them rights to manage and restore forests provides a promising option to align global agendas for climate mitigation, conservation, environmental justice and sustainable development (ERBAUGH *et al*., 2020).

Along these lines, it is recommended that restoration projects be drawn up in line with the actions already carried out under the AFR100 project. Detailed indications regarding elaboration of specie restoration plans are provided in the **P.10 - Operation Biodiversity Management**.

Figure 5.a of P.05
Predominantly modified habitats within the critical habitat that are a priority for restoration activities



6. Performance Indicator

The following indicators are proposed to monitor the implementation of this Plan:

Offset activity	Targets	Indicators	Deadline
1) Definition of the total area to be restored	➢ Review of net balance calculations following the triggers defined in Section 6.3 of the BMP.	• Reviews made	First scenario finalised at the end of the deployment stage
2) Carrying out specific consultations with project stakeholders, mainly TANAPA and TFS, for priority definition	➢ Consult protected area managers, TANAPA and TFS, and village and wards representatives on the definition of priority areas to be restored.	• Number of consultations held	Consultations completed by the end of the first year of the implementation stage
3) Fine-tunning of the executive project, if any flora trigger species are found in the DAA	➢ Evaluate the refinement (fine-tunning) of the project, with the aim of avoiding impacts, in 100% of the stretches where the species are found, with the help of expert botanists.	• Number of changes made to avoid impacts	Executive project revised after completion of the Flora Active Search Programme, prior to any vegetation clearing activity.
4) Selecting the focus areas for restoration.	➢ 100% of the areas to be restored defined.	• Number of defined areas x total number of areas to be recovered	The selection of areas should begin shortly after the end of consultations, during the second year of implementation.
5) Drawing up specific restoration projects for each group of areas.	➢ 100% of specific restoration projects elaborated.	• Number of restoration projects carried out.	Specific projects must be drawn up at the same time as the focus areas for restoration are selected.
6) Implementation and monitoring of the restoration areas.	➢ 100% of the total area to be restored with ongoing restoration and monitoring activities.	• Number of projects started.	Restoration activities must begin before the end of project implementation.

7. Reports and Documentation

Progress reports on the activities carried out as part of implementing the offset should be produced every six months. The reports should minimally contain: introduction, period to which it refers, activities carried out during the period, evaluation of performance indicators, critical analysis of points of concern and/or difficulties encountered, adjustments made (if any), planning of next steps.

8. Schedule

The implementation of the offset must begin with the start of the project's implementation, and must remain active throughout the project's lifetime.

P.06 - Ecosystem Services Impact Mitigation Plan

Ecosystem Services Impact Mitigation Plan, which will propose strategies to minimize impacts on priority ecosystem services, including TYPE 1 services that have been identified as priorities during the ESIA process.

1. Justification

As demonstrated in **Section 8.2.3.2** of the ESIA, five priority ecosystem services have been identified: 3 provisioning services and 2 regulation, all of them type 1. The ecosystem service 'feeding' is directly linked to the availability of arable land in the project area, and the impact on this service can be assessed based on the areas of farmland directly impacted by the implementation of the project. The other priority ecosystem services, natural medicines, biomass, pollination and life cycle maintenance, are linked to the availability and quality of native vegetation in the region. As these ecosystem services are a priority, measures are needed to mitigate the impacts of the project on these services.

However, since the priority ecosystem services are related to the availability of arable land (food service) and preserved natural habitats in order to guarantee the maintenance of the ecological cycle (natural medicines, biomass, pollination and life cycle maintenance services), mitigation measures for impacts on these components are already provided for in other programmes. This plan therefore only consolidates the specific mitigation measures to mitigate impacts on each of the priority ecosystem services.

2. Main Objectives

The objectives of this plan include:

- Reducing Negative Impacts: minimising the negative impacts of the project's construction on priority ecosystem services.
- Maintaining Socio-Economic Activities: Ensuring that the population directly affected by the project is compensated for the impact on the priority ecosystem service of food.
- Preservation and Restoration: Protect and restore degraded ecosystems to ensure the continuity of priority ecosystem services.
- Monitoring and Evaluation: Implement monitoring and evaluation systems to track the effectiveness of mitigation measures and make adjustments as necessary.

3. Applicable Legislation

National

- Protected Places and Areas Act (1969)

- The National Policies for National Parks in Tanzania (1994)
- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)
- Legislation regarding compensation for land use

International

- World Bank Environmental and Social Standards (ESS) 1, 5 and 6

4. Responsibilities

Responsibility for the correct implementation of the measures set out in this plan lies with TANESCO's Management Team, which will supervise the implementation of the ESMS programmes.

5. Methodology

The table below consolidates the mitigation and compensation measures for impacts on priority ecosystem services:

Priority ecosystem service	Related component	Plan/Program	Mitigation measures
Livelihood	Availability of arable areas	Resettlement Policy Framework (RPF)	The plan provides for financial compensation for the loss of land and monitoring of ways of restoring life, following the Good Practice Handbook on Land Acquisition and Involuntary Resettlement
Natural medicine Biomass Pollination Lifecycle maintenance	Availability of natural habitats in good conditions of preservation	Biodiversity Management Plan	Stablishes the biodiversity mitigation strategy of the project
		Biodiversity Offset Plan	The plan provides for offsetting for biodiversity residual impact.
		Fauna and Flora Rescue and Relocation Plan	The plan provides for measures to minimize impacts on flora and fauna during construction activities
		Invasive Species Control Program	The program provides for measures to monitor and eradicate exotic invasive species for the project area, preserving the natural habitats
		Landscape Protection Program	The programme determines measures to monitor natural habitats around the project, identifying vectors of

Priority ecosystem service	Related component	Plan/Program	Mitigation measures
			deforestation in natural habitats at an early stage
		Construction Environmental Plan (CEP)	Establishes procedures for vegetation clearing, and other measures to avoid and minimize pollution and contamination during construction
		Operation Management Programme	Establishes procedures for pollution and erosion control during operation. Provides for the Emergency Response Plan (ERP) Framework for the Operation Phase.
Feeding Natural medicine Biomass Pollination Lifecycle maintenance	Availability of arable areas Availability of natural habitats in good conditions of preservation	Stakeholder Engagement Plan	It provides for the implementation of mechanisms for public consultation with interested parties, continuous social communication and complaints and grievance mechanisms. Through these instruments, the affected population will be able to share their perceptions of the project's impacts on ES, as well as the effectiveness of mitigation measures on the availability of these services.

6. Performance Indicator

The monitoring indicators are those for the programmes mentioned in the previous section. The correct implementation and monitoring of the aforementioned programmes also guarantees the mitigation of impacts on ecosystem services

7. Reports and Documentation

The report and documentation implementation schedule follows the timetable for the programmes mentioned in **Section 5.8**. Reporting and documentation of the measures will be the same as for the programmes mentioned in **item 5.9**. In addition, a consolidated document should be produced annually, focusing specifically on actions to mitigate impacts on ecosystem services. This consolidated report will be based on the reports produced for the other programmes and will present the progress made in implementing the actions, any adjustments made and the timetable for future actions.

8. Schedule

The implementation schedule follows the timetable mentioned in **Section 5.8**.

P.07 - Fauna and Flora Rescue and Relocation Plan

1. Justification

Suppression activities could have an impact on fauna and flora species, including the loss of flora and the possible loss of low-locomotion fauna.

The suppression of native vegetation for the implementation of the TL could imply not only a reduction in vegetation cover in the region of the development, but also the loss of local floristic diversity and indirect impacts on the adjacent vegetation intercepted by it. In order to mitigate and compensate for this impact, this programme is proposed.

With regard to fauna, the scaring and rescue of wild fauna during vegetation suppression is essential to minimise the risk of deaths and accidents to animals in the directly affected area. Throughout the project's implementation period, it is necessary to maintain veterinary supervision for the rescue of wild animals that may be found on the work fronts and construction sites.

2. Main Objectives

The programme's objectives include:

- To guide the monitoring of vegetation clearing fronts during the implementation of the project.
- Passively promoting the translocation of larger and/or more mobile fauna from the area of vegetation clearing, directing them to vegetated/preserved areas in the region surrounding the intervention.
- Capturing animals that are injured or otherwise unable to move.
- Protect nesting species located in the vegetation clearing strips.
- Provide appropriate veterinary care and, if necessary, send them to a partner veterinary clinic.
- Identify, record and photograph the specimens, creating a database of the animals chased away/translocated throughout the activity.
- Making scientific use of the species of interest to science that die as a result of the intervention carried out in the area, through the formation of reference collections.
- Implement measures to protect the fauna and workers involved in the vegetation suppression activity, including actions to reduce people being run over on access roads, minimising potential accidents.
- Reduce the loss of floristic diversity in areas where vegetation removal is necessary for the implementation of the Transmission Line (TL), by rescuing germplasm, especially of species defined as priorities (endangered or protected, rare and endemic).
- Contribute to the conservation of local flora species by relocating the material rescued to adjacent fragments or donating it to institutions that are interested.
- Visit the areas where the vegetation will be cleared collecting botanical material (seeds, epiphytes and hemiepiphytes) with an emphasis on the species defined as

priorities (endangered or protected, rare, endemic and of traditional use).

- Dispose of the rescued material, either by relocating it to adjacent remnants that will not undergo intervention, using it in the Terrestrial Habitat Restoration Programme or donating it to research and/or teaching institutions, nurseries, botanical gardens, parks or others that show an interest.
- Draw up a spreadsheet with the main data on the rescued material (scientific name, type, rescue coordinates and final destination), as well as selective photographic records of the most relevant species rescued.

3. Applicable Legislation

- Protected Places and Areas Act (1969)
- The National Policies for National Parks in Tanzania (1994)
- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)

International

- World Bank Environmental and Social Standards (ESS) 6
- IFC Performance Standard 6

4. Responsibilities

TANESCO is responsible for the Programme and will have to allocate the financial and human resources needed to carry it out. It will have to hire fauna teams specialising in the terrestrial vertebrate groups (avifauna, mastofauna and herpetofauna).

As far as flora is concerned, germplasm collection must be carried out by a team trained and coordinated by a biologist, agronomist, forestry engineer or similar. The team must be sized to meet the vegetation suppression schedule, ensuring that the suppression areas are previously inspected by the rescue team.

A land survey team is also needed to obtain the necessary authorisations from the owners of the land where the rescue work will be carried out.

5. Methodology

5.1. Fauna Rescue and Relocation

Scaring away and rescuing wild fauna during vegetation suppression is essential to minimise the risk of deaths and accidents involving animals in the directly affected area.

Throughout the project's implementation period, it is necessary to maintain veterinary supervision for the rescue of wild animals that may be found on the work fronts and construction sites.

Small, less mobile vertebrate species such as amphibians, reptiles, marsupials, rodents and arboreal primates are among the most vulnerable. Nests, eggs and young found in the area to be cleared should also be preserved or removed according to a specific assessment. For medium and large fauna, as well as winged species (birds and chiroptera), it is expected that they will be able to move to areas unaffected by the activities. However, preventative measures are necessary to avoid accidents that could cause injury or even death to animals during vegetation suppression.

These activities have a special focus on rescuing vertebrates that are more susceptible to accidents due to their low mobility, as well as preserving and rescuing nests with eggs and puppies.

5.1.1. Mobilization

Prior to the initial field activities, the contracted teams must carry out the following actions:

- Meeting of the technical team to detail and standardise the methodologies to be applied during the rescue and chasing away of fauna.
- Integration of the teams involved in the suppression (tractor drivers, assistants, chainsaw operators, fauna technical team, etc.).
- Setting up a temporary structure with suitable equipment and materials to carry out the activities.
- Definition of a standard protocol to be followed by the teams during the fauna scaring and rescue process.
- Recognising and zoning the vegetation removal areas, identifying the best access routes and the different environments present.

In addition, educational talks should be given to the employees involved in the work (office, technicians, workers and support staff) prior to the start of the activities and throughout the work, when necessary, taking into account the hiring of new contingents of workers.

The talks should emphasise issues such as: the importance of preserving wildlife, processes for rescuing, chasing away and saving wildlife, environmental legislation, and the ban on hunting, catching and chasing wild animals.

5.1.2. Installation of the Temporary Fauna Rescue Base

The fauna rescue team must have a mobile support base in the immediate vicinity of the construction site for emergency assistance, equipped with materials and equipment (vehicle), with a veterinary surgeon in charge. In addition, a Temporary Fauna Rescue Base must be set up, with facilities for the temporary keeping of animals, including care

supervised by a veterinarian. A container can be used to set up this base, which will be located at the construction site. This base will include equipment for animal containment, materials for minor surgical procedures, a mini oven for sterilising materials, medicines, cupboards and a brooder. The base should also include a room with a fridge, freezer and microwave for any animal care needs, as well as another room for storing equipment and materials, and finally a room for conditioning animals suitable for release.

5.1.3. Fauna Rescue and Scaring Activities

The wildlife scaring and rescue activities should be carried out in two stages:

- **Stage I - Prior rescue**: This consisted of removing as many animals as possible from the DAA prior to the start of the vegetation suppression process, using scaring and active capture methods (Active Visual Search - AVP).

- **Stage II – Vegetation clearing monitoring**: During manual, semi-mechanised and/or mechanised vegetation suppression activities, the fauna rescue team carried out all the procedures to scare away and rescue any fauna that might still be in the area, even after the previous rescue.

It should be noted that in order to minimise the impact of capture stress on the health of the animals present in the area, the premise adopted should be to avoid capturing and handling animals as much as possible. Thus, only when it is impossible for a particular animal to move around on its own will it be captured and released in an area designated for release, located at a safe distance from the suppression activities. Whenever an animal is rescued, a field form must be filled out, containing the rescue location (with planimetric coordinates), the species rescued, information on the animal's situation and destination. All the species recorded in the area will be classified according to their degree of threat in accordance with official national and international lists, level of endemism and other pertinent information.

Stage I - Prior rescue

Prior rescue must be carried out by means of Prior Scaring and Prior Active Capture, as described below:

a) **Preliminary Scaring:** Prior to the vegetation suppression activities, the rescue teams will travel along the entire stretch to be suppressed in order to scare away the animals present in the intervention area to neighbouring natural areas. This methodology will promote the ‘guided escape’ of the animals in a non-invasive way, in order to maintain the physical integrity and reduce the stress of the individuals. It should be noted that the suppression procedures will be organised in such a way as to cause the fauna to move from the impacted areas to contiguous natural areas.

