Road Annuity Project in Kenya (Lot 3) - Biodiversity Action Plan
Modogashe - Samatar and Rhamu - Mandera Road Corridors.

Final Report

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ABBREVIATIONS AND ACRONYMS

AOI Area of Influence
AOO Area of Occupancy
ASAL Arid and Semi-Arid Land
AZE Alliance for Zero Ecological Sites
BAP Biodiversity Action Plan
CH Critical Habitat
ENNDA Ewaso Ng Development Authority
EAAA Ecologically Appropriate Areas of Analysis
EOO Extent of Occurrence
ESIA Environmental and Social Impact Assessment
ESMP Environmental and Social Management Plan
KEFRI Kenya Forestry Research Institute
KFS Kenya Forestry Service
GIS Geographic Information System
GN Guidance Note
GZT Grevy's Zebra Trust
HWT Habasweini Wildlife Trust
IFC International Finance Corporation
IUCN International Union for Conservation of Nature
KeNHA Kenya National Highways Authority
KBA Key Biodiversity Area
KWS Kenya Wildlife Service
LULC Land Use Land Cover
MIGA Multilateral Investment Guarantee Agency
NMK National Museums of Kenya
NECA North Eastern Conservancies Association
PDA Protected and Designated Areas
PPP Public-Private Partnership
PS Performance Standard
RLE Red List of Ecosystems

CHAPTER 1: INTRODUCTION

1.1 Overview and objectives of the document

This document presents the additional biodiversity study and Biodiversity Action Plan for the proposed road project by Kenya National Highways Authority (KeNHA) part of the LOT 3, annuity road project (see Project summary below).

The objectives of this additional biodiversity study and Biodiversity Action Plan were to:

- Update stakeholder consultations through review and validation of previous stakeholder consultations.
- Confirm the presence of Natural and Critical Habitat identified in the first objective and species of concern within, near, and crossing the roads through desktop reviews and field surveys at several locations along the corridor. ·
- Develop habitat maps and determine the level of degradation of natural habitat within the two corridors.
- Identify direct or indirect risks and impacts and their significance as a result of the project implementation such as increased hunting, invasive species, collisions, barriers to crossing/migration corridors, access to water etc. The loss of habitat will be quantified.
- Update existing mitigation measures relating to the loss of habitat and species to achieve no net loss or net gain where applicable. The mitigation measures will be integrated into the BAP.
- Develop a monitoring and evaluation report and prepare recommendations to strengthen the future implementation of the project.

This document is accompanied by an excel spread sheet which details the specific mitigation measures.

1.2 Project summary

The proposed road project by Kenya National Highways Authority (KeNHA) is part of the LOT 3 - annuity road project in Kenya under the Public Private Partnership (PPP), which entails construction of the 68 km class A road from Modogashe town through Habasweini town to Samatar and the 75km Mandera-Rhamu road. Upon completion, the two roads will lead to opening up of the North-Eastern part of Kenya. The project will create a linkage of Garissa and Isiolo Wajir. On completion, the road will also connect with Mandera County and serve as a gateway to Ethiopia, leading to improved transport network and growth of businesses in North-Eastern and trans-border commerce for the Horn of Africa region. The major trading centers along the road are, Modogashe and Habasweini for Rhamu and Mandera roads respectively.

The road project is welcomed by both local communities and stakeholders in the region due to its great positive economic impact through enhanced transport of both goods and people in the counties

of Garissa, Isiolo, Wajir and Mandera. Accessibility has been a major problem in this area especially during the wet season when vehicles get stuck in mud, inconveniencing residents and delaying the supply of food and services. It is on this basis that the project is considered to be a key source of transforming livelihoods in the region.

It is noteworthy that the roads to be upgraded have been in existence for the past 60 years and located within the alignment of the proposed road corridors. The gravel surface roads have linked the north eastern parts of Kenya since Kenya's independence. However, they have never been upgraded into bitumen surface status. The gravel roads have hitherto been accessible via trucks and four-wheel vehicles only especially in the wet season. Due to their dilapidated state whenever it rains, some sections of the road become impassable, and this has led to side roads opening up along the road alignment. As a consequence, the roads ROWs (40-60m) have been disturbed and contain very little vegetation, making it worse considering that the area is sparsely vegetated. Henceforth, upon upgrading of the road to class A-trunk road status, the clearance of vegetation within the designated road reserve will be minimal.

1.3 Biodiversity context

Inaccessibility and security concerns in the region have impeded biodiversity surveys, thus the region's fine details on biodiversity status remains poorly understood. The project area however, is situated in the larger Horn of Africa Biodiversity hotspot, the Eastern Afrotropical Ecoregion, and the Somali-Masai Floristic Biome, which are known to support high numbers of endemic and threatened species of both flora and fauna. Moreover, the project sites lie within the Arid and Semi-arid (ASAL) areas, which constitute >80% of Kenya's land mass and due to prevailing climate condition and unpredictable weather conditions, the habitat here is considered fragile and sensitive to ecological perturbations.

The project area where the two roads traverse constitutes both critical Habitats (CH) and degraded natural habitat. Though the whole of the project area is rich in CH-qualifying biodiversity features, a comprehensive biodiversity inventory of the area is lacking for quantification, dispersion (flora and fauna) and, movement of fauna and remains misunderstood. Thus, infrastructural developments require a careful thought process with prudent consideration of the regions' biodiversity and habitats they utilize as required by the International Finance Corporation guideline (performance standard 6) on Biodiversity Conservation and sustainable Management of Living Natural Resources. For instance, the Modogashe – Samatar road section that is being upgraded passes through key critical habitats, which include the Ewaso Ng'iro north river floodplain [(Wooded grassland and grassland vegetation towards Modogashe) and the *Acacia spp/Commiphora spp/Salvadora P. shrublands* plains between Habaswein and` Samatar)] and the Lorian swamp. Similarly, this occurs along the Rhamu-Mandera road corridor which cuts across key biodiversity areas extending from the border of Ethiopia and extends southward to an estimated 30-45Km. Such areas include the Wildlife dispersal areas between Malka Mari and Galare National Parks as well as the community wildlife conservancies (Habaswein, Sabuli, Chachabole & Rhamu).

The Lorian Swamp, partly located in the project area south of Wajir, on a vast floodplain, receives average annual rainfall of 150-600 mm. However, precipitation here is highly variable, making flooding and drought recurrent in the area. The mean annual temperature ranges from 24º C to 30º C. This leads to a high regime of evaporation that is ten times the annual rainfall in some locations. The swamp is fed by the Ewaso Ng'iro North River and to a lesser degree by seasonal streams from the southwest and northwest. The river drains a considerable area in the eastern slopes of the Aberdares. Stream gauge data shows the river's flow to be highly seasonal with the dry season flows accounting for minimal amount of the annual flow. The highly variable rainfall also makes the inundation of the area largely unpredictable, while high rates of water abstraction for upstream irrigation considerably reduce the amount of water flowing within the river, hardly reaching Lorian swamp during the dry season. However, the wetland is not well studied due to an inhospitable and inaccessible terrain as well as widespread insecurity that is frequently manifested through ethnic clashes.

1.4 Regulatory requirements

Relevant regulatory requirements and laws related to biodiversity management or offsets for this project and are directly or indirectly concomitant with the biodiversity management include: EMCA, 1999, Environmental Management and Co-ordination Regulations, 2006; Convention on Conservation of Biological Diversity; Biodiversity Conservation Act; the Water Act 2007; Forest Conservation and Management Act,2016; The Wildlife and Conservation Act 2013; The Agriculture, Fisheries and Food Authority Act of 2013; and The Traffic Act Cap 403 of 2013. The international regulatory requirements have been covered in the International Finance Corporation/World Bank Group Performance Standard Six, Biodiversity Conservation and Sustainable Management of Living Natural Resources; IUCN Red list of Threatened Species, 2020.

1.5 Relevant policy requirements:

The policies considered for this project were as follows: Kenya has a Policy on Wildlife Dispersal Areas and Migratory Corridors and the Kenya National Biodiversity Strategy and Action Plan (2019-2030) that captures the relevant policies related to biodiversity. Among such policy statements is the one safeguarding protected areas and states as follows: *The government shall ensure the highest level of protection possible to habitats containing viable representative populations of critically endangered, endangered, vulnerable, or near threatened species through their declaration as a Protected Area, as appropriate.*

KeNHA Environment and Social Safeguards Policy (2019), whose premise *inter alia,* prescribes that all their activities should be environmentally, sound, economically viable and socially acceptable. Other relevant National Policies that require consideration in addressing Biodiversity Action Plans for this project include: Wetlands Conservation and Management Act, 2015; Environmental Policy 2016; Forest Policy, 2005; Water Policy, 2012; and National Land Use Policy, 2018 to mention a few. In addition, Kenya is signatory to international policies and multilateral Environmental Agreements that are relevant to this project and have been domesticated, for their importance in the protection and conservation of key biodiversity. These include: Convention on Biological Diversity,

African Convention on Conservation of Nature and Natural Resources (IUCN), Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), and Bonn Convention on Protection and Conservation of Migratory Species of Wild Animals among others. These national and international policies that are applicable to Kenya environmental law and aim to enhance our biodiversity and environmental protection and conservation have been considered in developing this BAP.

1.6 Zero tolerance policy on possession, sale or purchase of illegal wildlife and forest resource products and operational procedure

Despite the Kenya Wildlife Act 2013, the ban on wildlife hunting in 1977 to protect wildlife species to address their insecurity, the government has issued, *inter alia*, this policy statement: The government shall prohibit the capture, taking, harassing, possession, offering for sale and export of all wildlife species, or parts and products of such species, whether resident or migratory, unless permission has been granted by the designated Cabinet Secretary through an appropriate permit; establish penalties that reflect the national value of threatened species and that serve as an appropriate deterrent to wildlife crime for persons responsible for killing and/or causing harm to any designated critically endangered, endangered, vulnerable, or near threatened wildlife species, or their habitats. At a global level and in implementation of CITES by the Kenya government, as well offers protection of the threatened biodiversity, which could be vulnerable to capture and sale for commercial reasons.

1.7 Stakeholder review

In view of the fact that the study area has not been explored sufficiently on numerous issues related to this project, a number of organizations which have worked in the general area together with experts were consulted. Since the devolved governments in Kenya came into existence (March, 2013), the counties have undertaken development studies in their respective jurisdictions known as; the 'County Integrated Development Plan (CIDP)'. These are plans prepared by all counties to guide development over a five-year period. These documents too have been scrutinized for relevant information. Further, several organizations, some with international affiliation, regional and local representation and experts were consulted: African Wildlife Foundation (AWF), World Wildlife Fund (WWF), International Union for Conservation of Nature (IUCN), Nature Kenya, National Museum of Kenya (NMK), Ewaso Ng'iro North Development Authority (ENNDA), Somali Giraffe Project,
Grevy's Zebra Trust (GZT), Hirola Conservation Programme, Green Climate Fund (GCF), North Eastern Conservancies Association (NECA), Habasweini Wildlife Trust (HWT), National Environment Management Authority (NEMA) –Directors (Isiolo, Wajir and Mandera), Ecosystem Conservators (Wajir and Mandera), Kenya Wildlife Service (KWS) office (Isiolo, Wajir, Mandera) and senior research scientists, County Government officials (Isiolo, Wajir, Mandera) from the Departments of Environment, Water, Livestock, Fisheries, Roads/Transport, National Museums of Kenya Experts (i.e., Ornithology, Mammology, Hertopology, Botany and Entomology departments and Save the Elephant.

List of Key informants/Experts consulted:

1. NMK taxa experts (Hepertology – Dr. Patrick Malonza, Ornithology – Dr. Mulwa Kala, Amphibians – Vincent Muchai, Mammology – Musila, Entomology – Dr. Laban Njoroge, Grace Kioko, Plants – Dr. Paul Musili, Christoper Chesire)
2. KWS officers – Senior Research Scientist – Daniel Muteti, Makau Malungu & Fred Omengo,
3. Grevy Zebra Trust – Sara Chilles, Infrastructure Officer
4. Save the Elephant – David Deballen, Program officer
5. NRT – The Manager – Antony Wandera, Tom Letiwa
6. Somali Giraffe Project – Mohamed H. Ali
7. Giraffe Taskforce – Regional Liaising Officer
8. Nature Kenya – Paul Gacheru
9. Northeastern Conservancies Association – Mr. Hussein Mahat
10. NEMA – Mohamud Hanshi – Wajir
11. WWF – Dr. Yusuf Wato

CHAPTER 2: CONFIRMATION OF CRITICAL AND NATURAL HABITAT SUMMARY.

2.1 TerrCon's Findings

One of the objectives was to confirm the presence of Natural and Critical Habitat identified as 'precautionary,' by the desk-based Critical Habitat Assessment undertaken by TerrCon in March 2021 and evaluate any species of concern within, near, and crossing the roads through desktop reviews and field surveys at several locations along the corridor. This task involved undertaking some limited biophysical field studies, that involved the traverse of the Modogashe-Samatar and the Rhamu-Mandera roads checking their physical condition, influence on settlements and anthropogenic activities like agricultural practices against the *intersecting habitats* and drainage facilities, juxtaposed with proposed upgrades to trunk road status and anticipated effects on biodiversity. Further, we carried out consultation with experts and the study of historical aerial surveys and conducted Focus group discussions (FGDs) with stakeholders.

The Critical Habitat Assessment undertaken by (TerrCon) in March 2021, identifies thirty-seven biodiversity values for Critical Habitat (CH) screening. They comprise 32 species (12 mammals, 15 birds and 5 plants), 2 features and 3 Protected and designated areas (PDAs).

2.1.1 TerrCon's conclusions on CHA

Based on available information the conclusions of the TerrCon CHA were as follows:
Part of the Modogashe Samatar Road EAAA was precautionary assessed as Critical Habitat for both the Grevy Zebra and Reticulated giraffe, under **Criterion 1 a**). It was designated as such as without more data it is challenging to be definitive, as the Grevy Zebra and Reticulated Giraffe move in large areas depending on water availability and food resources. The Rhamu – Mandera road's EAAA also supports CH for the Reticulated giraffe.

2.1.2 TerrCon's conclusions on Lorian Swamp CHA

Lorian Swamp was assessed as CH on Criterion 4(b)): No Red List of Ecosystems (RLE) assessments have been undertaken in Kenya. This was pending further assessment, as it is/was a regionally important wetland area, in the Greater Ewaso Ecosystem and Dispersal Area, for a large number of species particularly in an arid region. This importance is also expressed by the stakeholders the SBA consulted though the swamp seems to have been threatened by drought and desiccation.

2.13 TerrCon's conclusion on PDAs

Protected and Designated Areas (CH Criteria 1(c) and 4(b)): This category of CHs comprises three Protected and Designated Areas (PDA's) which Rhamu AAA intersects. The PDAs are Malka Mari National Park (NP) (Kenya), Borena NP (Ethiopia) and Bogol Manyo-Dolo Important Bird and Biodiversity Area.