   This scaring must be carried out indirectly, through the noise caused by machinery, equipment and the movement of the suppression team, or directly by

the rescue team, using noise and the movement of the team. Therefore, the suppression stages must be directed in order to direct the fauna with the greatest dispersal capacity to adjacent areas.

b) **Prior Active Capture:** In this method, an Active Visual Search (AVS) will be carried out throughout the area to be cleared, scouring micro-habitats such as boulders or loose rocks, tree hollows, burrows, termite mounds, nests, among other possible occupation sites. The aim of this practice will be to rescue as many animals as possible, with a focus on species with low agility, restricted use areas, fossorial and semi-fossorial habits, arboreal habits, young that are unable to move, sick or injured animals and other species that are likely to be involved in accidents and suffer damage during vegetation suppression.

The active visual search will be carried out in such a way that there is no specific time limit between the pre-determined points, with the team moving between daytime periods, if necessary, at night, always observing places that could be used as microhabitats by representatives of the macrofauna, such as: bromeliads, fallen trunks, burrows and treetops, leaf litter and other places that could be used by these individuals during their activities.

When abandoned nests and termite mounds are found, they will be destroyed, thus preventing possible recolonisation. In active environments, whether they are nests or burrows, they should be isolated with zebrafish tape for signalling and monitoring. Bees and maribondos will have to be relocated, as they can pose a risk to field workers, local inhabitants and their surroundings, as well as being an important group in the dynamics of the ecosystem. It is important to note that isolated trees located in anthropized areas (pastures) will also be inspected to identify and rescue these life forms.

The animals must be captured manually or with the aid of containment equipment, depending on the case. Once the animals have been contained, they should be placed in a transport box, a cloth bag or plastic containers with perforated lids and immediately sent to a veterinarian for an assessment of the animal's physical condition.

Animal species with a greater capacity for dispersal and escape behaviour will be guided to the fragments that remain unchanged. In this way, these specimens will continue to make up the faunal community of the local biota, avoiding overpopulation of the translocated areas.

Stage II: Monitoring Vegetation Clearing

The field team will be responsible for rescuing and chasing away vegetation during manual, semi-mechanised and mechanised clearing activities, as described below:

a) **Monitoring manual and semi-mechanised vegetation suppression:** Manual vegetation suppression will consist of the selective cutting of plant species that

can be utilised, carried out using light cutting tools (machete, sickle and chainsaw), while at the same time scaring away and rescuing species of fauna through active capture during the PVA. Dead trees hollowed out trees and palm trees, when felled, should be inspected to check for hollows that could be used as nests or shelters by animals.

b) **Monitoring mechanised vegetation clearing:** Prior to the start of the activity, the team will once again carry out the PVA and advise the machine operators on the procedures to be adopted to facilitate the scaring and rescue of fauna and ensure the safety of all those involved in the operation.

Throughout the intervention, the team must maintain a minimum distance of 10 metres from the clearing equipment, obeying the proposed safety margin, in order to save as many animals as possible. When animals are spotted, they must be signalled immediately in order to paralyse the machine/tractor and the biologist in charge must capture or chase the animal away.
As soon as the suppression front has passed, the fauna team should carry out a new sweep of the newly suppressed area to rescue any individuals that may not have been located previously or that may have sought shelter in the area after suppression.

5.1.4. Capture Methods

Capture will be aimed at animals with less capacity for movement, such as lizards, amphibians, snakes, rodents, invertebrates, etc., which will be rescued and kept on a temporary support base in ventilated transport boxes until they can be relocated to the pre-defined release points. It should be emphasised that physical restraint of the animals will only be carried out when it is confirmed that it is impossible to chase the animal away or move it.

The specific procedures that will be adopted for each taxonomic group are described below:

- **Arachnids:** The arachnids will be contained using plastic tweezers, plastic pots and, when harmless, bare hands or gloves to prevent injury to the animal. The specimens should be placed in plastic jars with perforated lids and moistened cotton wool. Special care should be taken with specimens of venomous arachnids.

- **Amphibians:** The methodology used will be visual recognition, followed by direct physical restraint with bare hands or gloves, avoiding injury to the animal due to the high sensitivity of its skin. For transport, specimens should be placed in plastic jars with perforated lids and cotton wool moistened with water to prevent dehydration.

- **Reptiles:** Reptiles considered aggressive will be restrained with the aid of leather gloves and a snake hook, and the rest should be captured with bare hands to avoid loss of sensation and injury to the animal. Special attention will be paid to ophidian species considered poisonous/poisonous. Wooden or plastic boxes with locks and

plastic jars with perforated lids will be used for transport.

- **Mammals:** Considering small to medium-sized mammals, capture procedures will be adopted by lurking and stalking, using some basic forms of physical restraint, according to the species, restricting defensive movements, using a Lutz lasso, lasso or crane. After capture, the small non-flying mammals will be transferred to containment boxes lined with leaf litter. Medium to large mammals should be transferred to wooden boxes of a size proportional to the size of the species, with small holes in the sides of the box, in order to minimise stress during transport.

- **Birds: In general, birds tend to flee at the movement and noise of suppression activities.** In the case of weakened individuals, they should be carefully captured by hand or with the aid of cloth pincers, due to their very fragile bodies. Cloth towels should be used for psittaciforms that use their beaks as their main defence. Leather gloves will be used mainly for birds that use their claws as a means of aggression, such as falconiformes. For transport, the birds will be placed in cloth bags to avoid stress during the journey.

- **Nests and eggs:** Nests containing eggs/puppies found during the activity should be isolated by marking them with a coloured tape, creating a protective radius of at least 5 metres from the nest, maintaining the surrounding vegetation until the puppies are fully developed, thus avoiding the handling of nests and their abandonment by the parents. These nests will be monitored daily and, when unoccupied and inactive, will be destroyed to prevent recolonisation by other animals during the suppression process. It is important to emphasise that if the parents abandon their eggs or nests, they must be rescued, packed in cloth bags and appropriate baskets and sent for veterinary monitoring.

- **Nests of native bees:** Removals of these nests will be carried out by the biologist in charge and a field assistant, duly equipped with appropriate clothing, a fumigator and transport box, with the aid of a chainsaw and machete. If a swarm of native bees is found on the ground in the suppression area, it must be removed and transferred to preserved areas that will not be interfered with by the work. Translocations should be made to an area with similar vegetation, as close as possible to the rescue site.

- **Live Containment and Interception and Drop Traps:** *Sherman, Tomahawk and Pitfalls* type traps should be used to capture herpetofauna and small mammals prior to vegetation clearing. Transects will be set up in the field to capture small terrestrial vertebrates. The *Sherman* and *Tomahawk* traps will have to be baited. The baits used will consist of a mixture of banana, peanuts, fishes and cornmeal.

5.1.5. Screening and Veterinary Care Procedures

Screening of rescued animals should be carried out *on site* to avoid transporting, handling and storing the animals for an unnecessary period, which could increase their stress levels and cause undesirable pathophysiological changes. During screening, the veterinarian will assess the animals' physical condition, and in cases where no alterations are

diagnosed, the specimens should be photographed, taxonomically identified, submitted to biometrics, sexed, weighed and then sent to the release areas.

Any animal specimens that have suffered any kind of physical injury, are in poor health or are unable to return to the wild (e.g. nestlings, puppies, etc.) must be taken to the Temporary Base in the project area, where they will be assessed, subjected to emergency procedures and sent for release.

For each individual of the fauna being cared for, a specific medical file has been drawn up to monitor its state of health, reporting the situation at the time of capture, the evolution of the clinical condition, the care required, the medication used (when necessary) and the specific management to which it was subjected.

In the case of more serious injuries, the animals can be euthanised in order to preserve animal welfare. To apply the technique, strict procedures will be adopted to minimise the risk of anxiety for the animal, so that it does not feel physical or mental suffering. Thus, the euthanasia method will aim for immediate loss of consciousness, followed by respiratory and cardiac arrest and loss of brain function.

Finally, in the event of animals being run over on the access roads used mainly by the project, they will have to be rescued as part of this plan, since it was expected that vegetation suppression activities would cause greater movement of fauna, and consequently lead to accidents with animals, including being run over, during their journey.

5.1.6. Release

During chasing away, the fauna will be directed to adjacent environments that have the same physiognomic characteristics as the affected areas, while each rescued animal must have its capture location georeferenced so that it can be released in the shortest time and in a safe, nearby location. This procedure will allow new individuals to enter the receiving areas as naturally as possible.

5.1.7. Fixing and Listing Dead Animals

Specimens of wildlife of scientific interest that die during vegetation suppression activities and are in a good state of conservation will be sent to a partner scientific collection. To this end, the animals will have undergone fixation procedures (preparation of the specimen for conservation) prior to being sent. The animals must be placed in containers and fixed with 70% alcohol or 10% formaldehyde.

5.2. Flora Rescue and Relocation

For the implementation of the TL, there is the potential for interventions on 131.01 hectares with native cover (natural habitats). In order to reduce the impact of the loss of floristic diversity due to the implementation of the Project, plant germplasm will be rescued in the intervention areas in native grassland and forest formations.

Priority species will be defined for rescue, such as those threatened with extinction, protected by law, rare or of scientific, environmental or economic interest. In addition to these, other native species present in the areas of suppression that are fertile and have suitable material for collection will also be targeted for salvage, with the aim of increasing the number of material and species collected. Thus, considering the results of the floristic survey presented in EISA, the species classified as priorities for salvage are shown in Table below, in which the species of greatest conservation interest are highlighted in bold. All employees involved in the germplasm rescue activities must undergo prior training, aimed at presenting safety procedures, detailing the areas destined for rescue, the target species and the procedures for collecting and finally disposing of this material.

The flora salvage team will visit the sites, equipped with digital GPS files of the suppression polygons, before the vegetation removal activities begin. To do this, they must maintain frequent contact with the suppression teams in order to organise field logistics.

Table 5.2.a of P.07
List of priority species for germplasm rescue

Family	Specie name	Author	Life form	Status IUCN	Status Cites	Usage	Occurrency
Anacardiaceae	*Lannea schimperi*	Engl.	Tree	'-	-	food and masticants (fruit, bark)	Native
Anacardiaceae	*Ozoroa insignis*	Delile	Tree	LC OR LR/LC	-	Sacred/medicinal	Native
Araliaceae	*Cussonia arborea*	Hochst. ex A.Rich.	Tree	LC OR LR/LC	-	Snakebite, malaria, constipation	Native
Asparagaceae	*Asparagus setaceus*	(Kunth) Jessop	Shrub	'-	-	Sacred/medicinal	Native
Asteraceae	***Vernonia galamensis subsp. galamensis***	**-**	**herb**	**'-**	**-**	**oilseed**	**Native - Endemic**
Burseraceae	*Commiphora africana var. africana*	(A.Rich.) Engl.	Tree	'-	-	food and masticants (gums and resins)	Native
Burseraceae	*Commiphora schimperi*	(O.Berg) Engl.	Tree	LC OR LR/LC	-	food and masticants (gums and resins)	Native
Celastraceae	*Mystroxylon aethiopicum*	(Thunb.) Loes.	Tree	'-	-	Economic or medicinal usage	Native
Ebenaceae	*Euclea divinorum*	Hiern	Tree	LC OR LR/LC	-	Tooth ache, stomach ulcers	Native
Euphorbiaceae	***Euphorbia hubertii***	**Pax**	**Tree**	**EN**	**II**	**-**	**Native**
Fabaceae	***Dalbergia melanoxylon***	**Guill. & Perr.**	**Tree**	**NT**	**II**	**Economical or medicinal usage**	**Native**
Fabaceae	*Erythrina abyssinica*	DC.	Tree	'-	-	Malaria, convulsions in children, anthrax, snakebite, sacred	Native
Fabaceae	***Pterocarpus angolensis***	**DC.**	**Tree**	**'-**	**II**	**-**	**Native**
Malvaceae	*Dombeya rotundifolia*	(Hochst.) Planch.	Tree	'-	-	Economical or medicinal usage	Native
Malvaceae	*Grewia forbesii*	Harv. ex Mast.	Shrub	'-	-	Food (seeds), sacred	Native
Menispermaceae	*Cissampelos pareira*	L.	Liana	'-	-	cultural forests	Native
Myrtaceae	*Syzygium cordatum*	Hochst. ex Krauss	Tree	'-	-	Sacred/medicinal	Native
Olacaceae	*Ximenia caffra*	Sond.	Shrub	LC OR LR/LC	-	food (fruit)	Native
Phyllanthaceae	*Bridelia micrantha*	(Hochst.) Baill.	Tree	'-	-	Worms, diarrhoea, headache, sacred	Native
Phyllanthaceae	*Flueggea virosa*	(Roxb. ex Willd.) Royle	Tree	LC OR LR/LC	-	Bilharzia, malaria, stomach ache, itching	Native
Primulaceae	*Maesa lanceolata*	Forssk.	Tree	LC OR LR/LC	-	Diarrhoea, tooth ache, rashes	Native
Rubiaceae	*Coffea eugenioides*	S.Moore	Tree	'-	-	food (seeds and fruits)	Native
Rutaceae	*Clausena anisata*	(Willd.) Hook.f.	Tree	'-	-	Stomach pains, worms, diarrhoea, headache, malaria, influenza, food (seed)	Native
Rutaceae	*Harrisonia abyssinica*	Oliv.	Shrub	LC OR LR/LC	-	Fever, nausea, vomiting, snakebite, tuberculosis, stomach ache, malaria	Native

Collection should be carried out using the technique best suited to the maturity of the fruit/seeds, the life habits of the species, field conditions and the type of seed dispersal. Fruits and seeds of tree and shrub species will be collected directly from accessible fertile branches or with the aid of pruning shears or loppers; directly from the substrate (soil) when the fruit does not have wind-dispersed seeds (anemochoric) and dispersal occurred close to the mother tree; and by manually shaking the tree so that they fall onto a plastic tarpaulin placed on the ground, maximising collection.

Storage of the propagating material may vary depending on its viability, logistical conditions and distance from the target germplasm rescue areas. With regard to the seeds collected, their storage will vary based on their classification as orthodox or recalcitrant. Orthodox seeds tolerate drying at low humidity levels (5 to 7% humidity) and low storage temperatures, and can be packed in airtight containers and subjected to temperatures of up to -18ºC (MEDEIROS, 2003). Recalcitrant seeds, on the other hand, cannot be dehydrated below a certain degree of humidity (25 to 50%, depending on the species) without physiological damage occurring. The right environment for conservation can be achieved by burying them in moist charcoal, moist sawdust or moist sand (FLORIANO, 2014). However, there are species that need good aeration and cannot be buried. They should be packed in paper bags or open boxes to allow good oxygen diffusion, and placed in an environment with high relative humidity so they don't dehydrate (FLORIANO, 2014).

The biologist coordinating the germplasm rescue will indicate whether there is a need to return to the areas to rescue material from the tops of fallen trees. In this case, the teams will be guided in advance by the germplasm rescue coordinator and will carry out the rescue.

Information about the collections will be recorded on specific forms containing: scientific name (or morphotype), type, rescue coordinates and final destination, and the rescued materials will be selectively photographed.

The final destination is one of the most important points in a rescue programme and will be defined in advance so that the material does not deteriorate due to storage time or the lack of a place with a clear purpose for its use. The material can be used for the rehabilitation of degraded areas by the construction, or, under the Biodiversity Offset Plan, donated to partner institutions such as universities, research centres, community associations and other entities or sent to partner nurseries for the production of forest seedlings.

The rescued cacti, epiphytes and hemiepiphytes will be relocated to plant formations in the vicinity of the development that will not undergo intervention. The type of substrate in which each plant was found should be recorded, in order to relocate them in the same type of environment (substrate, humidity, luminosity).

Rescued specimens should be wrapped in damp newspaper and sent for relocation to remnants of native vegetation adjacent to the suppression areas.

The epiphytes and hemiepiphytes found will be removed from the tree trunks by hand or using a machete or spatula, removing the outer bark of the trunk, or the section of the branch where the individuals are attached will be cut off and they will be relocated to trees in the surrounding remnants of vegetation. Transplanting will preferably be carried out in forks, scars from fallen trunks and depressions, as well as tree trunks whose rhytidomes are thicker and rougher, characteristics that allow them to retain more moisture and contribute to the attachment of the roots of the transplanted plants. Whenever possible, trees located in shady and humid areas and/or with similar characteristics to the site where the material was collected will be prioritised.

The epiphytes and hemiepiphytes will preferably be attached to the trunks of the selected trees using a biodegradable rope or string. The number of epiphytes to be transplanted into each forophyte may vary considerably, taking into account the size of the trees, the size of the epiphytes, the condition of the trunk, among other characteristics.

Terrestrial species, on the other hand, can be planted directly in the ground, using the most suitable substrate for the type of species. The cacti will be relocated in a similar way to the situation in which they were rescued, but favouring more protected locations, such as in crevices of the outcrops, or the relocated individuals can be propped up with loose pieces of rock found at the relocation sites.

Similarly, the seeds will be used to enrich adjacent plant formations by scattering them on the ground in places similar to their original habitats.

Preferably, these activities should be carried out with greater attention and intensity in the surroundings and interior of Burigi-Chato National Park, and should always comply with the Park's regulations.

If interested, all types of rescued materials can be donated to research and/or teaching institutions, nurseries, botanical gardens, parks, among others.

6. Performance Indicator

The performance indicators are the following:

Fauna rescue and relocation

- Number and variety of individuals chased away.
- Number and variety of individuals rescued.
- Number and variety of individuals seen by the Veterinarian.
- Number and variety of individuals referred to the Veterinary Clinic.
- Number and variety of specimens sent to scientific collections.
- Number of deaths.
- Number of releases points.
- Number and variety of animals released.
- Number of isolated nests.
- Number of hives isolated or relocated.

Flora rescue and relocation

- Extents/areas travelled to rescue germplasm in relation to total areas of native vegetation suppression.
- Quantity of material destined (relocated or donated) in relation to the total rescued.

7. Reports and Documentation

At the end of each month of monitoring vegetation suppression activities, a monthly report should be drawn up containing information on the stretches monitored, methodological procedures with sampling efforts, results containing information on the richness, abundance, quantity and type of material rescued (for flora), location of the record, coordinates of the release areas, translocation; destination of the animals, coordinates of the species of flora rescued and location of relocation, as well as photographic records. At the end of each quarter, a consolidation report and an annual report should be drawn up on the activities that took place during the period.

8. Schedule

The activities must take place while the vegetation is being cleared. The flora and fauna teams should scour the area prior to vegetation clearing, so the planning of activities should be done in conjunction with the team responsible for suppression.

9. References

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P.08 - Invasive Species Control Programme

1. Justification

As assessed in the environmental diagnosis of the project, 5 exotic species were recorded in the area, two species have high potential to invade native habitats. *Mimosa pigra* var. *pigra* and *Lantana camara* are American tropical plants reported as invasive in a long list of countries worldwide, the main focus of this programme must initially be on these two species. *Grewia rothii* and *Catunaregam spinosa* are species native from India Continet and southeast Asia having some reports in East Africa. The *Tamarindus indica* is a specie highly cultivated in the tropics due to its usage in culinary, and others (POWO-Kew; GBIF).

Exotic species with invasive potential are a threat to biodiversity and the ecological balance of the region's grassland environments. Transformation activities such as the installation of the towers and the opening of new accesses, as well as maintenance activities in the wayleave, could facilitate the dispersal of invasive exotic species throughout the area, especially with the increase in the flow of vehicles, people and machinery.

2. Main Objectives

The main objectives area:

- During the construction phase, draw up a map of the areas infested by invasive exotic species around the project's intervention areas, especially if they are located inside protected areas.
- Evaluate the need for and effectiveness of control measures for each case of detection of dispersal and/or proliferation of these species in the monitored areas.
- Carry out control measures for each case that has been assessed as necessary.

3. Applicable Legislation

National

- Protected Places and Areas Act (1969)
- The National Policies for National Parks in Tanzania (1994)
- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)

International

- World Bank Environmental and Social Standards (ESS) 6
- IFC Performance Standard 6

4. Responsibilities

TANESCO is responsible for the Programme and will have to allocate the financial and human resources needed to carry it out. Construction teams can help identify sites of exotic species infestation, as well as the teams that will be carrying out the fauna and flora rescue and relocation activities

5. Methodology

5.1. Control Activities During the Implementation and Operation of the Project

For the teams working in the field, training in the identification and management of invasive species should be given to all employees on these work fronts, covering information on invasive species, such as techniques for identifying the species, the type of dispersal, the appropriate final destination of seeds that are in the machinery or stuck to clothing and tools.

During the implementation of the TL, employees must report to the environmental supervision team whenever they observe areas infested by these species. The removal of these species in the areas where the project is being implemented must be carried out quickly. If there is reproductive material, the removal can only be carried out by trained staff to prevent the seeds of these species from being dispersed during their removal.

Periodically, and more intensively during the fruit dispersal period, the project's machinery and vehicles should be inspected to check for the presence of seeds and fruit of these species. If the presence of seeds and fruits of invasive species is found in the machinery, periodic cleaning of this equipment should be carried out to prevent it from acting as a source of dispersal of invasive species.

If sources of invasive species dispersal are found frequently on the machinery, construction and non-emergency maintenance activities in the areas with the highest infestation of these species should be interrupted until the reproductive period of these species is over.

5.2. Monitoring the Dispersal of Invasive Species

The TL intersects several native areas, in particular the Burugi-Chato National Park region. The vegetation around this stretch is predominantly grassland and Savannah formations. The monitoring of the dispersal of invasive alien species will be carried out within the wayleave and in a 20 m buffer on either side of the accesses within or in the Burugi-Chato National Park Buffer Zone, and with the same buffer for open accesses in native vegetation throughout the implementation of the TL.

During the construction phase, an initial mapping of the locations where invasive alien species are present in the study area will be carried out, based on *on-site* visual assessments. The focus of this activity will be to distinguish different mapping categories that reflect the degree of infestation in areas with native vegetation.

The sample areas for locating plots to support the initial mapping will be defined by analysing satellite images and field inspections. Once the first version of the mapping has been finalised, other sample areas may be included for monitoring using the plots.

In each selected sample area, fixed plots measuring 20 m x 20 m will be installed, within which the clusters of these invasive shrubs and trees will be counted, their total height measured and the coverage within the plot estimated. There will also be a visual analysis of the degree of infestation in each sampling area, which will include a photographic record at georeferenced fixed points.

Monitoring of the sample areas (evaluation of the plots and visual analysis) will be carried out at the start of the operation phase, and its frequency will be defined after the initial inspection, to be carried out during the installation stage. In each campaign, the aforementioned parameters will be measured, as well as the visual analysis of the sample area to update the mapping of infested areas.

If it is found that there has been an increase in the density of invasive alien species and/or ground cover in any of the sample areas, the need for and effectiveness of control measures should be assessed, including the recovery of the area following the procedures described in the vegetation restoration measure provided for in the **P.10 - Operation Biodiversity Management**, with the main activity being the mechanical removal or targeted application of herbicides to these invasive species.

The assessment of the need to restore the area should take into account the degree of infestation, the size of the area where the infestation was found, the current use and vegetation cover of the area and its surroundings, among other aspects. It should also involve the owners of the land where the infestation was observed, as it will depend on their authorisation for any intervention.

6. Performance Indicators

The following indicators are proposed to monitor the implementation of this Programme:

- Carry out 100% of the planned monitoring campaigns.
- Carry out 100% of the planned updates to the mapping of areas infested by invasive exotic species around the project's intervention areas.
- Reduction or eradication of invasive species in the areas most at risk.
- Reduction in the number of outbreaks in areas infested by invasive species.
- Reduction in the number of sources of propagules of these species on machinery and employees' clothing.

7. Reports and Documentation

A permanent channel for recording invasive species should be set up where employees can record the existence and infestation of these species in the project areas. In addition, a six-monthly report should be drawn up covering all the control activities carried out during the period, as well as monitoring the indicators indicated.

The report should be sent to the project's environmental supervision team, funding organisations (if they are interested) and environmental protection bodies involved in the project.

8. Schedule

The programme should begin its activities with the start of construction. The monitoring of exotic species should be carried out during operation, and its duration should be assessed by the team responsible for its implementation, based on a critical analysis of the results observed.

Regardless, the team responsible for maintaining the line must constantly check for new infestations. If new outbreaks are identified, the monitoring and eradication measures must be activated again.

P.09 - Landscape Protection Programme

1. Justification

The line will be built primarily using the 14-metre service lane. However, in some places where the terrain is not favourable, it will be necessary to open new accesses. The location and length of these new accesses has not yet been defined, but areas with low access capillarity and unfavourable terrain occur mainly in the Burigi-Chato National Park region.

In this area, the vegetation is mainly preserved. Considering the strong vocation for agriculture and livestock farming in the region, the opening of new accesses could facilitate the expansion of these activities into areas where they do not currently occur. It is therefore necessary to monitor whether the implementation of the project will lead to the expansion of anthropogenic areas or induce new conversions of native habitats.

2. Main Objectives

The main objectives area:

- Reduce deforestation and forest degradation, protecting natural areas and ecosystems.
- Check whether the implementation of the project is causing the expansion of anthropized areas.
- Identify and prevent illegal activities, informing the competent authorities whenever new deforestation is detected.

3. Applicable Legislation

National

- Protected Places and Areas Act (1969)
- The National Policies for National Parks in Tanzania (1994)
- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)

International

- World Bank Environmental and Social Standards (ESS) 6
- IFC Performance Standard 6

4. Responsibilities

TANESCO is responsible for the Programme and will have to allocate the financial and human resources needed to carry it out. Operation teams can help identify areas where there is evidence of new land conversion.

5. Methodology

5.1. Identification of Priority Areas for Monitoring

The first stage involves identifying priority stretches for monitoring. Stretches where anthropogenic occupation is already consolidated present a lower risk of new deforestation related to the implementation of the line, as land use is consolidated and the access network is already established. This situation occurs mainly along the 400 kV Nyakanazi – Ibadakuli TL.

The identification of priority stretches for monitoring should consider the following aspects:

- location of the new accesses
- land use and land cover around the new accesses. Areas with native vegetation cover within critical habitat should be prioritised for monitoring
- new accesses in or near protected areas should also be prioritised.

These sections should be identified as soon as the location of the new accesses is defined by the engineering team.

5.2. Monitoring of New Deforestation

Once the priority stretches have been defined, monitoring will be carried out through regular imaging using a drone. The drone to be used must be suitable for monitoring large areas, with ample flight autonomy, equipped with RGB sensors and high-resolution cameras.

In the first year after the line is built, overflights should be carried out every 3 months. In subsequent years, depending on the behaviour observed, the frequency of flights could be reduced to every six months. If any new deforestation is detected in the areas of the new accesses, the team should inform the competent authorities, stating the geographical coordinates and approximate size of the deforestation identified.

Additionally, as specified in the Operation Management Programme, for accesses in areas of greater risk to biodiversity, TANESCO should evaluate the possibility of not maintaining this access for maintenance of the TL, closing and recovering it, and checking another alternative form of access through areas of lower risk.

This monitoring should be included in the access control plan to be drawn up in the TANESCO environment.

6. Performance Indicators

The following indicators are proposed to monitor the implementation of this Programme:

- Number of priority areas identified
- Number of overflights carried out
- Number of new clearings identified
- Number of reports passed on to the responsible authorities

7. Reports and Documentation

Partial reports should be produced for each monitoring campaign, including at least the stretches monitored, whether new deforestation has been identified and the number of alerts made to the competent authorities.

8. Schedule

The programme should begin its activities at the end of the construction stage, as soon as the new open accesses are no longer used by the construction team. And continue during operation for at least one year. At the end of this period, the need for continued monitoring should be assessed on the basis of the frequency of new deforestation observed.

Regardless, the team responsible for maintaining the line must constantly check for new deforestations, and, if necessary, inform the competent authorities.

P.10 - Operation Biodiversity Management Programme

The operation of the line could cause biodiversity impacts, especially in relation to the risk of birds colliding with the line. The risk assessment presented identified the points and species most sensitive to this risk, which require monitoring to assess the significance of this risk and the need for mitigation measures.

The biodiversity management programme during the operation should also support the implementation of mitigation measures related to the recovery of degraded areas and areas where exotic species have been eradicated.

Therefore, the Operation Biodiversity Management is divided into three sub-programmes:

1. Subprogramme of bird collision monitoring
2. Subprogramme of fauna monitoring
3. Subprogramme of native vegetation restoration

P.10.1 – Subprogramme of Bird Collision Monitoring

1. Justification

The first studies to identify the interaction between birds and electrical structures as a problem for nature conservation emerged in the 1970s and 1980s, identifying collision and electrocution as the main problems. A third aspect of this interaction is the choice of these structures for nesting.