2.2 This Report's Findings

The study undertaken by Biodiversity experts in May 2021, identified a further twenty-six biodiversity values for CH screening. They comprise 58 species (19 mammals, 22 birds, 5 reptiles, 8 fish and 4 plants), 2 features and 2 PDAs. Although Borena NP (Ethiopia) is within the EAAA, it was eliminated from further analysis since it has no direct relationship with intersecting habitats due to Geographical location and its orientation with the project area. The following section details the field studies executed, experts consulted focus group discussions and other processes that led to this conclusion.

CHAPTER 3: DESKTOP RESEARCH, EXPERT CONSULTATION AND FIELD STUDIES

In order to evaluate the findings of the TerrCon CHA, we undertook some desktop research, expert consultation and fieldwork. Though we conducted a rapid field study due to limited time allocation, the study was able to reveal that both corridors intersect habitats that are endowed with a rich biodiversity. The work involved Focus Group Discussions with community members and biophysical studies. The biophysical studies involved traversing the road alignment and checking its current status, intersecting habitats and biodiversity, juxtaposed with the proposed development.

3.0 Field studies

Field work involved visiting the project areas and carrying out both social and biophysical assessment focusing on biodiversity and habitats within the project area. The social aspect was limited to Focus Group Discussions (FGDs) with a clear agenda on biodiversity assessment. The team assessed the potential Habitat fragmentation and losses by motoring/traversing the existing roads and ascertaining the locations of proposed material source sites, borrow pits, water resources/abstraction points, and concrete batch plants. Further, the team assessed the current road status and proposed expansion and rehabilitation against potential 'hotspots' and 'blind spots' for animal crossing and possible collisions, as they cross in search of browse and water resources or migrating to other areas. The team made stops on select points of interest and acquired data through observations and recording. Spatial attributes were acquired with a digital camera and geo-referenced with a hand-held GPS.
The field methods employed for vegetation classification were after Gillison A.N, (2006) and FAO, (2000). Wildlife survey techniques were guided by Waseen, A.K, (2018). More field methods were acquired by referring the relevant websites as provided in the reference section of this report.

3.1 Social Studies (Focus Group Discussions)

Focus group discussions with community members were carried out in the Modogashe-Samatar road corridor**.** The interviews carried out used guided questionnaires to focus the discussions to relevant information acquisition. The office of the Chief in each location was involved in selecting key community members who had also been involved in the ESIA process and knew about the proposed development.

3.1.1 Summary of FGDs responses

Focus group discussions were carried out in Samatar, Habasweini, Modogashe towns and Lagdima and Sabena settlements and centered on: level of awareness of the project and their views about the development; wildlife and birdlife biodiversity abundance in their areas; presence of migratory animals; human-wildlife conflicts;
Important plants species and their benefits to the community; perceived habitats and biodiversity threats; and, perceived threats to the well-being and livelihoods of these communities. The results of the discussions are presented below.

3.1.1.1 Level of awareness of the proposed road construction and the Initial ESIA

Majority of the FGDs participants (85%) stated that they were aware of the proposed road construction and that community engagement had been carried out for the ESIA in the area. Residents mostly from Samatar, Habasweini, and Modogashe area acknowledged that at least 15 members from their communities had participated in FGDs and interviews during the ESIA process in the area. However, respondents from Lagdima and Sabena cited that they had not been contacted during the ESIA process. They acknowledged that they were aware of the proposed road construction although their views had not been incorporated in the process. Some of the residents cited that they lived close to the road corridor and no relocation action plan (RAP) had been put in place to address those that would be displaced once the construction began. They were aggrieved that the ESIA team skipped their area yet the road construction would lead to the displacement of people in their area.

3.1.1.2 General view of the residents regarding the road construction.

The majority of the participants of the FGDs strongly supported the proposed road construction citing several benefits. Eighty percent of those who participated were of the view that the proposed road would lead to reduced transport time and cost. The existing road is gravel-surfaced and in poor condition leading to prolonged travel time on the road. They pointed out that the poor road condition also leads to huge travel costs due to the high maintenance cost of the vehicles using the road. The new road was a welcome idea as it would shorten the time that residents spend on the road as well as making movement more comfortable.

The proposed road construction would also lead to ease of movement along the road corridor from Modogashe, Habasweini, to Samatar. This would enable the area residents to access vital government services, where the majorly are in Isiolo and Wajir towns, which they would ordinarily ignore due to the poor state of the road. The residents of Habasweini also stated that the new road would enable them get items such as newspapers which normally do not reach their town especially in the wet season.

According to some of the respondents, the dilapidated state of the current road had made it difficult to do business along the road corridor. This is because of the challenges encountered when transporting goods from one point to another. With the proposed upgrading of the road to bitumen standard, it would be much easier for the area residents to transport goods between the various towns along the road corridor. This would also lead to the growth of new businesses thus improving the economic standards of the towns. Area residents also cited that once complete, the road would enhance food security in their areas. It would also stabilize the cost of food supplies, which is usually affected by the erratic weather conditions in the area that renders the current road impassable. Residents from Habasweini Central, Ndege, and Kibilai areas stated that the prices of food in their areas usually go up during the rainy seasons as a result of the impassable state of the roads which cuts off the food supply to their towns. With the proposed upgrading of the road, it would be much easier to get food to the towns thus enhancing food security. Some of the respondents pointed out

that the proposed road would lead to population growth in their regions. This is because the road would open up the area creating a pull factor as more people migrate to the area to do business or because of better social status. The new road would not only attract new immigrants but also some of those who had left their hometowns in search of a better life elsewhere. Even with the numerous benefits anticipated from the road construction, some of the respondents were wary of the fact that such a project would also have some negative impacts. Some residents of Lagdima township were worried that the new road would increase livestock accidents especially at night, when majority of reported cases of livestock related accidents (when crossing the road); as well as wildlife, which is very common in the area were noted. The area residents were also worried that accidents involving children would increase due to speeding vehicles on the road that traverses several towns.

3.1.1.3 Wild animals and birdlife in the area and their abundance

According to the area residents, there is an abundance of wildlife and birdlife in the area with some reporting increased cases of human wildlife conflicts. The table below shows the various wildlife cited by the residents at the different points along the road corridor in relation to what the field team witnessed in various sites. Among the major animals and birds in the area discussed were: African elephant *(Loxodonta africana),* Lion *(Panthera leo),* Spotted hyena *(Crocuta crocuta),* Stripped hyeana (Hyeana hyeana), Cheetah (Acinonyx jubatus), African wild dogs (Lycaon pictus), yellow baboon *(Papio cynocephalus)*, Reticulated giraffe (Giraffa reticulata), Beisa Oryx (Oryx gazelle Beisa), Gerenuk (Litocranius walleri), Somali ostrich (Struthio molybdophanes) Grevy's zebra (Equus grevyi).

Table 3.1: Animal Sightings by survey team compared with those reported by FGD's

Animals sighted or reported during field surveys			
Animal	**FGDs reporting on Sightings**	**Survey Team Sightings**	
	FGD-different locations reporting on Sightings (Modogashe-Samatar)	**Direct sightings**	**Indirect Sightings (Secondary Evidence e.g., spoors, tracks, skin) Spoor/track/skin**
MAMMALS			
African Elephant	√	-	-
African Lion	√		√
Spotted Hyena	√	-	-
Striped hyena	√	√	(carcass)
African Wild Dogs	√	-	-
Serval cat		√	(carcass)

Animals sighted or reported during field surveys			
Animal	**FGDs reporting on Sightings**	**Survey Team Sightings**	
	FGD-different locations reporting on Sightings (Modogashe-Samatar)	**Direct sightings**	**Indirect Sightings (Secondary Evidence e.g., spoors, tracks, skin) Spoor/track/skin**
Cape Buffalo	√	-	-
Yellow Baboon	√	√	-
Beisa Oryx	√	-	-
Reticulated Giraffe	√	√	√
Gerenuk	√	√	√
Grevy's Zebra	√	-	-
Grant Gazelle	√	√	√
Lesser Kudu	√	-	-
Cheetah	√	-	-
Desert Warthog	√	√	-
Kirk's Dik dik	√	√	√
Cape Hare	√	√	-
Slender Mongoose	√	√	-
African crested porcupine	√	-	-
Unstriped ground Squirrel	√	√	-
African pygmy hedgehog		√	-
REPTILES			
Nile Crocodile	√	-	-
Leopard Tortoise	√	-	-
SNAKES			
Red Spiting Cobra	√	-	√
Black necked spitting Cobra	√	-	√
Puff adder	√	-	--
African rock Python	√	-	-
Monitor Lizard	√	√	-
BIRDS			
Somali Ostrich	√	√	√
Marabou Stork	√	√	

Animals sighted or reported during field surveys			
Animal	**FGDs reporting on Sightings**	**Survey Team Sightings**	
	FGD-different locations reporting on Sightings (Modogashe-Samatar)	**Direct sightings**	**Indirect Sightings (Secondary Evidence e.g., spoors, tracks, skin) Spoor/track/skin**
Lappet faced vulture	√	√	
Pied crow	√	√	
Vulturine Guinea Fowl	√	√	√
Quelea quelea		√	
INSECTS			
Scorpions	√	√	

3.1.1.4 Migratory Animals

Wildlife abundance is high in the project area whereby most of it is resident population while other constitute migratory species, which temporarily or seasonally utilize the area either as grazing, watering, breeding or stop over point during migration to other areas. The migratory wildlife species identified during various FGDs at the two project sites were as follows: Modogashe residents: - reported Elephant, Lion, Grevy's Zebra and Buffalo. However, the residents pointed out that it was rare to see Buffalo while Zebras migrated southwards towards Sericho area. Habasweini residents: - reported occasional sightings of Elephants in Archers Post in Isiolo County during the rainy season. Samatar residents: - occasionally spot lions during the rainy season. The lions are known to follow livestock movement especially when they gather to graze. Sabena residents: - argued they occasionally see elephants moving from upstream Ewaso Ng'iro river to downstream during the rainy season.

3.1.1.5 Cases of human-wildlife conflict

Since the proposed road traverses through important wildlife areas, the respondents noted that there had been several cases of human and wildlife conflict. In Modogashe the FGDs reported livestock depredation by hyena (mainly goats), human and livestock deaths and injuries from snake bites especially puff udders. The Lagdima residents as well reported livestock attacks by hyenas mainly targeting the goats and cattle, which was even happening during the survey period beside scorpion stings. The residents expressed concern that they do report this livestock and human attack or deaths by wildlife because there is no Kenya Wildlife Office in the area for easy reporting.

Rampant cases of human-wildlife conflicts were also reported from the FGD in the Samatar area. Participants in Samatar pointed out that livestock attacks were committed mainly by hyenas and lions and was common during the dry seasons. Alternatively, giraffes and warthogs were the main culprits

reported to raid farms destroying maize and watermelons while birds such as Quelea quelea raided the Sorghum farms. Snake bites especially by puff udder were common also and occurred mainly at night.

Residents from Habasweini indicated that livestock attacks by large carnivores mainly hyaena, lion and cheetah occurred in their areas. The attacks by these three species mainly targeted goats and cattle with lions killing both goats and cows unlike the Hyena and cheetah which went for the shoats. Snake bite or attacks particularly by pythons, red spitting cobras, and black cobras and puff udders were reported to happen. The puff adder attacks were common and the most lethal and the residents argue that up to 15 people in the recent past. The residents from Sabena reported a similar pattern of snake bites, whereby majority of the casualties sought treatment in the nearby hospital. However, they pointed out that baboon occasionally attack lambs and calves. While the cases are reported to the nearby KWS station the claims are yet to be compensated.

3.1.1.6 Important Plants Species and their Benefits to the Community

The proposed road corridor boasts of several plant species associated with numerous benefits to the communities. Some of the plant species from the various FGD's include the following:

Table 3.2 Plant species that benefit the communities (ecosystem services)

Plant species	Local name	Useful plant parts	Usage
Boswellia microphylla	Mugle	Trunk, bark, twigs	Firewood, (bark and twigs used to flavor)
Grewia tenax	Dekah/defarur	Fruits, bark, fiber, stems, trunks	Edible fruits, medicine, charcoal production, firewood Livestock feed
Salvadora persica	Adhee	Twigs, leaves, fruits	Toothbrush, edible fruits, livestock feed
Tribulus terrestris		Leaves, stems	Camel feed
Indigofera spp	Darga	Leaves, stems	Camel feed
Cordia sinensis	Mareer	Fruits, bark, roots leaves, twigs, folliage	Edible fruits, medicine, livestock feed
Grass spp	Galagul	Leaves stolons	Thatch material
Boscia coriacea	Qalankaal	Branches, stems, bark, fruits, roots	Edible fruits, medicine, branches used in making temporary structures, livestock feed
Acacia tortils	Qurah	Leaves, pods	Livestock feed
Acacia zanzibarica	-	Leaves, bark	Tea, sap-medicine
Commiphora spp	Warek	Bark, Sap	medicinal
Aloe secundiflora	-	Leaves, sap	medicinal

Plant species	Local name	Useful plant parts	Usage
Phyllanthus somalensis		Stems/twigs	Fencing material
Azadirachtaindica	-	Bark, leaves	medicinal
Local Shrub/tree	Tumbar-bar	Leaves, bark, roots	Cleansing disinfectant, Soap extract

3.1.1.7 Perceived Habitat and Biodiversity Threats

The residents pointed out that the proposed development would result in loss of vegetation cover, especially grass used to feed their livestock. They were also concerned about the loss of important trees, for example, those with medicinal value and acacia trees important for providing shade, would be cut to pave way for the road construction. With the road passing through important wildlife areas, there were concerns that the new road would result in increased road kills of wildlife and domestic animals. They also expressed their great fears of the children being hit by speeding vehicles upon the upgrading of the road. Residents of Habaswein thought the proposed road would increase already existing problem of road kills as evidenced by past reported cases of snakes, hyenas, giraffes, and cape hares killed

3.1.1.8 Perceived threats to the well-being and livelihood of the affected community

Some of the residents were concerned that borrow pits would turn to breeding points for mosquitoes which would lead to the spread of malaria, if not properly rehabilitated. These pits when filled with water would also pose a drowning risk, especially to young children. Some of the respondents especially those from Samatar were concerned that the new road would lead to increased road accidents involving people and livestock. The residents of Habaswein central were concerned that the construction would lead to reduced water supply in the area. With most of the crop farming in the area being on irrigation farms, there were concerns, especially from residents of Sabena that reduced water supply would affect farming and food production in the area. Further, even with a RAP in place some of the residents were concerned that they had not been included on the compensation list.