Most of the accidents and negative impacts of birds on TLs, as well as TLs on birds, are reported in continents such as Europe, North America and Africa, due to the large flow of migratory species such as geese, storks and cranes (SAVERENO *et al*., 1996; JENKINS *et al*., 2010).

As for the efficiency of using *bird signalling devices* on TLs, some studies have already presented some efficient mitigation alternatives, such as a prior study of the route, painted PVC spirals to avoid collisions, and different types of signalling devices, such as spirals, signs, flappers, swivels or spheres (JANNS & FERRER; 1998; BEAULAURIER; 1981; ALLONSO *et al.,* 1994; SAVERENO *et al.,* 1996; BERNARDINO *et al.,* 2018). Devices with reflective or glow-in-the-dark parts are becoming more prevalent (SPORER *et al*., 2013; BARRIENTOS *et al*., 2011). According to Martin (2011), current trends reflect the expectation that, based on what we know about bird vision, larger or closer markers, brighter and more contrasting-coloured markers, and those with movable components should be the most effective.

Despite the various types of signalling devices, there is little evidence for their comparative effectiveness. This is partly due to limited study designs, lack of publication of studies with negative conclusions and possible variations in the effectiveness of each type of signalling device depending on the species (BARRIENTOS *et al.,* 2011).

Most studies comparing different signalling devices have found inconclusive results. Some studies have managed to establish a correlation between TLs marked with flappers and large double spirals and the response of individuals of the *Canadian* crane species (*Antigone canadenses*), however other studies have shown contrary results in relation to the effectiveness of spiral devices, both in relation to their size and the colour of the spiral (CROWDER, 2000; VENTANA WILDELIFE SOCIETY, 2009; CALABUIG & FERRER, 2009).

In addition, aspects relating to the ideal spacing of signalling devices are even more imprecise than the efficiency of the devices types themselves, and there may be a tipping point below which the addition of more signalling devices improves mitigation and above which little additional benefit is obtained (SPORER *et al*., 2013; BARRIENTOS *et al.*, 2011; ANDERSON, 2002).

In this way, it can be said that bird signalling devices on TLs cables result in a reduction in the number of collisions. Still, the effectiveness of the device can vary, which will depend on various factors, such as the type of device, the spacing used between them, the surrounding environment, the phytophysiognomic type and degree of conservation of this environment, the geographical location, the relief, the atmospheric conditions, the seasonality, the lighting conditions and the bird community itself in the region. As such, there is still considerable uncertainty when choosing the most effective design and arrangement for each specific circumstance, which will only be resolved when further studies are carried out. A recent study compared three different devices to reduce birds' risk of collision with the cables. FERRER *et al*. (2020) compared the yellow spiral, orange spiral, and flapper, where the flapper flight diverter showed the best result with the highest reduction in mortality.

As for bats, the three main direct impacts that an TL can have on this group are: collision with cables and towers, electrocution and interference from electric and magnetic fields (AGWANDA, 2013). However, unlike birds, bats almost never collide with TLs, poles, towers or other static structures, and mortality in energy systems, although not fully understood, is commonly related to wind energy projects (LEDEC, 2012; ARNETT *et al*., 2008).

High-flying bats, especially aerial insectivores, would be the most susceptible to collisions with TLs cables. However, these animals have an echolocation system designed to capture prey and identify obstacles relatively early (FENTON, 1990), minimizing the risk of collision.

2. Main Objectives

The Subprogramme's objectives are:

- Identify along the route of the TL the areas of interest for winged fauna that harbour species with potential for collision;
- Qualitatively characterise the bird community of each monitored stretch;
- Classify the areas of interest to winged fauna in terms of their sensitivity to collision

events;

- Identify the species that interact with the TL and other structures;
- Identify the efficiency of the signalling devices on the monitoring stretches; and,
- Identify the impact of the TL and other structures on the bird and bat community.
- (FENTON, 1990), minimising the risk of collision.

3. Applicable Legislation

National

- Protected Places and Areas Act (1969)
- The National Policies for National Parks in Tanzania (1994)
- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)

International

- World Bank Environmental and Social Standards (ESS) 6
- IFC Performance Standard 6

4. Responsibilities

TANESCO is responsible for the Subprogramme and must allocate the financial and human resources necessary for its implementation. It must therefore hire a team of ornithologists and mastozoologists to carry out the Subprogramme.

5. Methodology

Monitoring of winged fauna will be carried out using the following methodologies: observation census and collision estimation. To carry out this monitoring, the stretches with the greatest potential for collision indicated in the bird collision risk analysis **Section 8.2.4.2** were chosen.

According to the analysis indicated, the stretches located at the fauna sampling points during the baseline named BS1, BS8 and BS9 are the areas with the greatest potential risk for birds (see **Section 8.2.4.2** for details of the bird collision risk analysis). The following **Table 5.a** shows the locations and physiognomies of these winged fauna monitoring points.

Table 5.a of P.10.1
Winged fauna monitoring points during operation

Area	Coordinates UTM	Phytophysiomies
BS1	36 M 334614 9876670	Wooded grassland
BS8	36 M 358814 9632825	Miombo Woodland
BS9	36 M 461492 9635551	Shrubland Thickets

Although the risk analysis points to these three priorities stretches, the entire route of the TL will have to be assessed before operations begin to determine whether there will be a need for stretches in other environments. The focus of this analysis will be environments with alluvial influence, areas of forest vegetation and places with conglomerations of semi-aquatic or larger birds, etc.

Bird signalling devices should be installed on the segments considered to be mo.st at risk, as indicated in Table 5.a above, based on the collision risk analysis (**Section 8.2.4.2**, item 17.02 of the ESIA). For the stretches considered to be control stretches, stretches should be selected on the existing LTs around the project where there is no collision avoidance equipment installed. The monitoring methods are detailed below.

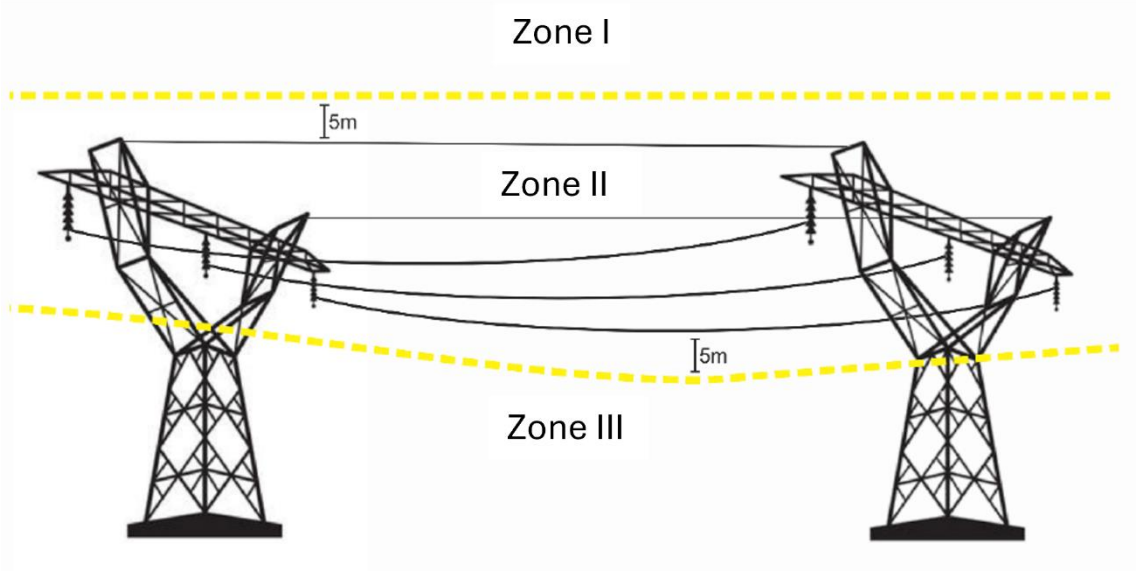
Observation Census

Bird flight observation should be carried out in two shifts, from sunrise to mid-morning and from mid-afternoon to sunset. In each of the chosen stretch (with and without signalling devices), the specialist will remain for 60 minutes near one of the towers, taking note of the species of birds and the types of interactions with the cables of the TL with the aid of a pair of 10x42 binoculars. In this way, it will be possible to observe up to 4 stretches per day, taking into account displacement and logistics.

For each flight interaction with the TL, the risk of collision will be assessed using two variables: a) distance of the flight in relation to the set of cables on the TL; and b) position of the flight transposing the TL (**Figure 5.a**). The distance variable will be classified according to whether the bird crosses the TL inside or outside an imaginary zone with a risk distance of five metres around the cables, both above and below them. This is an intermediate distance compared to that adopted in other studies (three metres in SAVERENO *et al*., 1996 and ten metres in DE LA ZERDA *et al*., 2003). Flights within the risk distance will be considered more dangerous for the birds, due to their proximity to the cables. The flight position variable will be categorised into three positions: I = above the cables; II = between the cables and III = below the cables. Of the three flight positions, position II represents the greatest risk of collision for birds (SAVERENO *et al.*, 1996) and bats.

It is worth emphasising that the methodologies described here will not involve any management of bird or bat species. The methodologies applied are aimed solely at non-invasive recording through visual censuses, without the need to capture, handle or transport wildlife specimens.

Figure 5.a of P.10.1
Schematic example of the delimitation of the imaginary line 5 metres down from the conductor cables and 5 metres up from the lightning cables and the zones that categorise the three flight variations



Source: Rialma (2021).

Therefore, in each monitoring area, i.e. the area chosen with a signalling device and without a signalling device, the census by observation methodology should be carried out. It should be noted that this methodology will only be used with birds, as it will be possible to visualise the interaction of birds between the cables and towers, and the greatest bat activity occurs at night.

As for the signalling devices (**Figures 5.b** and **5.c**), the ones known as fireflies can be used, also installed on phase conductors and protection cables, which can be differentiated into two categories: rotating type (Firefly Bird Flapper - FBF) and ribbon/spiral type. FBFs have the particularity of lighting up and reflecting ultraviolet radiation and visible light during the day and night (up to 10 hours). The ribbon types have two photoluminescent and retroreflective plates. Ferrer *et al*. (2020) compared the spiral type (yellow and orange) and the flapper, where they observed that the flapper flight diverter was responsible for a 70.2% lower average bird mortality rate.

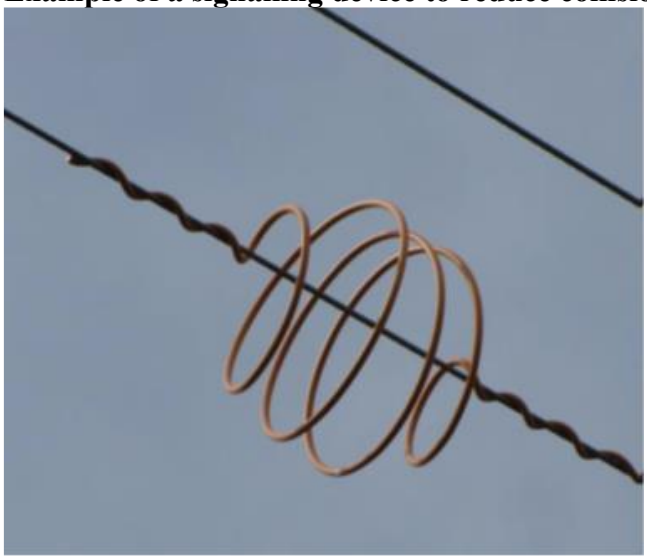
Studies on the mitigation of impacts of power lines on birds have been known for a long time. Janns & Ferrer (1998), mapping some power lines, concluded that a preliminary study of the route and the right choice of route can significantly reduce the potential for collision. Bevanger & Broseth (2001), studying the impact of birds on 300, 66 and 22 kV lines, concluded that removing lightning arresters would reduce bird deaths by more than 50% in relation to collisions. These authors believe that the development of technologies that allow the suppression of these cables is urgent. This result was also achieved by Raab *et al*. (2012) in Austria and Hungary. Beaulaurier (1981) summarised the results of 17 studies involving markers on wires or conductors and found an average reduction in bird mortality of 45% compared to unmarked lines. In addition, he recorded an average

reduction in collision rates of 48% when lightning conductors were removed. This study suggests that marking and removing lightning conductors appears to be equally effective in mitigating bird collisions. However, removing lightning conductors can cause electrical problems for line reliability and system operation, so marking is probably the best way to reduce bird mortality on power lines.

Alonso *et al.* (1994) clearly demonstrated the effectiveness of painted PVC spirals in preventing collisions. These authors carefully compared collisions and evasive behaviour of birds crossing 380 kV transmission lines in marked and unmarked segments. Their results pointed to a reduction of more than 60% in flight intensity and collision frequency after the installation of markers. This method was confirmed by Savereno *et al.* (1996) in South Carolina/USA with similar efficiency, confirming the effectiveness of the method. Janns & Ferrer (1998) used three models of markers on different types of power lines, in which the use of spiral warning devices reduced the number of collisions, black transverse stripes were effective for birds, with the exception of one species (*Otis tarda*), and the third type of warning device, which consisted of long, thin stripes, did not reduce bird mortality.

Bernardino *et al.* (2018) compiled and analysed several studies focusing on bird collisions with power transmission lines. This compilation resulted in a survey of 191 studies published between 1971 and 2016. They found that spiral, plate, flapper, spinning, or ball markers have been the most common mitigation measure used to reduce bird collisions with power transmission lines. Furthermore, devices with reflective or glow-in-the-dark parts are becoming more prevalent, while the aviation balls used in early signalling experiments are generally being phased out (MURPHY *et al*., 2016; SPORER *et al*., 2013; BARRIENTOS *et al*., 2011). According to Martin (2011), current trends reflect the expectation that, based on what we know about bird vision, larger or closer markers, brighter and more contrasting colours, and those with moving components should be the most effective.

Figure 5.b of P.10.1
Example of a signalling device to reduce collisions with birds



Source: *Avian Power Line Interaction Committee* (APLIC, 2012)

Figure 5.c of P.10.1
Examples of pendant devices that can be used to divert birds

Source: *Avian Power Line Interaction Committee* (APLIC, 2012)

Collision estimation

Whether through collisions or electrocution, this analysis aims to verify the direct impact of TLs on the behaviour of species. In this way, the area below the TL will be searched for the carcasses of collided birds and bats. This methodology will be carried out by two field researchers, each of whom will search for carcasses for 30 minutes on each side and then reverse the sides of the search, where they will again search for another 30 minutes (**Figure 5.d**).

All bird and bat remains (groups of feathers, bones or whole carcasses) found will be considered the result of collisions, as will dying individuals. Similar remains (feathers attributable to the same species) found under the same stretch will be attributed to the same individual, unless the total count indicates that more than one individual has been found.

When a trace is found, the necessary information should be noted on the forms, which will be compiled in a single electronic spreadsheet so that a standard database can be fed (geographical coordinates, taxonomic data, date, time, environment of the collision or electrocution site and annotation of the photographic record). All the remains found will then be removed from the site during the sampling period, avoiding overestimating the number of collisions by double counting the same remains in subsequent campaigns.

Figure 5.d of P.10.1
Schematic example of the search for carcasses in the TL

Source: Rialma (2021).

Bird Collision Risk Analysis

The search for and discovery of carcasses or dying birds in the field will be subject to certain sources of error (DE LA ZERDA & ROSSELLI, 2003; JOHNSON *et al*., 2002), which generate sampling errors. These errors can be classified into four types, according to the following provisions:

Search error (SE)

The structure of the habitat, among other factors, alters the observer's ability to find carcasses. Thus, it is likely that the number of winged specimen bodies found by a given technician will be lower than the actual number of bodies present in the area. Therefore, the objective of this search experiment is to evaluate the observer's efficiency in detecting carcasses on the ground under the transmission line.

This search error (SE) is calculated through an experiment in which a predetermined number of carcasses (N=10) are randomly scattered throughout the sample area and then located in a single review by a second technician (KERNS & KELINGER, 2004). If no carcasses from collisions are found in the field, domestic bird carcasses found at markets or aviaries should be used. The difference between the number of carcasses placed and the number of carcasses found provides the individual SE for each researcher, calculated using the following formula:

SE = (TN/PEC) – TN

SE = search error;
TN = is the total number of dead individuals found at the end of each seasonal sampling;
PEC = is the proportion of experimental carcasses found by the technician (expressed

from 0 to 1); and given this scope, it is important to use 10 samples of whole and partial carcasses (feathers, bones, carcasses, etc.) to test for search error.

Removal error (RE)

Moribund individuals and carcasses can be completely eliminated by various carnivorous animals (whether predators or scavengers), causing the actual number of animals impacted by TL to be underestimated (FERRER *et al*., 1991). Therefore, to determine the degree of removal by carnivores, an experiment will be conducted with domestic bird carcasses; 20 carcasses will be used and reviewed after 24 hours, representing the cycle of activities and temporal replacement of different carnivores throughout the day (morning, daytime, dusk, night).Thus, the proportional value is calculated by dividing the original number of carcasses by the number remaining at the end of the experiment, corresponding to the removal error or RE, which will be used to estimate the absolute number of birds affected by TL, according to the formula:

RE = (TN + SE)/PNR - (TN + SE),

RE = corresponds to the removal error by carnivores;
PNR = proportion of carcasses not removed by carnivores (expressed from 0 to 1) at the end of the experiment (24 hours after the carcasses were placed).
SE = search error;
TN = total number of dead individuals

Physiognomy error (PE)

This correction method will be applied in locations with dense vegetation or bodies of water, corresponding to the proportion of the difference between the total sampled area and the area that can be sampled, excluding those where the terrain or vegetation makes inspection impossible. It is governed by the following formula:

PE = (TN + SE + RE) / PPS (TN + SE + RE)

PE = corresponds to the physiognomy error;
PPS = + corresponds to the proportion of physiognomy sampled (expressed from 0 to 1).
SE = search error;
RE = removal error;
TN = total number of dead individuals.

Escape error (EE)

Some individuals may collide with the TL structures and not fall immediately to the ground, moving to areas where they will not be sampled (DE LA ZERDA & ROSSELLI, 2003). Others may fall within the sampling area but move along the ground outside the sampling area. This error is called the escape error (EE) and is given by the percentage of individuals that collide with the lines but continue flying or walking outside the sampling area. Thus, EE is calculated by direct observation of birds that collide and the proportion

of those that did not fall within the carcass search area, using the following formula:

EE = (TN + SE + RE + PE) / PBHF - (TN + SE + RE + PE)

EE = corresponds to the escape error;
PBHF = is the proportion of birds hit that fell within the sampling area, expressed from 0 to 1.
SE = search error;
RE = removal error;
PE = physiognomy error
TN = total number of dead individuals.

Total collision estimate (TNC)

The total number of collisions (TNC) will be calculated by adding each of the error estimates mentioned above to the total number of birds collided with found by the search method, according to the formula:

TNC = TN + SE + RE + EE.

6. Performance Indicators

The following are indicators of the Subprogramme's effectiveness:

- Length of the TL displaced in search of areas of interest to birds and their determination;
- Number of ornithological communities characterised by the number of stretches monitored; and,
- Number of stretches of the TL with signalling devices by the number of stretches of the TL with significant potential for collision.

7. Reports and Documentation

For each campaign to monitor collisions with winged fauna, a report should be issued containing information on species (richness), abundance, determination of species considered sensitive, threatened and endemic. Field records, including the efficiency of the signalling devices and the collision rate of birds and bats. For bats, information should be provided on whether there was a collision with cables/towers or by barotrauma. All reports must contain photographic records of the fauna monitoring areas, methodologies, results, photographic records and the raw data spreadsheet (excel table). A consolidation report must be drawn up annually. The campaigns will take place every four months.

8. Schedule

The programme will begin during the LT operation phase. Monitoring will be carried out for at least 3 consecutive years. After this period, an assessment should be made of the effectiveness of continuing the monitoring. The analysis should be carried out by the team

of specialists responsible for the monitoring, and based on the results obtained to date.

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P.10.2 – Subprogramme of Bioindicator Fauna Monitoring During Operation

1. Justification

Fauna monitoring is of fundamental importance in natural areas that will suffer from the implementation of linear structures, and especially in regions where migrations of large mammals and birds are recorded. Therefore, monitoring these groups means keeping track of ecological fluctuations in local biodiversity, using key groups of bioindicator species and thus assessing the negative effects of the construction work on these animals in the medium to long term.

Medium-sized and large mammals are more affected by habitat loss and fragmentation, as they depend on large areas to maintain healthy populations. In a review of the susceptibility of Tanzania's large terrestrial mammals to changes in their environment, whether in relation to climate change or even the species most sensitive to environmental changes of other kinds, they listed a series of mammals that can be considered as bioindicators of changes in their habitats (Shilla, 2014).The main species considered as bioindicators are the hippopotamus (*Hippopotamus amphibius*), waterbuck (*Kobus ellipsiprymnus*), african elephant (*Loxodanta africana*) and wildebeest (*Connochaetes taurinus*), in addition to these main species, the rhinoceros (*Diceros bicornis*), wild dogs (*Lycaon pictus*), buffalo *(Syncerus caffer*), lion (*Panthera leo*), African leopard (*Panthera parduspardus*) e cheetah (*Acinonyx jubatus*) can also be considered as indicator species of environmental quality, as they are sensitive to changes in their habitats (ELTRINGHAM, 1979; SINCLAIR, 2003; VIE *et al*. 2009; HERLEY, 2011). In this sense, the monitoring of large mammal species is necessary in order to ensure that their populations are monitored in the face of the development.

Birds, on the other hand, have several representatives that are sensitive to environmental changes (Stotz et *al.*, 1996) and have known taxonomy, endangered species (IUCN, 2024 and CITES, 2024), rare and endemic species; informing monitoring of environmental changes for more critical species. (VERNER, 1981; COELHO *et al*., 2016; TEIXEIRA & CARLOS, 2023; BALTZER *et al.*, 2010; WOTTON *et al*., 2020). Por essas características, são amplamente utilizadas em levantamentos e monitoramentos ambientais, uma vez que impactos decorrentes de empreendimentos afetam diretamente suas comunidades, sobretudo as espécies mais especializadas e sensíveis (VIELLIARD *et al*., 2010). Em áreas em processo de restauração, por exemplo, a presença de espécies florestais, frugívoras e insetívoras de sub-bosque é um indicativo de avanço sucessional e de recuperação ecológica (VOLPATO *et al*., 2018; GIACOMINI, 2024). Já em paisagens fragmentadas, observa-se um comprometimento do equilíbrio ecológico, com a redução de populações de aves sensíveis às alterações no habitat, como as insetívoras de sub-bosque, notoriamente intolerantes a variações microclimáticas de temperatura e umidade que ocorrem fora de ambientes florestais bem conservados (STOUFFER & BIERREGAARD-JR, 2010). Em ambientes aquáticos, tanto continentais quanto marinhos, diversas espécies atuam como indicadoras da qualidade da água, especialmente em relação à contaminação por metais pesados. Aves marinhas, por sua vez, estão fortemente associadas à produtividade oceânica, podendo refletir a disponibilidade de recursos pesqueiros e a presença de poluentes orgânicos persistentes (FIGUEROLA &

GREEN, 2003; BARRETO, 2013; ESTRADA-GUERRERO & SOLER-TOVAR, 2014).

Therefore, monitoring the groups listed above will make it possible to characterise the local fauna as a whole, allowing us to infer the negative impacts of the implementation of the TL on the biota.

2. Main Objectives

This Subprogramme has the following objectives:

- Monitor the abundance and richness of species.
- Identify possible population fluctuations of bioindicator fauna groups (birds and medium and large mammals).
- To identify species that are sensitive to environmental changes and are considered environmental bioindicators.
- To identify the influence of human activity in the region on the faunal groups monitored.

3. Applicable Legislation

National

- Protected Places and Areas Act (1969)
- The National Policies for National Parks in Tanzania (1994)
- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)

International

- World Bank Environmental and Social Standards (ESS) 6
- IFC Performance Standard 6

4. Responsibilities

TANESCO is responsible for the Subprogramme and will have to allocate the financial and human resources needed to carry it out. It must therefore hire a team of ornithologists, mastozoologists and herpetologists to carry out the programme.

5. Methodology

Fauna monitoring will include mastofauna (medium and large mammals) birds.

Monitoring will be carried out in four sampling areas: BS1, BS2, BS5 and BS6. These are shown in **Table 5.a** below:

Table 5.a of P.10.2
Biodiversity sampling points where fauna will be monitored during construction and operation

Biodiversity Sampling point	Coordinates (UTM, 36S, WGS84)	Phytophysiognomy
BS1	36 M 334614 9876670	Wooded grassland
BS2	36 M 309059 9851758	Evergreen dry forest
BS5	36 M 301705 9672599	Open Miombo Woodland
BS6	36 M 278828 9752758	Savana Woodland

In addition to the areas detailed above, sampling points will also be implemented in the target areas for habitat restoration (Programme P.05).

The sampling methodology for each group is presented below:

Mastofauna

Medium and Large Mammals

As the majority of medium and large mammal species can be identified in the field, invasive methods should not be used for monitoring. In this case, direct and indirect observation methods (Visual Census by Transect), camera traps and third-party information collection will be used.

- Transect Census - this methodology will take into account the existing trails in each sampling area. Censuses will be carried out from 7.30am until 11.30am and at the end of the day from 5.30pm until 6.30pm, totalling approximately 5 hours of searching per day. This methodology will take into account indirect records such as faeces, carcasses, signs of marking, fur and footprints, as well as visual records using binoculars and a telezoom camera. It should be noted that the records obtained from car journeys on the trails and main roads will also be taken into account in this methodology;
- Camera traps - 4 camera traps will be installed in each sampling area at a location chosen by the researcher. The locations for the camera traps will be selected taking into account the environments and the traces of medium and large mammals. To this end, priority will be given to natural trails and paths used by the target species, in order to maximize the result of photographic captures. In each area, the camera traps will have to remain active for 2 days and when considering the four monitoring areas, the sampling effort will be 32 camera traps/campaign (2 days x 4 cameras x 4 areas);
- Third Party Collections - This method will consist of records brought in by members of other teams and local residents. Although third-party data will not be used in statistical analyses, this method will allow species to be added to the list of local richness.

Birds

Two methods will be used to monitor terrestrial avifauna: transect census and mist nets.

- Transect Census - this consists of recording all the birds seen or heard as the observer walks along the transect of each sampling area. This method makes it possible to record birds in places where the visual and auditory field of the static observer would not reach. For this method, the observer will walk along the main trail of each sampling area and will identify the acoustic and visual recordings. In the event of doubtful identification, the play-back method will be used to attract territorial birds. The census per transect will be carried out at a speed of approximately 1 km/h in the early hours of the morning, from 07:00 until 11:00 and then at the end of the day, from 17:30 until 18:30, totalling 5 hours per day. Taking into account the four sampling areas, number of days and hours, the sampling effort will be 20 hours/campaign (4 areas x 5 hours);
- Mist nets - three (3) mist nets measuring 12 m x 2.5 m will be installed and kept open from 7am until 11am and at the end of the day from 5pm until 6pm, totalling around 5 hours of mist netting per day. The nets were inspected every 50 minutes. The mist nets must remain open for two days in each area.

6. Performance Indicators

The following are indicators of the Subprogramme's effectiveness:

- Number of records of endangered and endemic species;
- Number of environmental bioindicator species;
- Number of new records of extension of distributions in the monitoring zones; and,
- Increase in the accumulation curve in each campaign and their stabilisation.

7. Reports and Documentation

For each campaign, a report should be issued containing information on species (richness), abundance, determination of species considered sensitive, threatened and endemic. All reports must contain photographic records of the fauna monitoring areas, methodologies, results, photographic records and the raw data spreadsheet. A consolidation report should be drawn up annually.

8. Schedule

The campaigns will begin during the construction phase and continue during the operation phase for an initial period of 5 years. The campaigns will be carried out every four months. At the end of this period, a critical analysis of the data should be made and the continuity of monitoring should be assessed in conjunction with the team responsible for the BMP and the P.05 - Biodiversity Offset Plan.

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P.10.3 – Subprogramme of Native Vegetation Restoration

1. Justification

The suppression of native vegetation for the implementation of the TL may imply not only a reduction in vegetation cover in the region of the development, but also the loss of local floristic diversity and indirect impacts on the adjacent vegetation intercepted by it. In addition, vegetation clearing activities will cause habitat fragmentation, leading to the appearance of edge effects, which will need to be minimised to avoid further degradation of the remaining vegetation.

Thus, the implementation of the project will require the recovery of degraded areas and native habitats, both those degraded as a result of the implementation of the project and for the offsetting of the project's biodiversity.