3.2 IFC Performance standard 6 CH Determination and Desktop studies on regional ecological setting

The consultant referred to IFC standard 6 for the criterion on CH determination as presented below.

3.2.1 IFC Critical habitat determination

The targeted project area, which is well endowed with a rich and varied biodiversity was assessed for critical habitats presence using the IFCs Ps6 standards. These standards relate to existing ecological setting in terms of ecological zones, habitats and protected and designated areas (PDAs). Towards this a literature review was carried out to define the habitats before ascribing the IFC's Ps6 standards. The following criterions were used:

Criterion 1: Habitat of significant importance to Critically Endangered and/or Endangered species.

Criterion 2: Habitat of significant importance to endemic and/or restricted-range species.

Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species.
Criterion 4: Highly threatened and/or unique ecosystems
Criterion 5: Areas associated with key evolutionary processes

With these definitions in mind, EAAA's were defined for the individual road projects, juxtaposed with the development AOI, taking into consideration intrinsic biodiversity values, ecological processes and respective ecosystem services the habitats provided. The CH potential was then evaluated through the study of relevant literature, project documents, and analyzing secondary data on IUCN and CITES sites, GIS and Remote Sensing data. Biodiversity values were screened according to the CH Criteria thresholds defined by IFC Guidance Note (GN) 6 presented here in Table 3.3.

Table 3.3 Critical habitat thresholds used to designate CH qualifying Species/Habitats

Criteria	Index	Threshold
Criterion	1(a)	Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species).
	1(b)	Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in criteria 1(a)
	1(c)	As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.
Criterion 2	2(a)	Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species
Criterion 3	3(a)	Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle
	3(b)	Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress
Criterion 4	4(a)	Area representing ≥5percent of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.
	4(b)	Areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning
Criterion 5	5(a)	Areas of key evolutionary processes defined by: - The physical features of a landscape that might be associated with particular evolutionary processes, and/or - Subpopulations of species that are phylogenetically or morpho genetically distinct and may be of special conservation concern given their distinct evolutionary history. The latter includes evolutionarily significant units and Evolutionarily Distinct and Globally Endangered (EDGE) species.

The screening process also integrated experts' knowledge, stakeholder's insights through FGDs. The consulted specialists have been covered in section 1.7. The screening resulted in the identification of biodiversity values with high potential of triggering CHs. These values are further

assessed to determine whether they trigger CHs according to the Ps6 criteria thresholds. The assessment is further exposed to expert opinion and relevant stakeholders.

3.3 Regional Ecosystems

The following regional ecosystems are considered vulnerable and they affect the project area and its greater environs.

3.3.1 Eastern Afrotropical Ecoregion (Ethiopia, Eritrea, Kenya, Somali & Sudan),

The Eastern Afrotropical Ecoregion covers a majority of the horn of Africa and includes the northern Kenya semi deserts as well as the Ogaden desert. The temperatures in the area rise to a high of 30^0c going up to 42°c in the driest seasons and a low of 15^0c while the rainfall ranges from 100mm to 600mm. The ecoregions habitats vary from scrubs, woodlands grasslands and deserts. Due to its dry nature, most of the agriculture is practiced long waterbodies leaving a huge part of the ecosystem un-fragmented and high in biodiversity. The area is home to many arid adopted species including a rich large mammal Fauna. There are more than 1250 recorded plant species with some of them being endemic (White, 1983). There are many protected areas in the ecoregion with some being home to few remaining populations of desert dwelling fauna. The parks in the area which include the Malka Mari in Kenya, the Alifuuto in Somali and Chew Bahr wildlife reserve are not well protected leading to a lot of poaching and excessive harvesting of trees (Barnes et al., 1999). According to Kingdom (1989), most of the vegetation in the area, especially the riverine vegetation is extremely degraded as a result of overgrazing.

3.3.2 Somali-Masai Floristic biome (considered centre of endemism)

This region encompasses a large part of Eastern Africa as well as the South-Western part of Arabia. It includes the whole of Djibouti and Somalia, most of lowland Ethiopia, south-eastern Sudan, a large part of Kenya excluding the highlands and the coastal belt, the north-eastern corner of Uganda and the dry lowlands of central and northern Tanzania

The natural vegetation of much of the area is deciduous *Acacia-Commiphora* bushland and thicket; much of the northern part is very arid with semi-desert grassland and scrub while the moister south-western part supports a mosaic of climax evergreen woodland and secondary Acacia savannah and open woodland, (World Bank, 1993).

- The region is dry receiving less than 500mm of rainfall on average
- The habitat is fragile and sensitive to disturbance due to prevailing environmental conditions
- Area acts as migratory/dispersal area for wildlife utilizing protected area in the region, e.g., Malka Mari National Park, Gerale NP (in Somali)

3.3.4 Horn of Africa biodiversity hotspot

According to Bellard et al., (2014), the horn of Africa biodiversity hotspot is one of the arid biodiversity hotpots in Africa. It covers parts of Kenya, Somali and Ethiopia. The region has an array of ecosystems varying from open woodlands, mangroves, shrubs, savannahs as well as the tropical

grasslands. The area is home to over 2700 endemic plant species (Marshall et al., 2016). The region also hosts more than 220 mammal species with most of them being threatened as well as over 285 bird species.

3.3.5 Ecological Zone of the project area

According to the Wajir CIDP (2018-2022)**,** Wajir County is a semi-arid area falling in the ecological zone V-VI. Zone V receives rainfall between 300-600mm annually, has low trees, grass and shrubs. On the other hand, zone VI receives an annual rainfall of 200-400mm. Overall, the county receives an average of 240 mm of rainfall per year which is erratic and short making it unfavorable for vegetation growth and rain fed agriculture. There are two rainy seasons i.e., short and long rains. The short rains are expected between October to December and the long rains from March to May each year. Cropping activity is evident in the Lorian swamp and along the drainage lines in Bute. The main crops grown in the area are sorghum, beans, fruits and vegetables. The average annual precipitation is 240 mm. The higher areas of Bute and Gurar receive higher rainfall ranging from 500mm to 700mm. The average temperature is 27.9 °C. The County experience frequent drought episodes especially from June to September, which impact negatively on livestock, crop farming, education, nutrition, access to water and pasture. On the other hand, the county also experiences flash floods, which damages infrastructure and kills the shoats (goats and sheep) during the enhanced rainy seasons or high tide flooding or heavy rainfalls in the Ethiopian highlands. The frequency and intensity of the extreme climatic events has been increasing in the recent past disrupting the livelihood of the communities.

The Mandera CIDP (2018-2022) reveals that, Mandera County has two ecological zones namely, arid and semi-arid. Up to 95% of the county is semi-arid with dense vegetation consisting mainly of thorny shrubs and *Prosopis juliflora* (*Mathenge)* bushes along foots of isolated hills and fallow land. Temperatures are high with a minimum of 24° C in July and a maximum of 42°C in February. Variation in altitude is the cause of differences in temperatures across the county, where places near Banisa Constituency experience low temperatures due to neighboring highlands in Ethiopia. Rainfall is scanty and unpredictable, averaging 191.7mm annually. The long rains fall in April and May averaging 69.1mm, while the short rains fall in October and November averaging 122mm. Most parts of the county experience long hours (approximately 11 hours) of sunshine in a day. This causes high evaporation rates, leading to withering of most of the vegetation before they mature. The long sunshine hours in the county has great potential for harnessing solar energy.

3.4 Habitats Intersecting the project area

It is imperative to juxtapose the projects AOI and the existing habitats in the area, since the biodiversity features and ecosystem services will relate directly to the impacts of the changes the project will bring about.

3.4.1 The Modogashe-Samatar road corridor

This project site habitat can be characterized as follows:

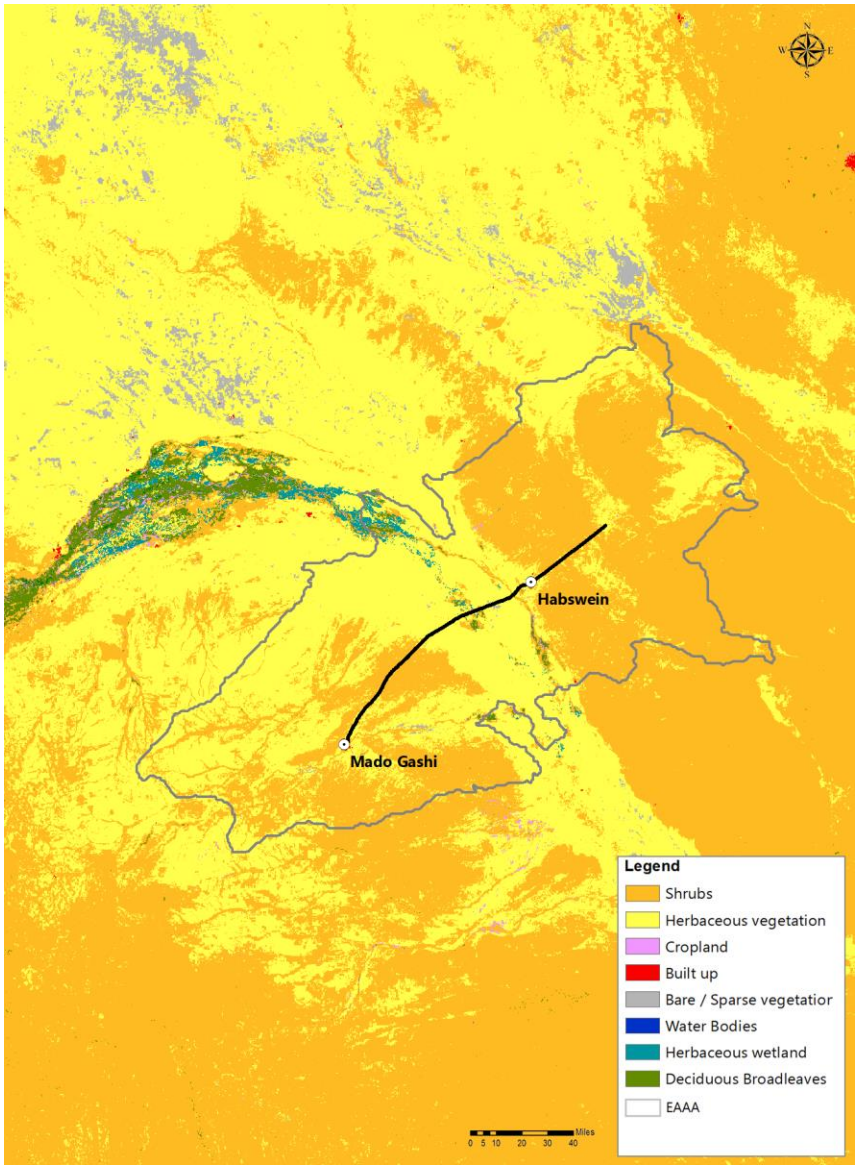
3.4.1.1 Vegetation of the project area

The vegetation of the greater project area varies with the landforms that obtains in the area viz: the Ewaso Ng'iro north river floodplain that drains into the Lorian swamp and the vast Ewaso Ng'iro grass plains. The areas forming the upper terrace of the Ewaso Ng'iro river floodplain (Immediate south of Habasweini to Lagdima) is also dissected with many small to medium shallow interfluves that support vegetation growth and laggas that drain the area seasonally.

Plate 3.1: Clockwise from top: Grants grazing in Lorian Swamp habitat, Ostriches feeding in the Ewaso Ngi'ro north plains, Giraffe spotted in the Acacia-Commiphora habitat near Modo Gashe and Gerenuk spotted in Lorian swamp.

In this area, vegetation is mostly woodland that supports a closed *Acacia woodland vegetation (A. tortils, A. zanzibarica)* along the upper terrace of the Ewaso Ng'iro river floodplain/Lorian swamp and as you move further from the fringes, the vegetation alters to open *Acacia-Salvadora shrubland and Salvadora-Phyllunthus/Balaria shrubland*. The vast plains are predominantly grasslands and wooded grasslands with the dominant woody vegetation being *Acacia zanzibarica*. This habitat also harbors a herbaceous vegetation that supports the large herds of Grant gazelles and Ostriches. Towards Modogashe in the drier zone, the vegetation changes to *Acacia-Commiphora shrubland* the dominant acacia species being *Acacia reficiens, Acacia horrida and Acacia elatior*. Near settlements and by the roadside the invasive plant *Prosopis juliflora* is found in linear formation and in clusters

near the roadside and settlements respectively. It is notable that *Acacia zanzibarica* has also adopted this formation along the road and other vegetal species do not establish in these areas, where it grows making it undesirable.



Map 3.1: Map showing the vegetation of the project area that encompassed the EAAA

Table 3.4. shows some of the vegetation identified in the Modogashe-Samatar road corridor and the Ewaso Ng'iro catchment during field studies. Some specified species were sampled for further identification at the NMK

Table 3.4: Woody and Herbaceous vegetation in the Habitats of the project area

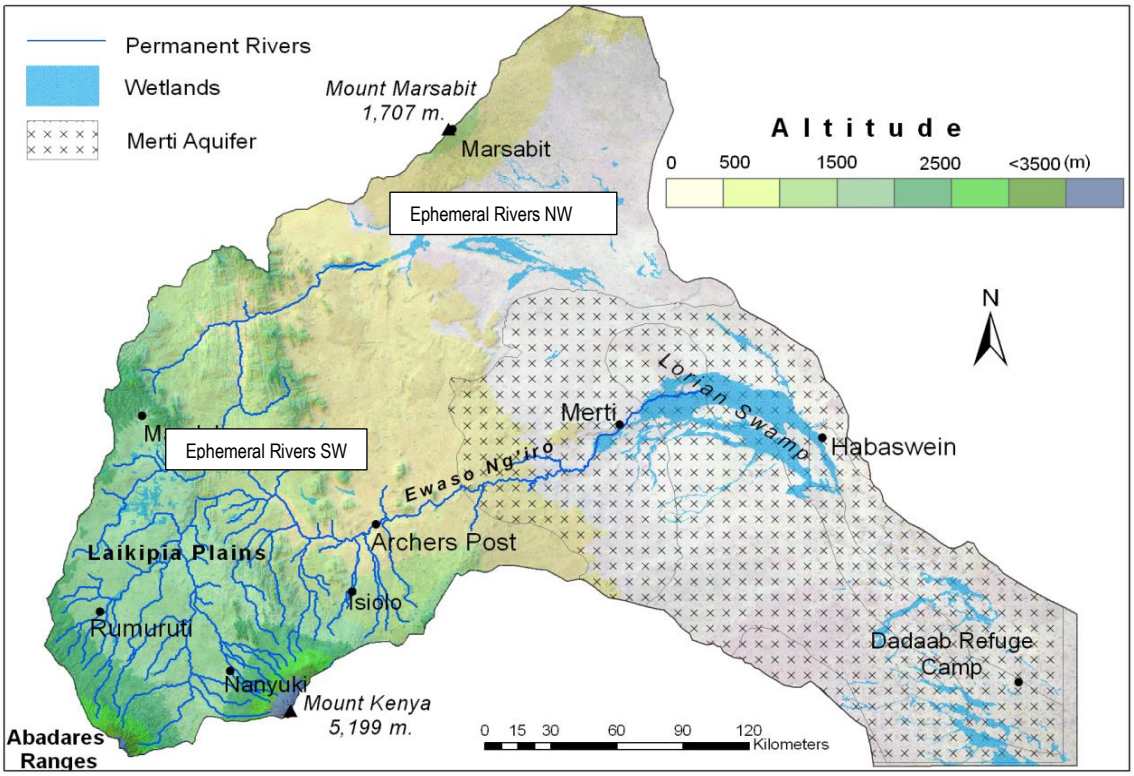
Woody vegetation (Shrubs and trees)	Herbaceous vegetation (Forbs and grasses)
Acacia Elatoir	*Helitropium longiflorum*
Acacia Horrida	*Urochloa panicoides*
Acacia nubica	*Cyperus kilimandascus*
Acacia reficiens	*Solunum incanum*
Acvacia Senegal	*Cynodon spp*
Acacia zanzibarica	*Brachiaria leersoides*
Acacia tortilis	*Indigofera spp*
Boscia angustifolia	*Molugo naudicaulis*
Commiphora Africana	*Amaranthus spp*
Cordia africana	*Sedera hersuta*
Euphorbia spp	*Tragus berteronianus*
Grewia tenax	*Berleria ancathoides*
Maerua spp	*Commelina bengalensis*
Phyllanthus somalensis	*Ipomea spp*
Prosopis juliflora	*Cormicapus spp*
Salvadora persica	
Solanum coagulans	
Solanum incanum	

3.4.1.2 Soils

From field observations, the soils of the project area, northeast of Habasweini to Kanjara are greyish brown, cracking clays with weak surface crusts, and as you move further north the soils alter to yellowish brown sandy soils with a firm surface sealing. The trend is the same as you move south westwards past the Lorian swamp area. The change from clay soils with surface cracks to sealing sandy loam to sandy clays occurs towards the drier parts of Modogashe.

3.4.1.3 Drainage

The Ewaso Ng'iro North River, which is mid-sized and semi-permanent river, is the most important wetland in this basin. The river drains from Mount Kenya and the Aberdare Range in the central Kenya highlands and flows eastward into Somalia, running alongside the Lorian Swamp. The ephemeral seasonal rivers found to the north-west and south-west also drain into the Ewaso Ng'iro north river. The project area's meso-relief is nearly level and in places gently undulating and generally consists of a flood plain. It experiences seasonal flash floods during the rainy seasons rendering sections of the road impassable especially in area near the Lorian swamp and the Borji swamp. Surface water bodies include dams and water pans. There are also a few boreholes that serve the area, mostly community based.



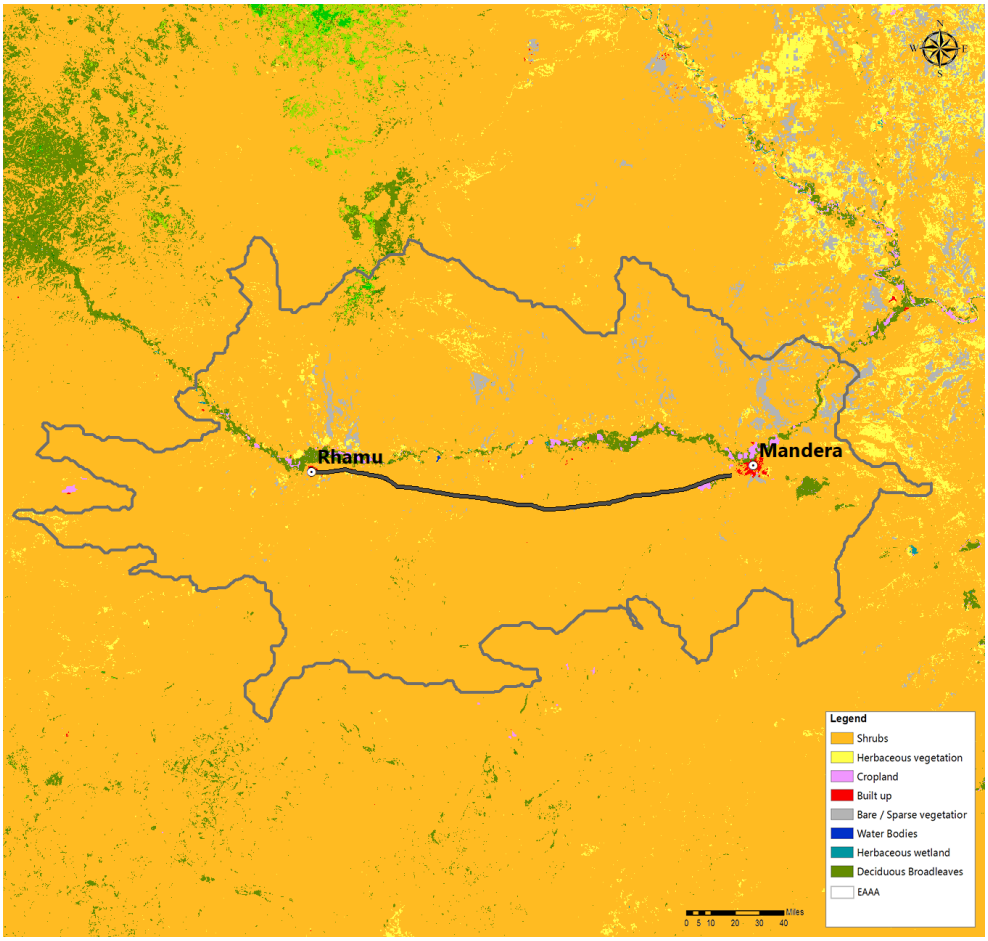
Map 3.2 Drainage Map showing ephemeral rivers that drain into the Ewaso Ng'iro north River that in turn drains into the Lorian swamp (Source: Leeuw et al., 2012)

Plate 3.2 Earth dam near Habasweini that serves the community needs, livestock and also shared by wildlife like the captured desert warthog

3.4.2 The Rhamu-Mandera Road corridor

The project area is characterized by low lying rocky hills located on the plains that rise gradually from 400 meters above sea level in the south at Elwak to 970 meters above sea level on the border with Ethiopia. The rest of the topography is low lying, characterized by closed Acacia woodland vegetation and Acacia shrubs. The road cuts through a hilly landscape with steep gradient from Rhamu towards Mandera. Mandera town is the highest point of the road at 400 meters above the sea level. The

Vegetation at the outskirts of Rhamu town and along the seasonal streams is dominated by closed *Prosopsis juliflora* shrubs, transiting into a woodland formation to Open *Acacia tortilis* intermixed with *Acacia mellifera*. At Quimbiso village through Caro village and Garbaqoley, the vegetation community transits into an open woodland formation dominated by *Terminalia orbi* (Bissik) intermixed with *Acacia xanthophloea* especially along the streams and flood plains.



Map 3.3.Vegetation map of the Rhamu-Mandera road that encompasses the EAAA

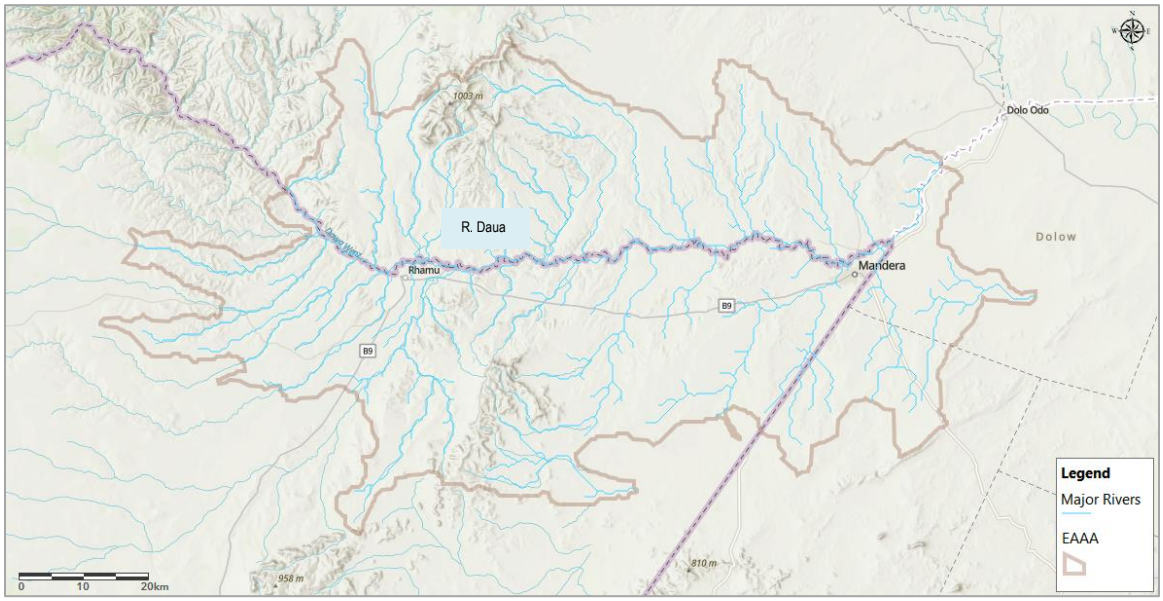
3.4.2.1 Soils of the project area

Generally, the soils found along the Rhamu–Mandera road corridor are deep, gravelly, sandy loam to sandy clay loams with surface stones and small rock out crops. Some areas have clay soils with impeded drainage while others have shallow soils (Leptosols) overlying impermeable layers of base material. Most of these soils exhibit salinity and/or sodicity at various thresholds. Areas adjacent the Daua river have fertile silty clays that are good for crop production.

3.4.2.2 Drainage

The drainage within the project area mainly consists of seasonal laggas and the more permanent River Daua. Daua river flows from the Bale mountains in Ethiopia across the border. The river joins

with Rivers Ganale and Gestro that flow southward from the Bale mountains in the north, to form Jubba River that flows south eastwards into Somalia. Most of the streams and laggas have a northeasterly flow into River Daua which in turn flows eastwards to Somalia. Other drainage features consist of water pans found around Rhamu and Mandera areas.



Map 3.4: Drainage map of the project area

3.4.3 Ewaso Ng'iro north catchment and the Lorian Swamp

3.4.3.1 Soils of the project area

The soils of the Lorian Swamp area from Skanska to Habasweini are imperfectly drained, very deep, dark grey, very firm, slightly calcareous, cracking clay, with a slightly to moderately saline and sodic deeper subsoil. From Lagdima to Lagh Bogol the soils are imperfectly drained, moderately deep brown, extremely firm, moderately calcareous, moderately sodic clay loam with a top soil of sealing sandy loam (Sombroek et al., 1982).

3.4.3.2 Drainage characteristics and water retention

According to Oord et al., (2014), the Ewaso Ng'iro River drains the northern and western slopes of Mount Kenya and the NE slopes of the Aberdares. At Archer's Post (north of Isiolo), the mean annual flow was approximately 633 million cubic metres per year during the period 1949-1990. After the Ewaso Ng'iro River becomes ephemeral, it is referred to as the Lagh Dera. The ephemeral river floods irregularly. In the 1950's the Lagh Dera was known to flood the Lorian Swamp near Habasweini regularly. However, increased water subtractions and changes in climate have caused a now irregular and less frequent flooding of this area. Currently, the swamps have retreated many kilometers upstream, decreasing the perennial swamp size from 150km^2 to 39km^2. According to Leeuw et al., 2012, The river passes through the Laikipia plateau and Archer's Post beyond which it

crosses an undulating plateau where it changes in an ephemeral river to discharge its waters near Merti into the Lorian Swamp. Mean annual rainfall over the swamp is 180–250 mm, but precipitation is highly variable. Several ephemeral rivers (Wadis) from the SW and NW supply the swamp with additional water.

This study has determined that over time water volume within the wetlands has reduced by approximately 46% while the healthy vegetation has reduced by approximately 88% in 34 years (Figure 3.5). Leeuw et al., (2012), observes that the swamp is situated in a 2310 km^2 depression, 196 km long and 25 km wide, yet the inundated area is smaller and expands and contracts with river discharge and rainfall over the swamp and affects the surrounding vegetation. In recent years, the western part of the swamp is frequently flooded as opposed to the Eastern part of the swamp (Figure 3.5). The healthy vegetation provides water and forage to people and livestock particularly in the dry season.

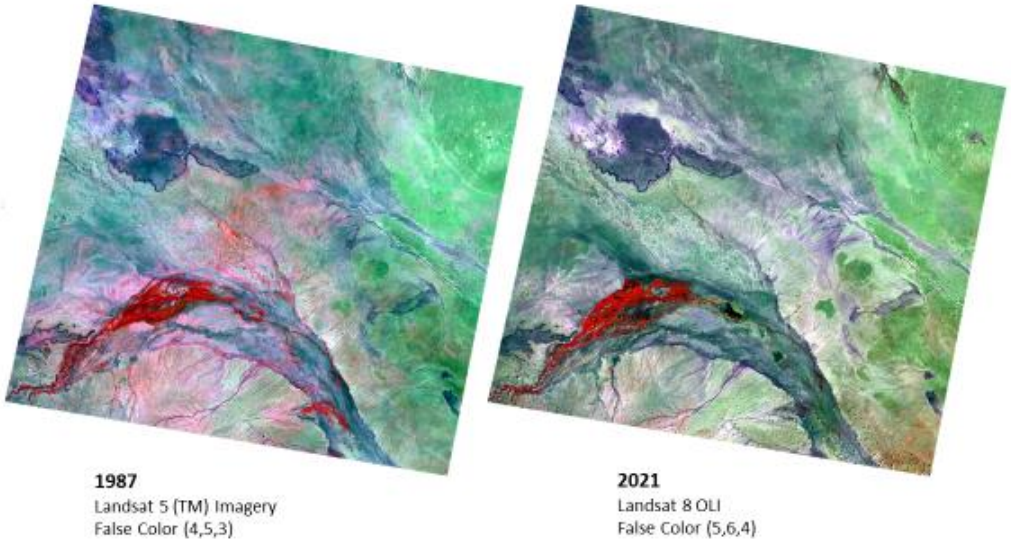


Figure 3.1: (A) False color composite image of the study region in 1987. (B) False color composite image of the study region in 2021. Notice the reduced bright red patches in image B. This indicates a considerable reduction in healthy vegetation between 1987 and 2021.