2. Main Objectives

The Subprogramme's objectives include:

- Minimising the effects of degradation of the remaining vegetation.
- Promoting the recovery of areas degraded by the works, and other degraded areas, as a way of offsetting the impacts on biodiversity and ecosystem services.
- Present guidelines for the preparation of executive projects for the recovery of degraded areas.

3. Applicable Legislation

National

- Protected Places and Areas Act (1969)
- The National Policies for National Parks in Tanzania (1994)
- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)

International

- World Bank Environmental and Social Standards (ESS) 6
- IFC Performance Standard 6

4. Responsibilities

TANESCO is responsible for the Subprogramme and must allocate the financial and human resources necessary for its implementation. TANESCO will have the support of:

- Specialists responsible for drawing up the specific restoration projects.
- A Cadastre Team to obtain the necessary authorisations from the landowners.
- An execution team made up of forestry engineers, biologists and field assistants.

5. Methodology

Edge protection of remnants of native vegetation

The remnants of native vegetation should be inspected periodically, in conjunction with the surveys to be carried out to identify the invasion of exotic species, to assess the edge effects caused by the clearing of vegetation for the installation of the Project.

The surveys should identify the sites most sensitive to impact, based on the structural characteristics of the remaining vegetation, the situation of the surroundings (more fragmented areas are likely to have more significant edge effects) and location in relation to sensitive areas (such as protected areas and critical habitats). These sites should be delimited and vegetation restoration carried out at the edge of the fragment, using one of the methods described below.

Invasive plant removal

The need to implement eradication and control actions, as well as which ones will be applied, should be assessed on a case-by-case basis during monitoring, depending on the invasion situation and the degree of dispersal evidenced. Eradication actions may include the following (ICMBio, 2023; BUISSON *et al*., 2018):

Manual control: isolated plants or small populations that have not yet reproduced can be uprooted manually, by weeding or manual uprooting. The operation should be monitored and repeated until the seed bank is exhausted. If you notice that there has already been seed production on the site, it is recommended not to uproot, as the seeds can be brought to the surface and germinate.

Chemical control: Some plants break easily, making uprooting inefficient because the root system remains in the soil. In these cases, foliar spraying of a glyphosate-based herbicide at a dilution of 2% for small grasses and 3% for larger grasses is most effective. In the case of tall grasses, mowing should be carried out at the base and subsequent foliar spraying on young leaves 20-30 cm high after regrowth and always before they reach the reproductive period. In areas of high environmental fragility, such as wetlands, the use of a chemical broom is an interesting alternative, as it practically cancels out the risk of the herbicide coming into contact with the soil or water (PEREZ, 2008 *apud* ICMBio, 2023). It should be noted that the use of chemical controls must be preceded by obtaining the necessary authorisations from the environmental agencies responsible.

Control by burning: The use of fire (prescribed burning) can also be considered, usually in combination with chemical or mechanical control of grasses that regrow after burning. The guidelines for controlled burning are presented below (direct sowing).

Management of natural regeneration

This technique is recommended for sites with high regeneration potential, high plant density of regenerating native species and proximity to remnants of native vegetation. It consists of allowing natural processes to act freely so that recomposition can take place and only carrying out management to control degradation factors, such as: the occurrence of invasive species, isolating the area using fences, building/maintaining firebreaks and tracks. Management is restricted to eliminating or mitigating the factors that prevent regeneration (VIEIRA *et al.*, 2018; SAMPAIO *et al.*, 2019; SKORUPA *et al.*, 2021).

Total Area Planting (Seedlings and Direct Seeding)

Total area planting is indicated for sites with low natural regeneration potential, where several major intervention activities will have to be carried out in order to restore native vegetation. This requires pre-planting activities (isolating the area, fire prevention, soil preparation, control of leaf-cutting ants and invasive plants, erosion control and soil fertility correction), planting (seedlings or direct seeding) and post-planting (maintenance, control of degradation effects and monitoring).

For restoring forest areas, planting seedlings has been favoured. In savannah and grassland areas, direct seeding has been used (SAMPAIO *et al.*, 2015; VIEIRA *et al.*,2020; BUISSON *et al*., 2018).

Direct Seeding

Direct seeding is a restoration technique in which seeds are planted directly into the soil. With this technique, the plants germinate, establish themselves and always grow in the conditions of the planting site.

In direct seeding, a large number of seeds are used, as not all of them germinate. According to Sampaio *et al.* (2015), this technique is recommended for areas that have been cleared for agriculture and pasture and are dominated by invasive exotic grasses.

To implement this methodology, seed management is essential. Due to the difficulty in obtaining inputs, seeds can be collected (preferably from grass and shrub species), processed and stored. It is recommended to seek technical and scientific partnerships with recognised technical bodies (*e.g.* Embrapa Cerrados), and to seek specific technical advice for this activity.

The areas to be restored using direct sowing can be mechanised, which means that installation and maintenance costs are low. It is also a technique that is widely recommended for restoring grassland and savannah physiognomies.

The steps involved in implementing direct seeding through no-till are: soil preparation, fertilisation, planting, management and monitoring.

Preparing the soil is a very important stage, because as well as making the substrate ready for sowing, it has the function of eliminating invasive species. The recommended form of soil preparation is a combination of controlled burning and harrowing. The use of controlled burning should be planned and carried out before the vegetation dries out completely. Burning should be carried out in the late afternoon and early evening, when the temperature tends to drop and the humidity rises, making it easier to control the fire.

After burning the area, the soil should be harrowed to break up the roots of the exotic grasses and break up the clods. This activity should be repeated, as harrowing the soil only once will promote seed germination. Before planting, the soil should be harrowed again to further reduce the exotic grasses and finish preparing the soil with a levelling harrow. As the seeds of the native herbaceous species to be planted are very small, it is important that the soil is loosened and levelled for better germination. This activity should be carried out during the dry season to better control exotic species. According to the areas to receive this activity in this project, it should first be carried out from the lowest level of the land and following the contour line to avoid problems with soil erosion.

It is not recommended to fertilise the area where the direct sowing will take place, as this allows the exotic grasses to benefit from the fertiliser and grow faster than the native species. It is recommended that the area is ready for seeding at the start of the region's rains.

Planting Seedlings

This technique can be used alone or in combination with the other techniques proposed here for restoring the shrub and tree layer. The planting of seedlings should take place respecting a similar distribution between slower-growing species and fast-growing species. The planting of zoochoric species is fundamental so that spontaneous species emerge more easily due to the visitation of these areas by fauna (DURIGAN, 2011).

Prior to planting, it is recommended that the planting cradle be prepared using organic fertilisers and hydrogel. The seedlings should be placed in this cradle, and soon after planting a layer of burlap should be laid down to protect the soil; if possible, the seedlings should be irrigated soon after planting (DURIGAN, 2011).

Planting should be carried out at the beginning of the rainy season, preferably just after the first heavy rain. In addition, periodic maintenance activities should be carried out just before and at the end of the rainy season:

- Fertilising with an agronomic prescription at the start of the rainy season;
- Control of leaf-cutting ants as long as they attack small seedlings;
- Manual control of scrub competition, especially by fast-growing grasses and herbs that provide a layer of leaf litter (DURIGAN, 2011).

The species selected should give priority to those indicated in the P.07 - Flora Rescue and Relocation Programme and, if possible, from the rescued material itself.

For forested areas, planting at a spacing of 3m x 3m or less is recommended, while for areas of tree and shrub formation, denser planting in denser islands is recommended.

Control and maintenance measures for areas undergoing restoration

According to Sousa & Vieira (2017), ecological indicators (ground cover with native vegetation, density of regenerating native individuals and number of native species) should be monitored in order to assess the sustainability of native vegetation restoration areas. To collect data on these ecological indicators, sampling will be carried out in the focus areas using permanent sample plots measuring 25m x 4m (100 m^2). In small areas (where it is not possible to install sample plots) data will have to be collected on the total area for the ecological indicators (density of regenerating native individuals and number of regenerating native species) and 5 sampling lines up to 25 metres long will have to be installed to survey the indicator of ground cover with native vegetation.

To set up the sample plots, we recommend using a tape measure and wooden stakes and/or PVC pipes. The geographical coordinates of the beginning and end of each sample plot should be recorded using GPS. In addition, the data collection should be carried out by a team made up of a specialised professional (biologist, forestry engineer, agronomist or another related field) and a field assistant. It is estimated that 10 field days will be required to carry out the monitoring data collection.

Sampling of the ecological indicator (ground cover with native vegetation) will be carried out using the interception method every metre along the central axis of the sample plots, totalling 26 points/installed sample plot. For forest formations, information will be collected on crown cover (above 2 metres) and for savannah formations, ground cover will be sampled.

Sampling of the ecological indicator (density of native regenerants) will be estimated by counting native trees and shrubs that are regenerating and perennial within the sample plot. Regenerants are considered to be woody individuals of native species with a height ≥ 0.3 m and ≤ 2 m.

Sampling of the ecological indicator (number of regenerating native species) will be carried out by counting the species of native evergreen, regenerating and non-regenerating trees and shrubs contained within the sample plots.

The ecological indicators to be measured include the percentage of vegetation cover, the density of native regenerants and the number of native woody species (richness).

6. Performance Indicators

The Subprogramme's indicators are:

- Carrying out 100% of the vegetation restoration defined;
- Meeting restoration criteria considered satisfactory for the recomposition areas, such as:
  - Control or eradication of invasive exotic species;
  - Restoration by covering the entire area with native species;
  - Good development of seedlings and/or natural regeneration of the shrub and tree stratum, meeting diversity and density criteria similar to those obtained in the ESIA phytosociological survey.
  - In the case of planting seedlings, mortality must be less than 10% 2 years after planting.

7. Reports and Documentation

Periodic reports should be drawn up for each monitoring event, to be finalised within one month of the end of field activities. The periodic reports should include

- Period during which the activities were carried out
- Methodology
- Activities carried out during the period
- Discussion of results
- Conclusions and follow-up recommendations, if necessary
- Proposed corrective measures, if necessary

Consolidated annual reports should also be generated, including a critical analysis of the accumulated results, evaluation of the restoration indicators, discussion of the effectiveness of the measures carried out, corrective measures required, conclusions and follow-up recommendations.

8. Schedule

Restoration actions must be implemented in line with the objective of the measure:

- Actions to restore areas temporarily degraded by the works should be recovered at the end of construction.
- Actions to restore the edge of remaining vegetation should begin during the operational stage. A detailed schedule should be drawn up following the verification surveys to be carried out, in conjunction with the P.08 - Invasive Species Control Programme.
- Actions to restore degraded areas as a biodiversity offset should follow the deadlines established in the P.05 - Biodiversity Offset Plan.

In the case of monitoring restoration areas, this should take place until the restoration is considered satisfactory by experts in the field (biologists, forest engineers, agronomists, among others).

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P.11 – Flora Active Search Programme

1. Justification

According to the critical habitat assessment carried out (**Section 7.2.4** of the ESIA) there are 12 priority biodiversity values (PBV) that triggered critical habitat in the project region, considering the entire Indirect Area of Influence (see **Chapter 7.0** of the ESIA for details). Although 12 PBV triggered critical habitat, the project will directly intercept the critical habitat of only 2 PBV, the elephant *L. africana* and the wildlife corridor. Other biodiversity trigger values include: (i) the Lake Burigi, trigger for criterion 'c', also not intercepted; (ii) two species of fauna, the pangolin *P. tricuspis* and the primate *P. tephrosceles*, both do not occur in the Directly Affected Area, according to the IUCN geographical range (for *P. tephrosceles*) and the primary data collected (for *P. tricuspis* and *P. tephrosceles*); and (iii) seven flora species that were included in the analysis through secondary information, there is no evidence of records of these species in the project's DAA and the project will not directly intercept the critical habitat delimited for them.

For the CH trigger flora species, although it is understood that there is no direct impact on their population since there is no evidence of their presence in the directly affected area, there is a potential risk, due to uncertainties regarding their population and distribution and the existence of phytophysiognomies that could harbour these species.

Experts were consulted during the development of the ESIA to verify more up-to-date and accurate information on these species, and all of them affirmed that the known records for these species are those available in the herbaria and publications consulted, and more precise data on their presence in the project's DAA would require a more intensive search in the field.

Therefore, to avoid any potential impact on the population of these species, an active search in certain stretches should be carried out prior to any vegetation clearing.

2. Main Objectives

The main objectives area:

- Verify the presence of the seven flora trigger species in the area directly affected by the project.
- In case individuals of these species are evidenced, refine the executive project (fine-tunning) to avoid potential impacts on the population of these species.

3. Applicable Legislation

National

- Protected Places and Areas Act (1969)
- The National Policies for National Parks in Tanzania (1994)

- Plant Protection Act (1997)
- National Forestry Policy (1998)
- The Forest Act No. 14 (2002)
- The Environment Management Act (2004)
- The Wildlife Policy of Tanzania (2007)
- Wildlife Conservation Act, No. 5 (2009)
- National Environmental Policy (2021)

International

- World Bank Environmental and Social Standards (ESS) 6
- IFC Performance Standard 6

4. Responsibilities

TANESCO is responsible for the Programme and will have to allocate the financial and human resources needed to carry it out. For this task, TANESCO should hire consultants specialising in East African flora to carry out the field work, support the engineering team in re-designing the project and develop offset measures, if necessary.

5. Methodology

5.1. Target flora species

Table 5.1.a details the seven flora trigger species that are the target species for the search. The orange lines highlight those most likely to occur in the project's DAA, according to the existing records.