The Landsat images were taken during the dry season between January and February for accurate seasonal comparison across the years. The bright red patches indicate healthy vegetation. The spread of the red patches in the 1987 imagery depict that there was enough moisture or water to sustain vegetation throughout the year, even during the dry season. Reduced red patches in 2021 indicate reduced water quantity within the catchment.

Over the years the Lorian swamp has been drying up due to degradation of vegetation upstream via overgrazing and excessive abstraction of water upstream. Although the area receives average annual rainfall of 150-600 mm, this is highly variable, making flooding and drought recurrent in the

area (Tutana, 2019). Ranging from 24° C to 30° C, the mean annual temperature is quite high with the result that evaporation can be ten times the annual rainfall in some locations (Tutana, 2019). Previously, the wetlands used to maintain healthy and robust vegetation even during the dry season. Consequently, there has been some adaptation with a substantial increase in the seasonal vegetation. This suggests that over time the perennial vegetation has transformed into seasonal vegetation.

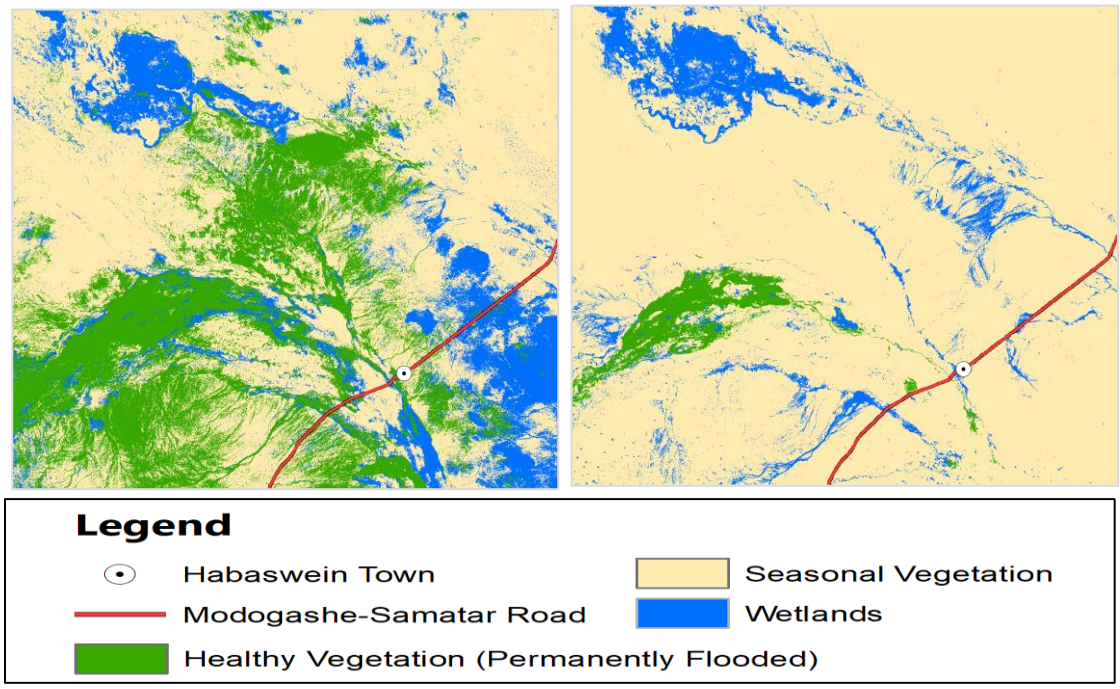


Figure 3.2: Shows the considerable reduction in wetlands from 1987(Figure A) to 2021 (Figure B). The blue patches represent the wetlands

The Ewaso Ng'iro catchment experiences different anthropogenic and natural pressures, which are summarized in the table below.

Table 3.1 Ewaso Ngi'ro North Basin, Major Wetlands, Land use and Pressures bearing on the Basin and its Impacts (Source: Kenya Wetland Atlas; MEMR, 2012)

Basin & Basin area (sq. km.)	Major wetlands	Major land /wetlands uses	Pressures	Impacts
Ewaso Ng'iro North 213731 sq.km	• Lorian Swamp • Ewaso Ngiro rivers • Lake Ol Bolossat • Amala river • Habasweini swamp	• Large scale commercial farms • Pastroralism, • Ranching, • Wildlife conservancies, • Oil and gas exploration, • Forestry, • Grazing, • water supply, • Fish farming, • Tourism	• Inappropriate land use • Overutilization of water • Conversion of land to agriculture • Overstocking of livestock • Settlements • Loss of catchment forests • Increased demand for resources • Reduced water levels • Land subdivision and fragmentation	• Pollution • Soil erosion/siltation • Overgrazing • Reduced water volume

3.4.4 Protected and Designated Areas

The IFC Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of living natural resources, states that Internationally and/or nationally recognized areas of high biodiversity values can trigger CHs. Such areas include, *inter alia,* IUCN Protected Areas (Categories Ia, Ib and Ic), Ramsar Sites (RS), Key Biodiversity Areas (KBAs), Important Bird Areas (IBAs), World Heritage Sites (WHS), Alliance for Zero Extinction Sites (AZEs), and National Protected Areas [(The Wildlife Conservation and Management Act (2013)].

Accordingly, Malka Mari National Park lies along the Kenya-Ethiopia border along the Daua River, The Park has an area of 1,500 km^2 and it is an IUCN Category II Park. The Park is mostly semi-arid bushland and scrubby grassland with riparian woodland along the river. It is within the the Rhamu – Mandera road AOI. The Park supports a varied wildlife that include the Reticulated Giraffe (*Giraffa camelopardalis*) - EN, Gerenuk (*Litocranius walleri)* (NT) and White-winged Collared-dove (*Streptopelia reichenowi*) – NT among others.

Bogol Manyo-Dolo is found in the Genale river basin in El Kere Zone and covers an area of 430,000 Ha. It is close to the meeting point of the Ethiopian, Kenyan and *Somalia* borders. The site holds the only known population of Gillette's lark (*Mirafra degodiensis)*-LC. Further, White-winged –collared dove *(Streptopelia reichenowi)*-NT, that occurs along the Genale river, is uncommon, while Philippa's crombec (*Sylvietta philippae)*-DD, known from only three locations in Ethiopia, is considered rare. It is classed as an Important Bird Area (IBA) under IBA Criteria A1, A2 and A3. Consequently, it is also a Key Biodiversity Area. The Rhamu-Mandera Road's EAAA intersects its designated area. Somali–Masai biome species found at this site include Juba Weaver (*Ploceus dichrocephalus)*-LC, Spmali bee-eater (*Merops revoilii)*-LC, Scaly Chatterer (*Turdoides aylmeri)*-LC, Golden pipit (*Tmetothylacus tenellus)*-LC and Black-bellied sunbird (*Nectarinia nectarinioides)*-LC. The White-headed Mousebird (*Colius leucocephalus)*-LC, Blue-capped Cordon-bleu (*Uraeginthus cyanocephalus)*-LC and Fischer's Starling (*Spreo fischeri*)-LC are all known from the Dolo

area. Water Thick-knee (*Burhinus vermiculatus)*-LC, is expected to occur in the site along the Genale river. In terms of species, it meets the following IBA Criteria: A1 three species, A2 two species and A3 thirty-six species. The IBA/KDA is within the Rhamu-Mandera AOI.

The project area also harbours community conservancies at Habaswein, Sabuli, Chachabole & Rhamu which however have not been evaluated.

3.4.5 Habitats Designation in the project area

From above analysis the habitat existing in the project area are modified (natural) habitat and critical habitat according to IFC guidance Note 6 (GN6 (16 and 11). Settlement areas especially Modogashe, Habasweini, Rhamu and Mandera have a large population and due to anthropogenic activities, have attracted the invasive plant species, *Prosopis juliflora*, which has colonized a sizeable area in the Rhamu-Mandera road corridor and further afield. Additionally, farming practices, grazing of livestock and human traffic in the relatively higher density population areas, have interfered with ecological functions. For example, the Grevy's zebra that used to be present in the project area has since been extirpated from the region and migrated further south towards Isiolo. According to FGD's the Oryx also prefers to graze further afield from herders and their livestock. This is corroborated by Mungoche J.M. (2019) In a study he carried out in Nakuprat Gotu conservancy; he observed that encroachment of livestock herders into the conservancy, was a threat to the remaining Beisa oryx. Direct competition for habitat resources such as salt licks, grazing lands and watering points posed a great danger for this species. This means that for the project area, the further the herders move with their livestock from their traditional grazing grounds, into areas occupied by the oryx, the Oryx invariably extends its EOO.

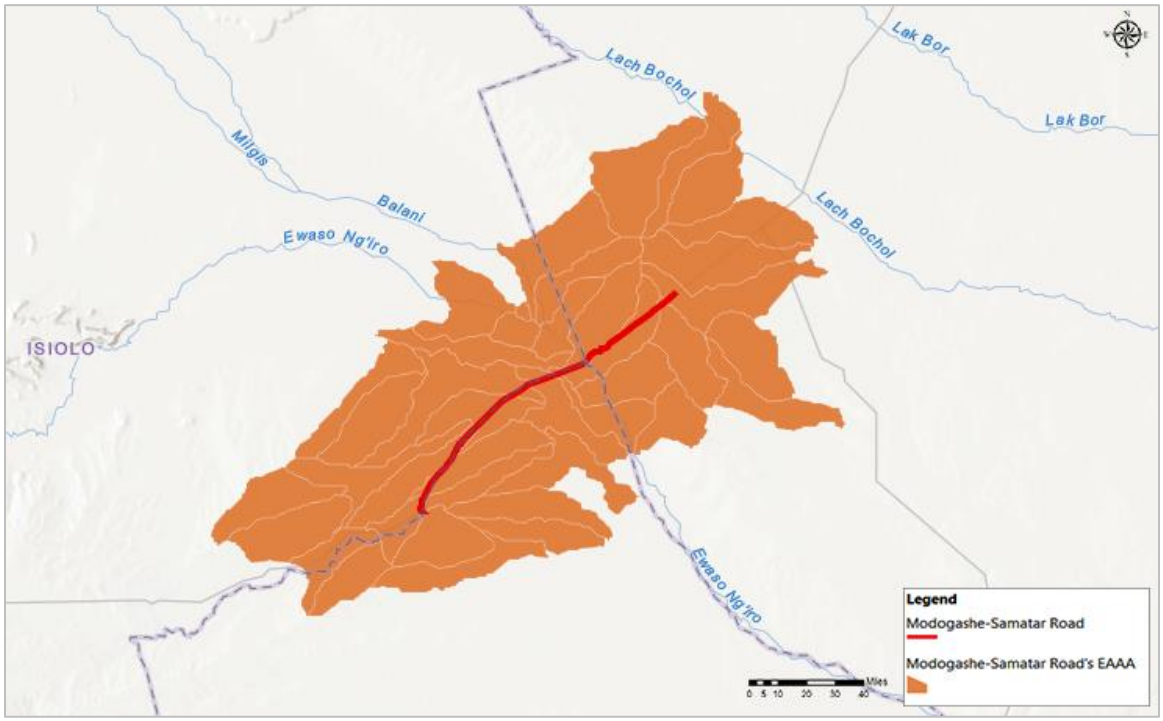
3.4.6 Vegetation loss in the designated Habitats

The new road alignment with a ROW (60m) entails the cutting of vegetation from the Natural and Modified habitats along the road traverse. However, since the modified habitats consist mostly of settlements and their environs consist of agricultural farms; these areas are degraded and denuded of vegetation. It follows, then, that the effect of the vegetation excision would be negligible. Consequently, the vegetation loss was calculated for the Natural Habitats for both roads using the Quality Metrics method. From the road centerline, 6.5m (carriageway) was deducted and 2m added on either side of the shoulders, making it 10.5M of the width covered by the road carriage. Since ROW of the road is a maximum of 60m, with the exception of town/settlement areas (which reduce to 40m), irrespective of this, 10.5m was deducted which makes the 'total width' represented by the roadside vegetation to be 49.5m which is constant along the road alignment as far as the study (road vegetation) is concerned. The truncated vegetation was determined using the quality metrics method. In this case, Quality Hectares (QH) is a condition-extent biodiversity metric comprised of habitat area (extent) and habitat quality (condition). It is calculated for each portion of a habitat by: QH = Area of habitat (hectares) × ecological condition (quality) of the area Ecological condition or 'quality, expressed on a scale of 0-1, with 1 representing the 'pristine' reference condition of that

habitat (100% cover), and 0 (0% cover) representing complete habitat losses. The ecological condition considered was vegetation cover. Thus, the results obtained for the excised vegetation were multiplied by the cover 'quality condition' factor. If the cover obtained was 45% for a particular species, then the factor considered was 0.45 for the ecological condition to be multiplied by area assessed. From this, the Modogashe-Road corridor assessed upon development, would lose the equivalent of approximately 128Ha, while the Rhamu-Mandera road corridor would lose ~173Ha.

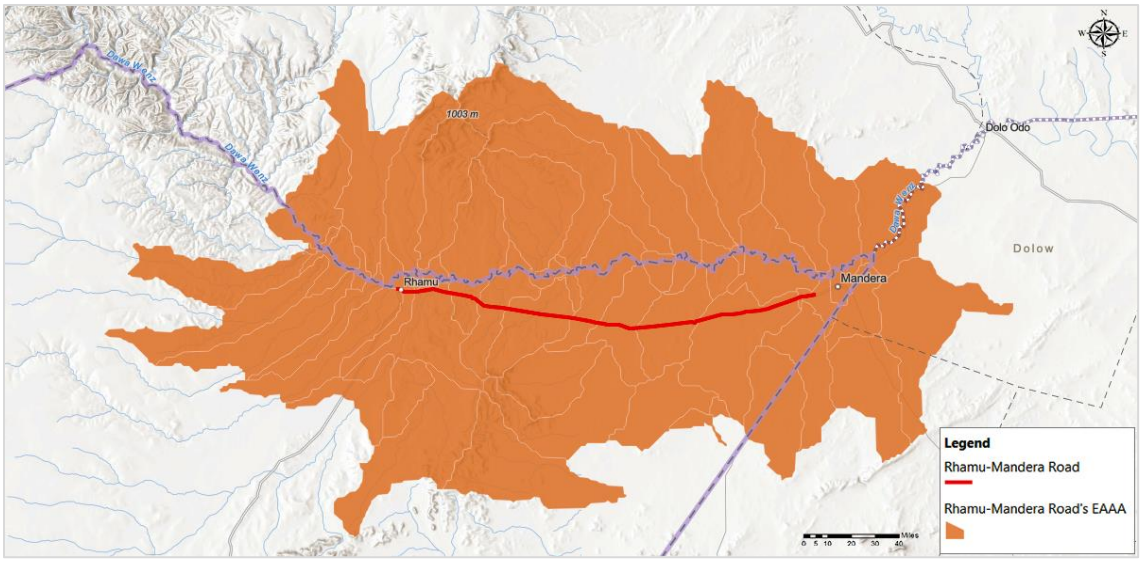
3.5 Screening of the Ecologically Appropriate Areas of Analysis (EAAA).

The Ecologically Appropriate Areas of Analysis (EAAA) were defined based on the water sub-basins. This is because any alterations in the hydrological cycle would have major consequences not only to the flora and fauna but also to the communities living in these zones and would also impact local economies. Water basins act as an ecological and key ecosystem function. The Modogashe-Samatar Road's EAAA covers a total area of 5504.75942Km^2



Map 3.5: The Modogashe-Samatar road's EAAA

The Rhamu-Mandera EAAA is also dependent on the drainage characteristics of the area. It covers the ephemeral rivers that drain onto the Daua river and past the river into the river basin on the Ethiopian side. The Daua sources its waters from the Bale mountains in Ethiopia to the north and flows along the Kenyan border to Somalia where it confluences with Rivers Ganale and Gestro from Ethiopia whose source is the Ahmar mountains, forming the river Jubba that flows southwards into Somalia.



Map 3.6: The Rhamu-Mandera road's EAAA

The Rhamu-Mandera road's EAAA covers a total area of 6010.084 Km^2

CHAPTER 4: POTENTIAL CH QUALIFYING SPECIES AND SPECIES OF CONCERN IN THE EAAAS OF BOTH CORRIDORS

Following the assessment of the habitats and biodiversity found in the EAAAs, expert consultation, stakeholders' interviews, and literature review, our study revealed the following potential CH qualifying species and species of concern.

Table 4.1 Potentially CH Qualifying species

Common Species Name	Scientific Name	Conservation Status
Mammals		
African elephant	*Loxodonta africana*	EN
African wild dog	*Lycaon pictus*	EN
Beisa oryx	*Oryx gazelle beisa*	EN
Reticulated giraffe	*Giraffa reticulata*	EN
Somalia White-collared Monkey	*Cercopithecus mitis ssp. zammaronoi*	CR
Grevy's zebra	*Equus grevyi*	EN
Northern White Rhino	*Ceratotherium simum ssp.cottoni*	CR
Black Rhino	*Diceros bicornis*	CR
Eastern Black Rhino	*Diceros bicornis ssp.michaeli*	CR
Mountain Reedbuck	*Redunca fulvorufula*	EN
Hildegarde's Tomb Bat	*Taphozous hildegardeae*	EN
Birds		
White headed Vulture	*Trigonoceps occipitalis*	CR
Hooded vulture	*Necrosyrtes monachus*	CR
White-backed vulture	Gyps africanus	CR
Rüppell's griffon	*Gyps rueppelli*	CR
Secretary bird	*Sagittarius serpentarius*	EN
Egyptian Vulture	*Neophron percnopterus*	EN
Lappet-faced vulture	Torgos tracheliotos	EN
Bateleur	*Terathopius ecaudatus*	EN
Martial eagle	*Polemaetus ardicosus*	EN
Steppe Eagle	*Aquila nipalensis*	EN
Grey Crowned Crane	*Balearica regulorum*	EN
Basra Reed-warbler	*Acrocephalus griseldis*	EN
Madagascar pond heron	*Ardeola idae*	EN
Reptiles		
-	-	-
Fish		
Ewaso Nyiro labeo	*Labeo percivali*	VU - Endemic
Boji Plains nothobranch	*Nothobranchius bojiensis*	VU - Endemic
Ewaso Nyiro barb	*Enteromius mimus*	LC - Endemic

Common Species Name	Scientific Name	Conservation Status
Plants		
-	*Ethulia scheffleri*	EN
Olubaporo	*Sphaeranthus samburuensis*	EN
-	*Sclerocarya gillettii*	EN
-	*Lagarosiphon hydrilloide*	EN

The following are some species identified in this category found in the area of study.

Plate 4.1: Clockwise from Top: Giraffe seen near Samatar, another crossing road near Habasweini, Beisa oryx at the fringes of the Ewaso Ng'iro plain, Lappet faced vulture on the road besides a marabou stock

Table 4.0 Other Species of concern in the project area

Common name	Species name	Conservation status
Mammals		
Lion	*Panthera leo*	VU
Cheetah	*Acinonyx jubatus*	VU
Striped hyena	*Hyaena hyaena*	NT
Black backed jackal	*Canis mesomelas*	LC
Desert warthog	*Phacochoerus aethiopicus*	LC
Fringe-eared Oryx	*Oryx beisa ssp. callotis*	VU
Gerenuk	*Litocranius walleri*	NT
Lesser kudu	*Tragelaphus imberbis*	NT
Birds		
Somali ostrich	*Struthio molybdophanes*	VU
Common pochard	*Aythya ferina*	VU
Tawny eagle	*Aquila rapax*	VU
Kori bustard	*Ardeotis kori*	NT
Bearded Vulture	*Gypaetus barbatus*	NT
Sothern banded snake eagle	*Circaetus fasciolatus*	NT
Pallid Harrier	*Circus macrourus*	NT
Williams's Lark	*Mirafra williamsi*	LC
Kikuyu White-eye	*Zosterops kikuyuensis*	LC
Reptiles		
Africa Rock Python	*Python sebae sebae*	DD
African softshelled turtle	*Trionyx triunguis*	VU
Somali kassina	*Kassina somalica*	LC
Painted agama	*Agama persimilis*	LC
Parker's Running Frog	*Kassina maculifer*	LC
Fish		
Elephant-snout fish *	*Mormyrus kannume*	DD
Somalian giant catfish	*Pardiglanis tarabinii*	DD
Widehead catfish	*Clarotes laticeps*	LC
African Mottled eel	Anguilla bengalensis	NE

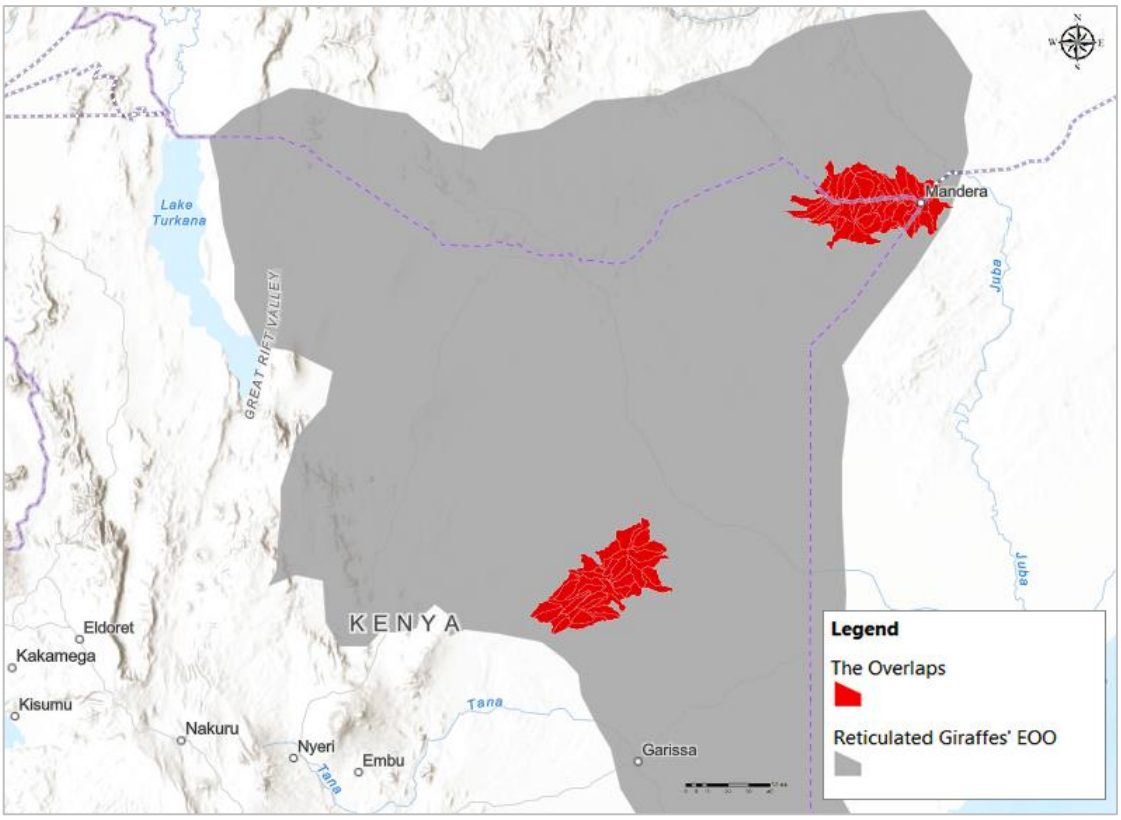
*(https://www.fishbase.de/summary/Mormyrus-kannume.html)

The following are some species identified in this category found in the area of study.

Plate 4.2: Desert warthog at a water spot in Habasweini, Black backed jackal at a wooded grassland patch of the Ewaso Ngi'ro north plains

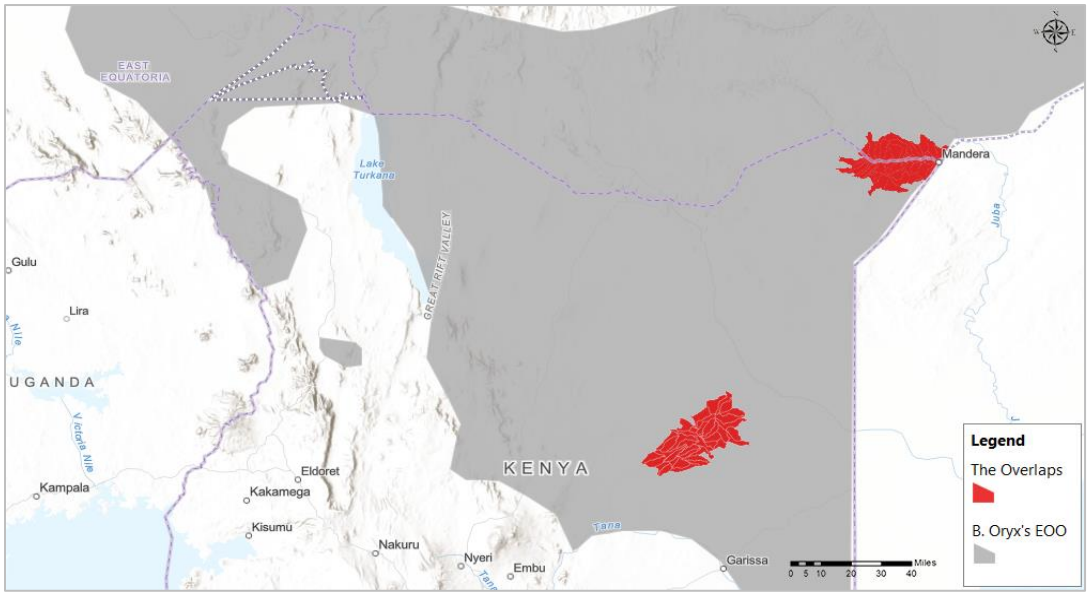
4.1 CH Qualifying Species and features

Following the potential for CH determination, the biodiversity features that qualify for CH, were analyzed guided by the IFC standard 6 and Guidance Note 6, for CH disaggregation and through expert knowledge. The EOO of the species was mapped out within the EAAAs and information on population dynamics were incorporated to check if they met the CH-qualifying criteria. The reticulated Giraffe, the Oryx and the Grevy's zebra were assessed based on the existing information. The Maps below show the EOO of these CH-qualifying species against the EAAA.



Map 4.1: Reticulated Giraffe EOO Intersect with the project's EAAA

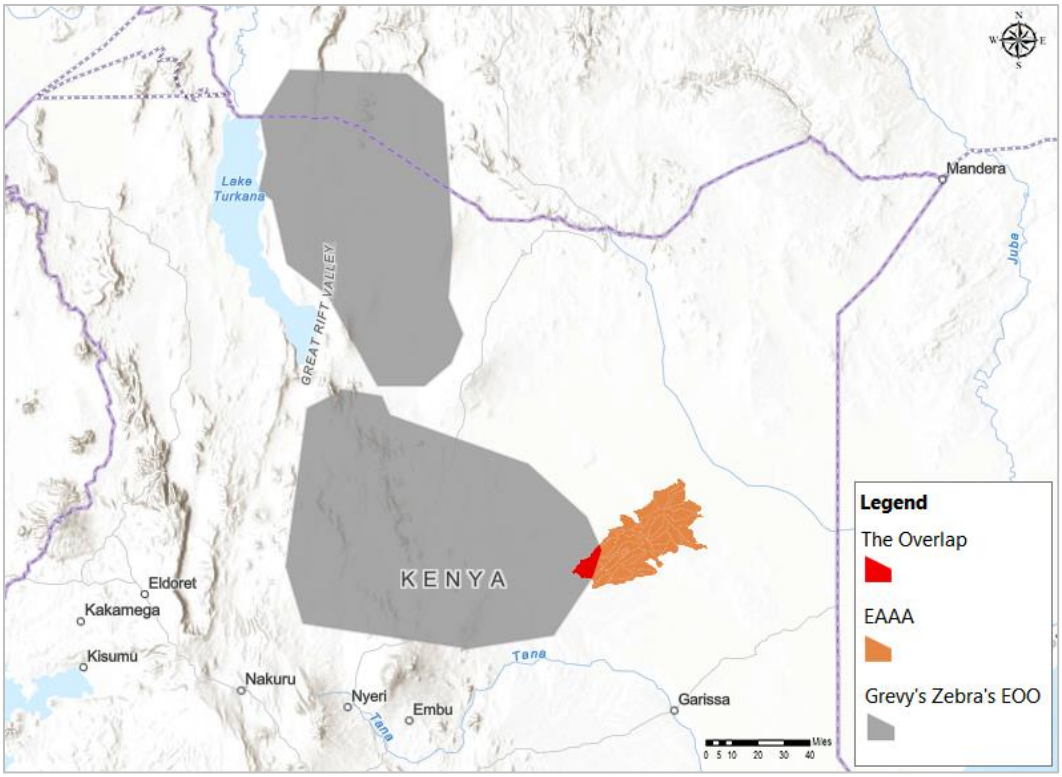
According to Muneza et al., (2018), the Reticulated giraffe (*Giraffa reticulata*) has a relatively limited distribution across northern and north-eastern Kenya, and small restricted populations most likely persist in southern Somalia and southern Ethiopia.
An estimate of 15,950 individuals remain in the wild, a decline of over 50% from the approximate 36,000 individuals that occurred three decades ago. Wajir county has about 40% of the existing population. The road projects EAAA intersects 6010.084 Km^2 of the reticulated Giraffes' EOO. The Modogashe –Samatar road also transects through a dense Reticulated Giraffes AOO, making it a CH-qualifying species under criterion 1a.