Table 5.1.a of P.11
Target flora species for active search in the project's DAA

Family	Species	Distribution	Habitat of occurrence (according to IUCN)	IUCN Category	Observations
Acanthaceae	*Thunbergia laborans*	This species is native to Rwanda and Tanzania where it is found between 1,150–1,550 m asl.	Woodland, bushland and roadsides.	EN	Unprotected localities in rural areas of Biharamulo, Musoma, and Sengerema Districts. There is one record in Kyebitembe, Muleba, near a rural road, about 6 km away from the B8 road.
Asteraceae	*Emilia cryptantha*	Emilia cryptantha is endemic to S Uganda and NW Tanzania.	Sswamp grassland	EN	The only known records in Tanzania are in unprotected localities near Kitwe and Bugandika in the rural area of Bukoba.
Asteraceae	*Vernonia tinctosetosa*	Endemic to northwest Tanzania and southwest Uganda.	Wetland areas on sandy lake	EN	The only known record in Tanzania is in the Bukoba, close to the urban area.
Dennstaedtiaceae	*Blotiella trichosora*	The species occurs in Burundi, Tanzania and Uganda.	Semideciduous moist forest, swamps	EN	The Minziro region is an important site for this species' population (Luke et al., 2024). There are two other records in the

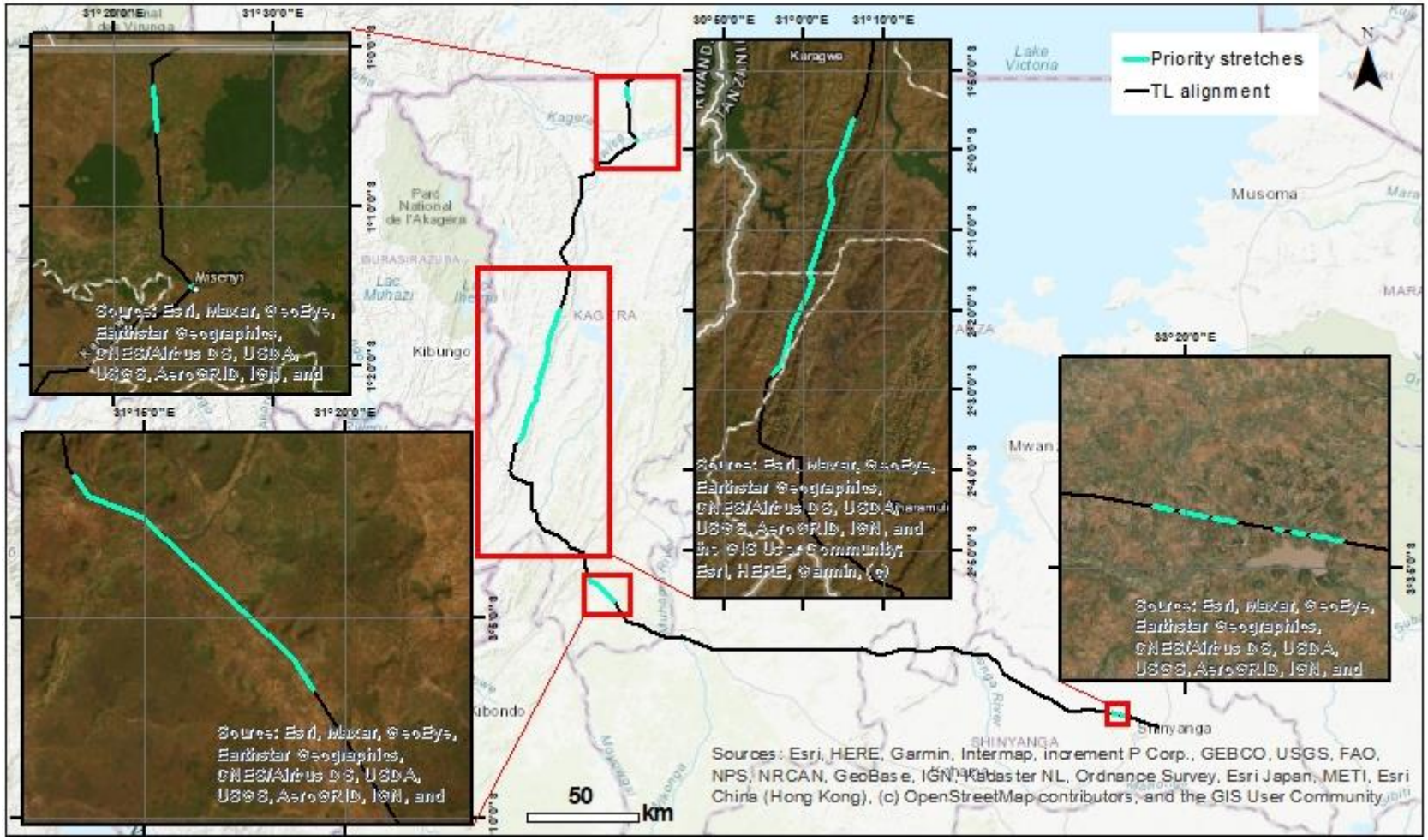
Table 5.1.a of P.11
Target flora species for active search in the project's DAA

Family	Species	Distribution	Habitat of occurrence (according to IUCN)	IUCN Category	Observations
					rural area of Bukoba, near Lake Victoria.
Lamiaceae	*Tinnea physalis*	This species is endemic to Tanzania where it is found between 1,160–1,350 m asl.	Commiphora scrub, rocky outcrops and inselbergs.	EN	The last record of the species dates back to before 1960, near Mantini Hills in the rural area of Shinyanga District, and the region is currently intensely anthropized.
Menispermaceae	*Albertisia exelliana*	This species is native to Burundi, Rwanda, Tanzania, Uganda between 600–1,250 m asl.	Riverine forest	EN	The Minziro region is an important site for this species' population (Luke et al., 2024), but there is also a register in Nyantakara/Biharamulo, southwest of the B3 road, Kichi Hills in Rufiji District.
Rubiaceae	*Oxyanthus ugandensis*	The native range of this species is E. Central DR Congo to SW. Uganda and North Tanzania.	Semideciduous moist forest	EN	Experts from Tanzania state that this species is endemic to Uganda. There are 2 records in GBIF in the rural area of Mayondwe, Muleba District, near Lake Victoria.

5.2. Priority stretches

According to the information available in the literature, provided by the experts consulted, and the land use and cover in the project's DAA, four (04) priority stretches were selected to carry out the active search (**Figure 5.2.a**).

Figure 5.2.a of P.11
Priority stretches for flora active search survey



5.3. Active search and Mitigation Measures to be Taken

The flora active search should be carried out in the stretches highlighted in **Figure 5.2.a**, in the entire area directly affected by the project, including the TL, accesses, and any other necessary infrastructure. The flora search team should visit the stretch, equipped with digital GPS files with the polygons of the directly affected, and cards with photos and the characteristics of the species. The team should carry out a thorough search of the species' preferred habitats of occurrence.

The field stage should be preceded by an in-office assessment of the priority search stretches and identification of preferred habitats. In these places, search quadrants should be delimited to ensure that the entire area of potential occurrence is effectively surveyed.

A pre-survey of the area using a drone can be carried out to identify the current state of conservation of the vegetation and optimise searches, for example by identifying recently cleared areas beforehand.

All identified individuals should be georeferenced and photographed. The characteristics of the site should be recorded on a spreadsheet, including at least: species, number of individuals, area occupied, phytosanitary status, phenological status, quality of habitat at the site, and signs of anthropisation.

Locations where individuals of these species are found should be shared with the engineering team so that the necessary adjustments can be made. It is of fundamental importance that the teams work together, under the constant supervision of Tanesco's environmental management team.

In cases where individuals of these species are found, three possible mitigation measures should be adopted:

1) If few individuals are found, in a partially anthropised habitat:
   a) Work on micro-adjustments to the project, without altering the main alignment, such as the location of towers, access, the need to maintain the cleared strip under the line, etc.;
   b) Draw up offsets, including the rescue and relocation of these individuals and the collection of germplasm for studies related to in-vitro propagation, and/or

2) If few individuals are found in a conserved natural habitat, or if a significant number of individuals are found::
   a) Evaluate adjustments to the project alignment to avoid passing through the site

The parameters relating to the number of individuals and the quality of the habitat should be defined by the botanists with the help of external specialists in the target flora species, if necessary.

Depending on the progress of the botanical team's field research, the stretches already surveyed may be cleared for construction to begin if no trigger species are found.

6. Performance Indicators

The following indicators are proposed to monitor the implementation of this Programme:

- Number of priority areas identified.
- Number of stretches surveyed.
- Number of adjustments made to the project.
- Number of stretches cleared for the beginning of the construction.
- Number of individuals relocated, if any.
- Quantity of germplasm rescued.

7. Reports and Documentation

Firstly, a work plan should be drawn up, detailing the field methodology, the schedule of activities, and the teams involved.

Partial reports must be produced for each stretch surveyed, including: field methodology, field duration, results, mitigation measures adopted, photos, and field sheets. At the end of the activities, a final report should be produced, including the compilation of the results found, a critical evaluation of them, changes made to the project and future actions to be taken if necessary, such as monitoring relocated individuals, or monitoring the production of seedlings from collected materials, etc.

8. Schedule

The programme should begin its activities before the completion of the executive engineering project and before any vegetation clearance activities.

ANNEXES

Annex 13.1 – Documents Received from Stakeholders During the Consultation Process

Questionnaire received from Dra. Siima Bakengesa

1. What are the main conservation objectives of this protected area?
    a. Biodiversity conservation in general
    b. Conservation of ecosystems
    c. Preservation of a specific species of flora and fauna
    d. Promote the sustainable use of the area's natural resources
    e. Curbing human activities, such as illegal hunting, deforestation, burning, etc.
    f. Others. Conservation of water catchment areas

    All of above

2. What are the protected area's main species of fauna and flora? Are there any species of special interest (e.g., endangered or endemic species?

    This information will be provided by TFS on specific forest reserves

3. Are there any critical sites for biodiversity in the protected area, for example, areas with intact habitats, places of high concentration of individuals/species, and important areas for reproduction/feeding? Where?

    Yes, specific species will be provided by the managing authority TFS

4. What are the main environmental impacts faced by the protected area?
    a. Uncontrolled extraction of forest products. If so, what is extracted? (Mainly wood and non wood resources- timber, medicinal, mushrooms etc)
    b. Wild fires
    c. Others. Which ones?

5. What are the main risks and impacts that the transmission line construction will bring to the protected area and the biodiversity it shelters?
    a. Habitat fragmentation
    b. Habitat reduction for native species
    c. Loss of flora species

6. What mitigation/compensation measures do you suggest avoiding or minimizing the impacts of transmission line construction and operation?

    1. Involvement of the Ministry of natural resources and Tourism in all steps of project implementation from the initial plan to implementation.
    2. Support in surveillance programmes to curb illegal extraction of forest products, wildfires and invasive species

7. What compensatory measures do you suggest for the potential risks and impacts of transmission line construction and operation?

8. What are the main needs of the protected area today?
    a. Restoration of degraded areas
    b. Control of human activities (illegal hunting, fires, etc.)
    c. Lack of trained personnel for inspection
    d. Lack of equipment for surveillance (e.g., cars, communicators, weapons, drones, etc.)
    e. Others. Support to surrounding communities on alternative sources of income

9. How is the local community involved in managing the protected area?
    a. The local community sustainably extracts products from the forest
    b. Social responsibility programme geared towards communities

Questionnaire received from TFS

Dear Dr.Siima

Kindly find the answers to the questioner

1. What are the main Conservation objectives of the protected areas?

    a) The main conservation objectives of the protected areas from Makotopora to Tabora are:
    b) Biodiversity conservation in general as well as promotion of sustainable use of the area's natural resources .In the mentioned area there is an endemic species of Itigi thickets which requires a special protection model for its existence and sustainability.
    c) Curbing anthropogenic activities to the lowest level in the protected areas.

2. What are the main environmental impacts faced by the protected areas?

    a) Illegal extraction of forest products especially timber species and charcoal
    b) Encroachment of forest reserves for cultivation, mining and grazing in protected areas.

3. What are the main risks and impacts that the transmission line construction will bring to the protected areas and the biodiversity it shelters?
   There will be a loss of flora and fauna species and biodiversity in general where the clearance of vegetation will be done to give way to the construction of transmission lines.

4. What mitigation /compensation measures do you suggest avoiding or minimizing the impacts of transmission line construction and operation?
   It is proposed that where there is too much vegetation/high concentration of biodiversity the way of the line could be shifted a bit so as to reduce too much removal/clearance of the vegetation hence reduce loss of biodiversity.

5. What compensatory measures do you suggest for potential risks and impacts of transmission line construction and operation?
   The compensation of negative impacts caused by construction of transmission lines within the protected areas is clearly stipulated in the Forest Act No.14 of 2002 and the fees payable for such destruction of forest resources caused by the project within a forest reserve is stipulated in the Government Notice (GN) No. 59/28/2022. This will be ascertained by undertaking a resource assessment in collaboration with TFS officers hence compensation fee established and paid according to the aforementioned Act and GN.

6. What are the main needs of the protected areas today?
   The main needs of the protected areas today are but not limited to:-

- Creation of awareness of the importance of protected areas to the surrounding communities and the general public.
- Restoration of degraded areas by planting trees
- Law enforcement hence control and minimizing illegal activities (fires, charcoal burning, timber harvesting, agricultural encroachment, pastoral activities and human settlement ect)
- Inadequate trained personnel and working facilities like vehicles, motorcycles and modern photographic equipments (drones) for protection
- Ranger posts within protected areas
- Political will.

7. Regarding restoration of degraded areas and Land tenure regularization the priority areas for carrying out the restoration activities will be in those areas whereby the transmission lines are passing through and neighboring areas.

8. How are the local communities involved in managing the protected areas?
   The local communities are both sustainably extracting forest products and forest services where permitted while respecting the restrictions and regulations for the wise use of the resources in protected areas.

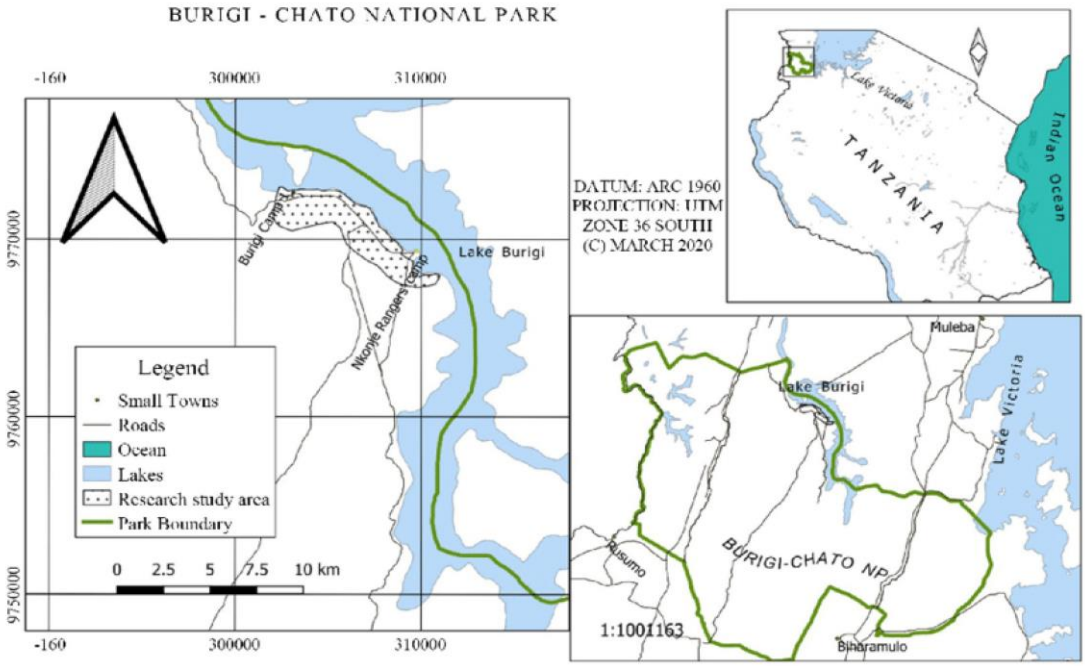
Document received from TANAPA

Burigi-Chato National Park was official approved by the Parliament of the United Republic of Tanzania on 9th February 2019. This new park was formed from three Game Reserves that were upgraded into a National Park status. The Game Reserves were Biharamulo, Burigi and Kimisi.