Map 4.2: Beisa Oryx EOO Intersect with the projects EAAA

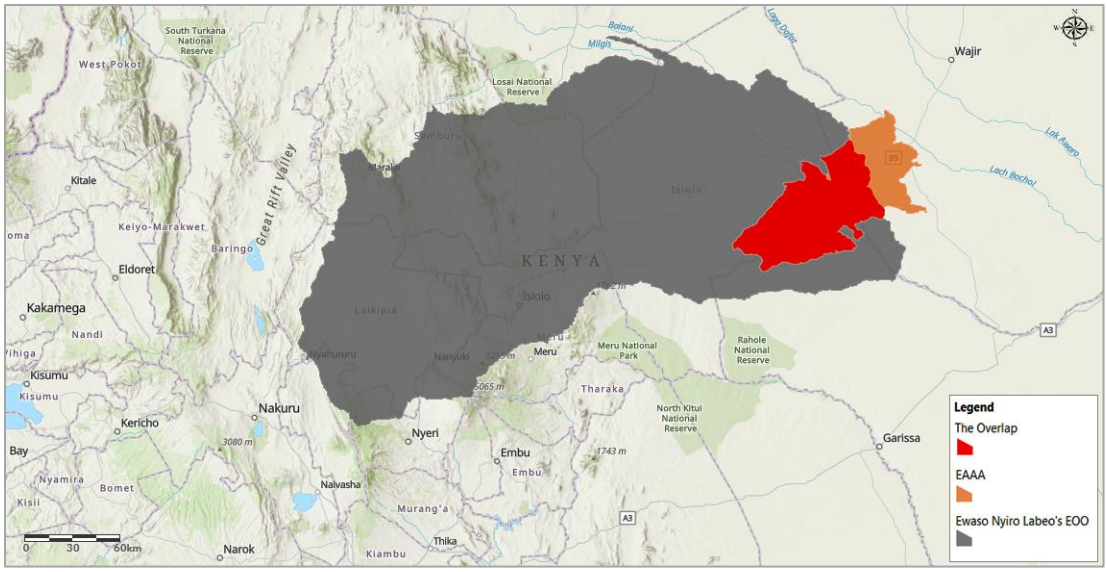
The Beisa oryx EOO extends to Djibouti and Ethiopia and the fringe of Uganda border with Kenya. The species is present in the project area. Under the IUCN red list, Beisa Oryx are categorized as endangered (IUCN, 2021). East (1999), correcting for undercounting bias, gives estimated total populations of about 50,000 Beisa Oryx. Currently the estimates are 8000 to 9000 individuals according to IUC site on Beisa oryx. It is worth noting that the anthropogenic disturbances of habitats through agriculture and livestock grazing have interfered with the Beisa's oryx EOO and they are tending to move out further to areas outside their natural habitats. Both road projects EAAAs intersect with 1.354% of the Beisa Oryx's EOO, making it a CH qualifying species under criterion 1c. This is because the actual population of the species is yet to be determined notwithstanding the fact that they occupy extensively the EAAA and beyond as seen in Map 4.2.

According to the IUCN, in the late 1970s, over 15,000 Grevy's zebras roamed in the wild. Hunting and poaching drastically reduced the population over the years, and the 2016 Great Grevy's census results indicated that Kenya is now home to 2,350 Grevy's zebras, 90% of the world's population.



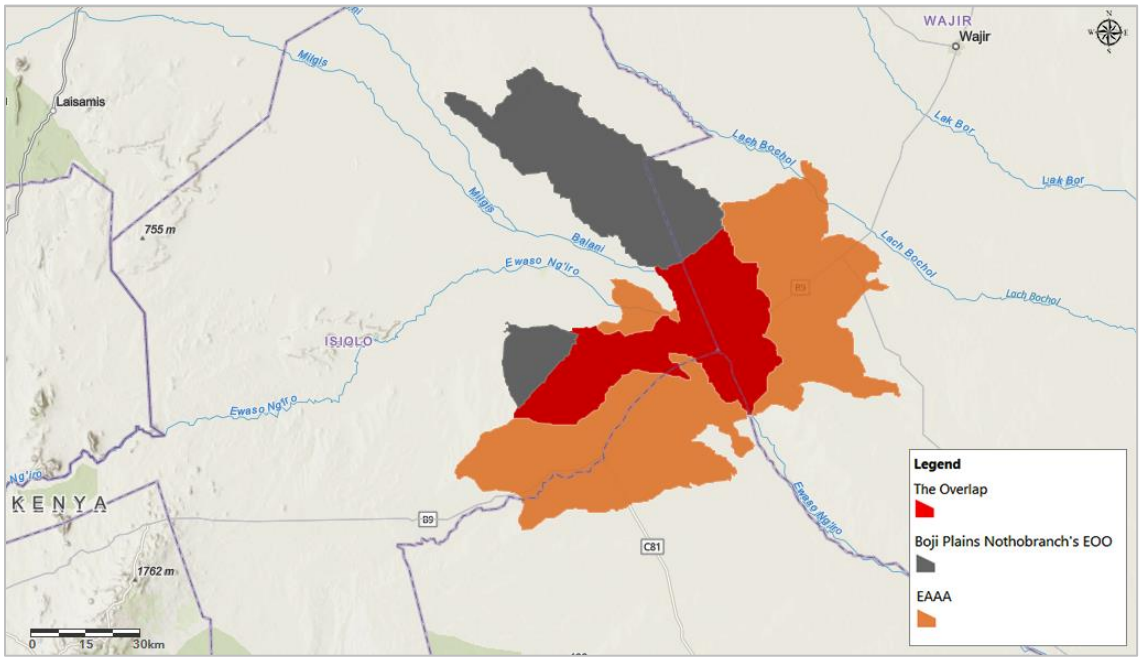
Map 4.3: Grevy's zebra EOO intersect with the southern project's EAAA

The Modogashe-Samatar Road's EAAA intersects with 0.427% of the Grevy's EOO (Map 4.3). However, due to continued anthropogenic perturbations and the increasing land degradation, the Grevy's zebra has since been extirpated from the project area and moved southward to Isiolo County. The endemic fish species in the project area, screened and qualified for CH are: *Ewaso Nyiro Labeo, Boji Plains nothobranch* and the *Ewaso Nyiro barb*. The maps depicting this are presented below.



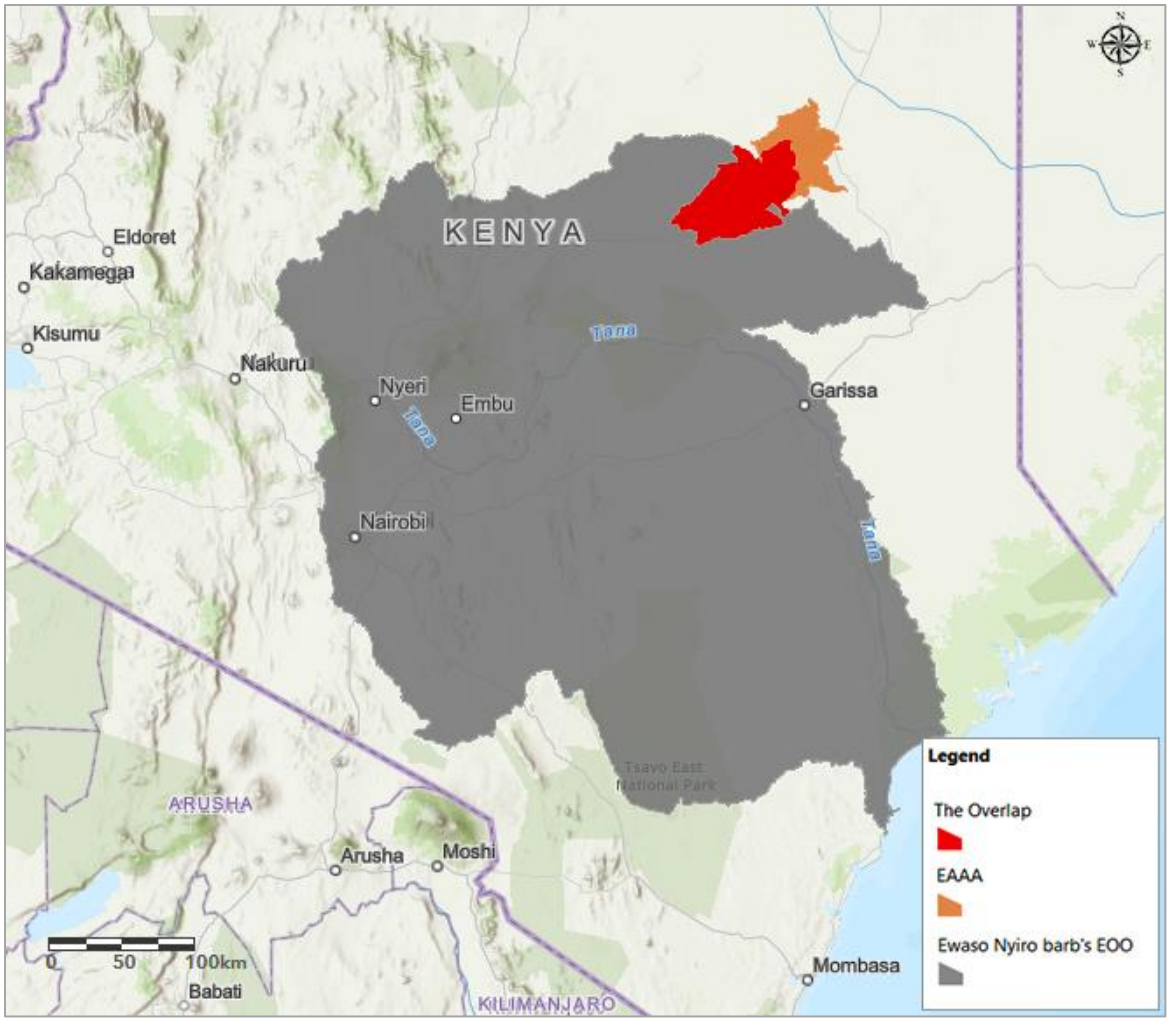
Map 4.4: Ewaso Nyiro labeo's EOO intersects with the Modogashe-Samatar road's EAAA

The Ewaso Nyiro labeo is a fresh water Ray-finned fish that is endemic to the northern Ewaso Nyiro basin. The population is currently unknown but presumed declining because of the degradation of the Ewaso Ng'iro north basin. This is mainly due to anthropogenic activities and climate change aspects that have brought about seasonal variations in weather patterns resulting in prolonged droughts. The Modogashe-Samatar Road project's EAAA intersects with 7.524% of the endemic *Ewaso Nyiro Labeo's* EOO (Map 4.4).



Map 4.5 Boji plains nothobranch's EOO intersects with the Modogashe-Samatar road's EAAA

The *Boji plains nothobranch* is a freshwater fish in the class of Ray-finned fish in Kenya. It is found in waterholes near Merti, on the Boji plains, and it is endemic to the Northern Ewaso Ng'iro basin. The population of the fish is declining due to alteration of the hydrological functions of the Merti aquifer, a result of excessive water abstractions, and climate change aspects that affect the weather pattern. Ariga (2015), reports of drying up of wells in some well fields and deterioration of water quality as a result of increasing salinity of the abstracted water in the last 30 years. The Modogashe-Samatar Road project's EAAA intersects with 44.149% of the endemic *Boji Plains Nothobranch's* EOO (Map 4.5).



Map 4.6:Ewaso Nyiro Barb's EOO intersects with the Modogashe-Samatar road's EAAA

The *Ewaso Nyiro barb* is a fresh water fish under the class of Ray-finned fish, endemic to the Northern Ewaso Ng'iro and Tana River system and its wetlands. Currently the population is unknown but presumably declining due to the degradation of the Ewaso Ngi'ro north basin. The Modogashe-Samatar Road project's EAAA intersects with 2.355% of the endemic *Ewaso Nyiro Barb's* EOO (Map 4.6).

Table 4.1 Critical Habitat screening

Species	Intersected EOO	
	Modogashe – Samatar Road	**Rhamu – Mandera Road**
*Grevy's Zebra	0.427%	0%
Reticulated Giraffes	1.787%	1.951%
B. Oryx	0.697%	0.657%
Ewaso Nyiro labeo	7.524%	-
Boji plains nothobranch	44.149%	-
Ewaso Nyiro barb	2.355%	-

*The Grevy's zebra has since been extirpated from the project area

Table 4.2 shows CH qualifying features consisting of two mammals; 3 fish species and 4 plant species which are endemic to Ewaso Ng'iro catchment.

Table 4.2: Critical Habitat-qualifying features

Feature	Species	IUCN Threat category	PS6 CRITERION
Mammals	*Reticulated Giraffe*	EN	1a
	Beisa Oryx	EN	1c
Fish			
	Ewaso Nyiro labeo	VU	2a
	Ewaso Nyiro barb	LC	2a
	Boji Plains nothobranch	VU	2a
Plants			
	Ethulia scheffleri	EN	1c, 2a
	Sphaeranthus samburuensis	EN	1c, 2a
	Sclerocarya gillettii	EN	1c, 2a
	Lagarosiphon hydrilloide	EN	1c, 2a

4.2 Criterion 4: Highly threatened or unique ecosystem

The project area is part of the Ecosystem that is included in the Eastern Afrotropical Ecoregion (Ethiopia, Eritrea, Kenya, Somalia & Sudan), which is considered vulnerable. Further, the project area is included in the Horn of Africa Biodiversity hotspot and Somali-Masai Floristic biome (considered center of endemism). The project area acts as a migratory/dispersal area for wildlife utilizing protected area in the north i.e., the Malka Mari National Park in Kenya and the Gerale National Park in Somalia. It is also part of Arid and Semi-Arid lands (ASALs) of Kenya with a mean annual rainfall of 500mm.

The Ewaso Ng'iro north catchment that includes the Lorian swamp is a critical habitat under criterion 4a, because it harbors critical habitat fish species. The River Daua floodplain, the temporary wetlands (the seasonal swamps/temporary wetlands that form from Didima, Gudediye, Gingro, Hafadi, Jirma, Shafshafe to Handadu) qualify as a highly threatened ecosystem under Criterion 4a since it harbors critical habitat species i.e., *Reticulated giraffe and Beisa oryx.*

4.3 Summary: Qualifying Features most likely to be affected

The Reticulated giraffe, Beisa Oryx and, the restricted range fish: Ewaso Nyiro barb, Ewaso Nyiro labeo, Boji plains nothobranch and three species of plants viz: *Ethulia scheffleri, Sphaeranthus*

samburuensis, Sclerocarya gillettii, Lagarosiphon hydrilloide, trigger critical habitat. Ewaso Nyiro catchment is CH due to the presence of restricted range fish.