Biharamulo Burigi and Kimisi Game Reserves were gazetted in 1963, 1972 and 2003 respectively. These were among well-established Game Reserves of Tanzania. Extending from the western shores of Lake Victoria to the high ridges of the Central Rift Valley and interspersed with additional lakes and papyrus swamps. These reserves contain some splendid scenery and a wide diversity of habitats. On rich fertile soils and within a high rainfall zone these reserves are renowned for their diversity and tremendous wildlife populations. Among Biharamulo, Burigi and Kimisi Game Reserves the largest GR was Burigi with an area of 2,941 km^2 followed by Kimisi 1,030 km^2 and the smallest in this cluster was Biharamulo with an area of approximately 736 km^2 thus making the current park's total area of 4,707 km^2.

The Burigi-Chato National sits in northwestern Tanzania between the Kagera swamps in Rwanda, and Bunkwe Bay on Lake Victoria, it is the nation's fourth largest national park after Serengeti, Ruaha and Nyerere. The landscape is heterogenous, encompassing rivers, freshwater lakes, swamps, undulating hills, rocky escarpments, deep-set valleys lined with forest, open plains, floodplains and hundreds of square kilometres of medium and tall grass wooded savanna.

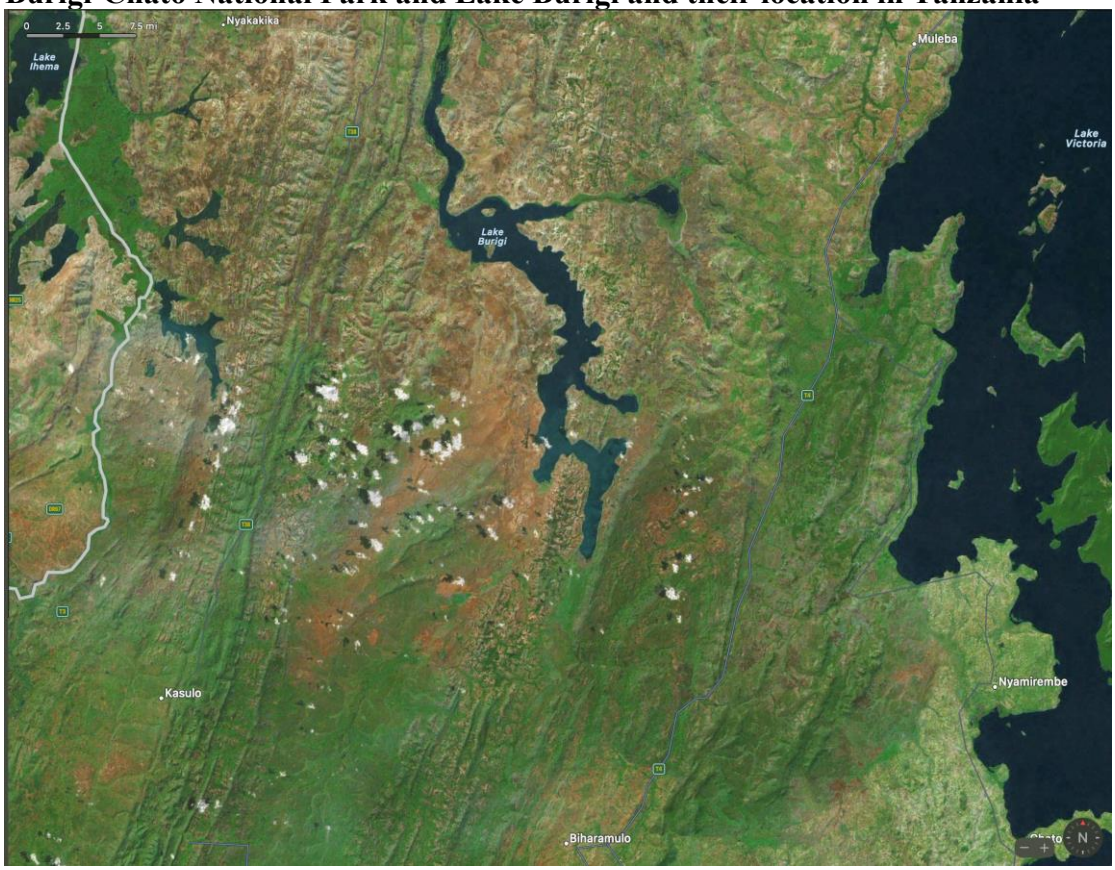
Figure 1
Burigi-Chato National Park and Lake Burigi and their location in Tanzania



More specifically, the park is characterized by a series of north–south ridges, separated by drainage lines and rivers flowing north. In one of these drainage lines is Lake Burigi, some 30 km long and 4 km wide. To the east the land slopes towards Lake Victoria where large stands of *Acacia xanthophloea* dominate on the poorer soils. On the higher ground the woodland is largely *Brachystegia speciformis* (rather stunted at its northern limits) and *B. boehmii* in the east, with *Protea-Combretum* on the drier ridges in the west and extensive areas of *Combretum* and *Terminalia* (Miombo). On the slopes there are considerable areas of open grassland and, in the steeper valleys and gullies, remnants of Guinea-Congo Forest. Relict sclerophyll forest on some hillslopes suggests much more extensive forest cover historically.

The area is an Important Bird Area (IBA) and by default until re-analysis a Key Biodiversity Area (KBA). Only approximately 200 of the possible 500 species of bird have thus far been recorded, with notable species including shoebill stork *(Balaeniceps rex)*, papyrus gonolek (*Laniarius mufumbiri*), red-faced barbet *(Lybius rubrifacies)*, corncrake *(Crex crex)*, great snipe *(Gallinago media),* miombo rock thrush (*Monticola angolensis)* and Arnot's chat (*Myrmecocichla arnotti)*.

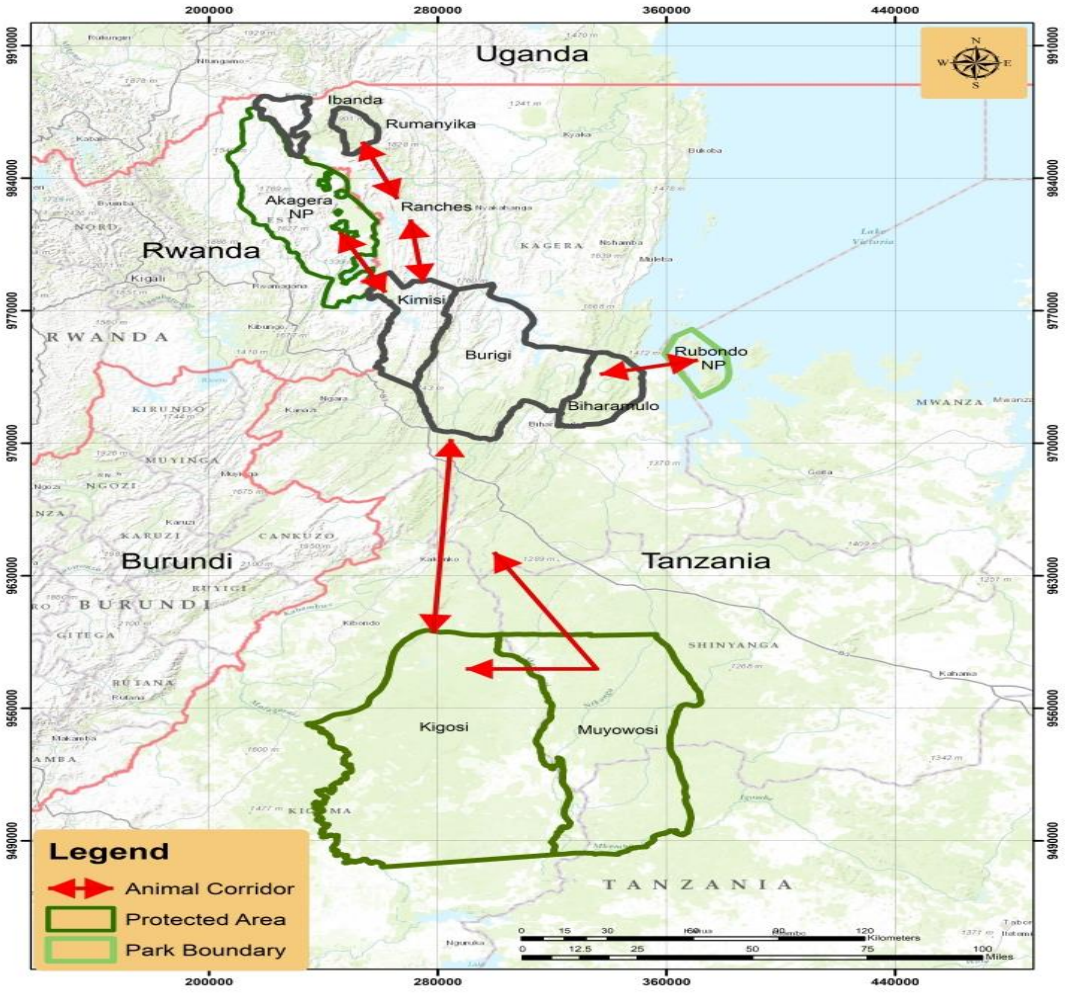
Figure 2
Burigi-Chato National Park and Lake Burigi and their location in Tanzania



Regarding Wildlife, with the exception of the larger mammals such as elephant, buffalo, eland, lion, leopard, zebra, giraffe, it is not well known faunistically in the savannah. It is

regarded as having been heavily hunted (legally and illegally) over the years, leading to low numbers of almost all game species. **In this regard,** there is a needs to support and maintain diverse and abundant wildlife population within Burigi-Chato National Park, to conserve and grow the population of threatened species, particularly elephants, topi, buffalo and impala and black rhino. This will be done through scientific establishment of the migratory corridors of wildlife and in particular by elephants. The red arrows in **Figure 3** show potential BURIGI-CHATO corridors to study.

Figure 3
Burigi Chato National Park Potential wildlife corridor



Document received from the expert Neduvoto Mollel

Sn.	Scientific name	Family	Habit/Form	Herbarium Specimen	Distribution (FTEA)
1	*Albertisia exelliana (Syn. Epinetrum exelliatum)*	Menispermaceae	Climber	**Present**. T1: Biharamulo District-Nyakanazi	Uganda (U4)
2	*Blotiella trichosora*	Dennstaedtiaceae	Fern	Not Present	T1: Bukoba District, around Kahororo Secondary school
3	*Emilia cryptantha*	Asteraceae	Herb	Not Present	T1: Bukoba District-Kitwe
4	*Oxyanthus ugandensis*	Rubiaceae	Shrub 1m tall	Not Present	Only found in Uganda
5	*Thunbergia laborans*	Acanthaceae	Perennial herb with white hairs	**Present.** TI: Biharamulo District	T1: Mwanza, Geita, Butiama, and Musoma
6	*Tinnea physalis*	Lamiaceae	Shrub 1-3m tall	**Present.** T1: Ukiriguru-Mwanza	T1: Shinyanga, T2: Mbulu District
7	*Vernonia tinctosetosa*	Asteraceae	Perennial herb with many stems 15cm tall	Not Present	T1: Bukoba

Document received from the expert Fandey Machimba

Family	Species	Distribution in Tanzania	IUCN Status
Menispermaceae	*Albertisia exelliana*	Minziro NFR, an unprotected locality in Biharamulo Dist., Kichi Hills in Rufiji Dist.	Not Evaluated
Dennstaedtiaceae	*Blotiella trichosora*	Minziro NFR, unprotected localities near Bukoba town	Not Evaluated
Asteraceae	*Emilia cryptantha*	Unprotected localities near Kitwe and Bugandika in Bukoba Rural Dist.	Not Evaluated
Rubiaceae	*Oxyanthus ugandensis*	Not in Tanzania; endemic to Uganda	Not Evaluated
Asteraceae	*Vernonia tinctosetosa*	Bukoba town	Not Evaluated
Acanthaceae	*Thunbergia laborans*	Unprotected localities in Biharamulo, Musoma Rural, and Sengerema Dists.	Not Evaluated
Lamiaceae	*Tinnea physalis*	Unprotected locality N of Babati town, unprotected locality in Magu Dist., in and near Mantini Hills in Shinyanga Rural Dist.	Not Evaluated

Annex 13.2 – Photographic Record, Consultation with TANAPA

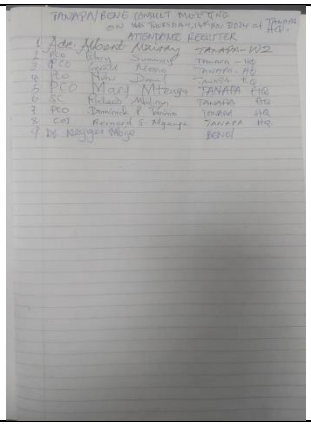


Photo 01: Attendance list of the consultation held with TANAPA and TFS in November, 2024.	**Photo 02:** Participants of the meeting: TANAPA, TFS and Bene Consult
	
Photo 03: Participants of the meeting: TANAPA, TFS and Bene Consult	**Photo 04:** Participants of the meeting: TANAPA, TFS and Bene Consult
	
Photo 05: Participants of the meeting: TANAPA, TFS and Bene Consult	**Photo 06:** Participants of the meeting: TANAPA, TFS and Bene Consult