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4.4 Species of concern potentially affected

Other species that may be affected are the Striped hyena, Cheetah and Gerenuk for mammals. In addition, potential impacts could occur to the Somali Ostrich. Though Somali Ostrich is not endangered, there is a high population of the same in the Ewaso Ng'iro plains and the project's activities will fragment its habitat and increase the danger of road hits.

CHAPTER 5: BIODIVERSITY MANAGEMENT

Many of the impacts due to the anticipated development, can be mitigated through effective implementation of the Biodiversity Action Plan, Environmental Management Plan and other Biodiversity Monitoring Plans recommended for the project.

5.1 Prioritization of Biodiversity Features

In spite of successful mitigation measures when the aforesaid plans are followed, there will always be some residual impacts. For instance, the restoration and rehabilitation of the borrow pits, quarries and other sections of the habitat that may be degraded during construction phase, will be important to resuscitate the growth of vegetation so long as local species are planted. However, this should be seen as a long-term management of the restoration's phase that requires monitoring and replanting of dried tree species as necessary to ensure a sustainable rehabilitation and particularly during the rainy season.

The prioritization of biodiversity features is based on knowledge of the geospatial extent and sensitivity of the priority features, the consequence and value of suggested mitigation measures, and the significance of the residual impacts. Normally, within habitats, there are variations in terms of ecological necessities, the level and scale of threats and the level of scientific knowledge, therefore, the mitigation impacts are also based on these variations for efficient and effective conservation goals. Be that as it may, based on new knowledge acquired, the prioritization may amend to accommodate new information.

Table 5.1 Prioritization of biodiversity features where there is Clear Risk based on information available

Enough information available about the feature to indicate there is high impact risk	**Impact likely**	Is impact significant for the conservation of the feature?	***Occurrence***	**Action Category**
			High likelihood of impact and potentially significant consequence for the feature	**Action category 1**
			High likelihood of impact consequence unlikely to be significant for the feature	**Action Category 2**
	Impact not likely	If impact occurred, would it be significant for the conservation of the feature?	*Low likelihood of impact but if occurs, significant for the feature*	**Action Category 3**
			Low likelihood of impact and unlikely to	**Action category 4**

			be significant for the feature	

Table 5.2 Prioritization of biodiversity features where there is no Clear Risk based on information available

There is no Enough information available about the feature to indicate there is high impact risk	Are there well-defined mitigation measures that would reduce the significance of the impact to the feature?	**Yes**	***Risk***			**Action Category**
				Unclear risk but impact can be mitigated		**Action category 5**
		No	*Do we understand the habitat associated enough to reduce the significance of the impact?*	**Yes**	*Unclear risk but impacts can be mitigated*	**Action Category 6**
				No	*Unclear risk and potentially significant consequence for the feature*	***Action Category 7***

Defining Action Categories

Action Category 1: Immediate attention: Apply specific avoidance and minimization measures; robust monitoring to assess losses and gains; implement offset actions

Action Category 2: Proactive avoidance: implement control measures; monitor scale of impact; verify presence in offset sites

Action Category 3: Proactive monitoring: implement control measures; monitor scale of impact; verify presence in offset sites

Action Category 4: Remain aware: implement general control measures; remain aware of scale of impacts

Action Category 5: Specific mitigation: implement species specific measures; monitor the implementation of mitigation; verify presence in offset sites; re-assess following pre-disturbance surveys

Action Category 6: Habitat-focused mitigation: implement general measures to reduce habitat impact; monitor habitat and the implementation of mitigation; verify presence in offset sites, re-assess following pre-disturbance surveys.

5.2 Onsite Management

Minimizing impacts onsite is a PS6 requirement, and given the anticipated fragmentation and loss of habitats through vegetation matter removal, enhanced management onsite may be able to deliver gains through revegetation. This would also require the protection of fragile ecosystems like the Lorian swamp, plant species like the *Ethulia scheffleri, Sphaeranthus samburuensis, Sclerocarya*

gillettii, and Lagarosiphon hydrilloide, whenever encountered. Further, the control of noxious invasive plants like *Prosopis juliflora* and the current manifested *Acacia zanzibarica* in the Ewaso Ng'iro North floodplains.

5.3 Offsite management

Where there are significant residual impacts to CH qualifying species, offsets will be required. This will be the case for the reticulated giraffe, see Section 9.3 and table 9.1. Site-based offset approach is not appropriate/feasible, in this case additional actions, such as: focused research efforts i.e., radio telemetry surveys or support to existing conservation projects, are required to support the generation of biodiversity gains.

Overview: ESMS diagram showing where ESMP, BAP, biodiversity policies and offsets plans fit within ESMS.

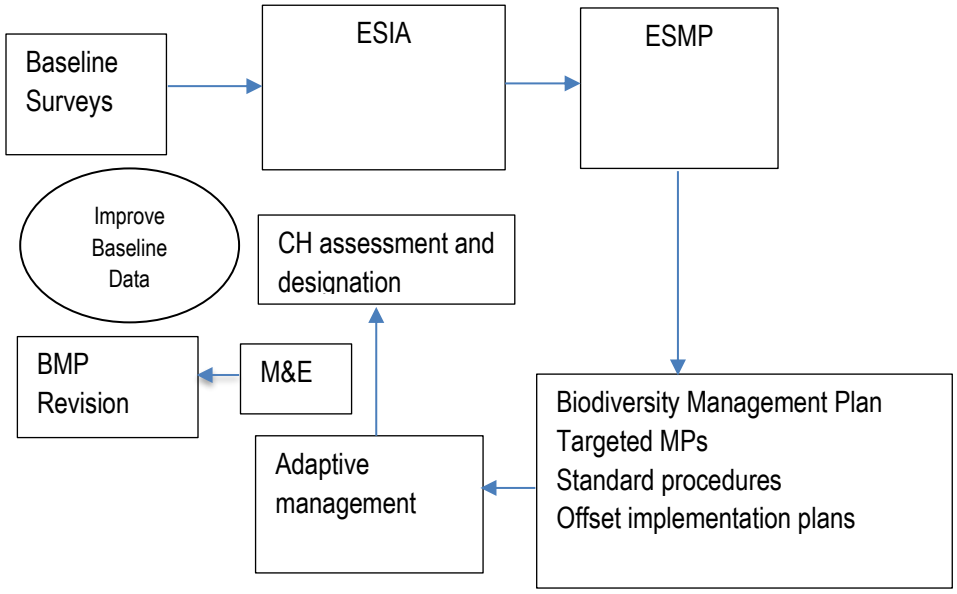

Figure 5.1: ESMS relationship between ESMP and BMP

CHAPTER 6: APPLICATION OF THE MITIGATION HIERARCHY

The mitigation hierarchy is important for projects that impact habitats and that aim at achieving no negative impact on biodiversity or conversely on balance of net gain as opposed to a net loss scenario. The hierarchy is based on crucial steps that should be undertaken in a project's life cycle to limit negative impacts on biodiversity and leading to a sustainable ecosystem management.

In other words, it is a tool designed to assist its users to limit, as far as practicable, the negative impacts of development projects on biodiversity and ecosystem services. It involves a sequence of four crucial actions i.e., 'avoid', 'minimize', 'restore' and 'offset', further, it provides a best practice approach to assist in the sustainable management of living, natural resources by establishing a mechanism to balance conservation needs with development priorities.

6.1 Description of the composite of actions, and their rationale, to achieve the mitigation requirements of Performance Standard 6

For this project, Figure 6.1 shows the mitigation hierarchies adopted and disaggregated into its constituent components of action and rationale to achieve the mitigation performance Standard 6.

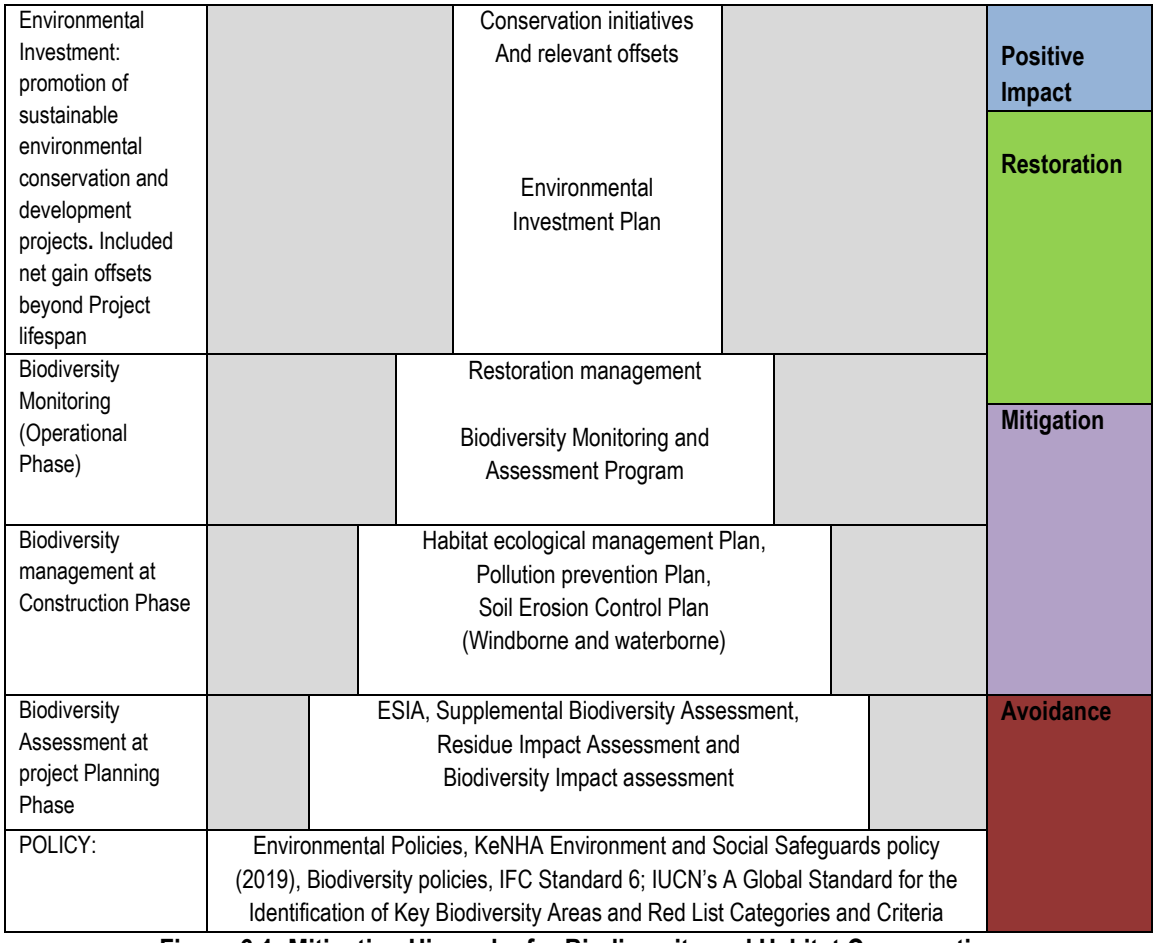

Figure 6.1: Mitigation Hierarchy for Biodiversity and Habitat Conservation

6.2 Roles and responsibilities of internal staff, contractors and external partners to achieve the desired outcomes.

Different project players (project internal staff, contractors and external partners) will be instrumental in achieving optimal results desired in adequately addressing the mitigation measures to protect and conserve biodiversity throughout the project cycle including design, development and implementation of BAP, and in project monitoring and evaluation to ensure compliance. The roles and responsibilities of various parties involved in the project could be visualized as follows:

Table 6.1 Role and responsibilities of project player

Project staff/partner	Role & responsibility
Internal Staff & Contractors	
Project Engineer	- Ensure that the project designs alternatives and considerations aimed to help the project avoid or minimize adverse impacts are implemented correctly for the projects' greater economic, environmental and biodiversity sustainability - Ensure that restorations and rehabilitation programs captured in the designs to achieve desired goals of enhancing biodiversity resilience and continuous support of ecosystem services via BAP are executed appropriately.
Project Operations Manager	- Oversee overall project processes and operations to ensure compliance with the EMCA 1999 regulations, IFC PS6 and the BAP is fully and effectively implemented. - Ensure all proposed mitigation measures/activities to protect the biodiversity and environmental integrity are integrated in the project planning process.
Health, Safety & Environment & Social Manager	- Monitor and report on project processes and operations to ensure compliance with the EMCA 1999 regulations, IFC PS6 and the BAP is fully and effectively implemented - Ensure the project implementation complies with all the health and environmental safety measures (for both staff & environment) and the necessary mitigation measures are identified and integrated in relevant plans including EMP and BAP to avoid or minimize the risks. - Closely work with the project operations manager and contractors to ensure compliance with the Control Measures of the BAP to overcome negative project impacts regarding to health, safety and environment risks.

Project staff/partner	Role & responsibility
Internal Staff & Contractors	
Project Biodiversity & Environmental Officer	- Ensure implementation of the BAP on daily basis and escalate issues on non-compliance to the Project Director - Provide technical advice to the project on matters of environmental protection and biodiversity conservation in relation to project potential impacts. - Guide and/or advise on the process of assessing the project's impacts and developing the EMP, BAP and their effective implementation to avoid or minimize the project impacts. - Develop and communicate the relevant biodiversity targets and requirements to all project managers and staff. - Coordinate environmental and biodiversity conservation activities among government and non-governmental agencies, local communities and other stakeholders - Provide checks and balances to project contractor or subcontractors for compliance with control measures outlined in the BAP. - Ensure the contractors engage with experts for advice to meet the goals and objectives of the BAP. - Support the Implementation, monitoring, and reporting on the progress and outcome of the BAP through maintenance and updating of the relevant project GIS database.
	-
	- Provide technical guidance (in consultation with the Project Biodiversity and Compliance Officers) in mapping of critical habitats, distribution of threatened biodiversity, migratory corridors, sensitive ecosystems and wildlife dispersal areas for effective development and implementation of the BAP. - Support the Implementation, monitoring, and reporting on the progress and outcome of the BAP through maintenance and updating of the relevant project GIS database.
Security Manager	- Oversee the enforcement and compliance with onsite regulations relevant to the BAP especially by the project staff and contractors.

Project staff/partner	Role & responsibility
Internal Staff & Contractors	
	- Work closely with KWS and KFS officers to strengthen the enforcement of all national regulations aimed at protecting and conserving biodiversity in conservation areas.
Project support staff	- This support staff (i.e., technicians, drivers, office staff and casual laborers) should support the BAP implementation through compliance with onsite regulations. - Supporting field monitoring activities and report any incidents that obtain regarding infringements or risks to biodiversity that they observe, to ensure success in BAP implementation
Contractors	- Ensure all the project mitigation measures as stipulated in the plan are integrated and implemented during all the project activities cycles
External Partners	
Local community	- Ensure the ecosystems services provided by the habitat where the project is implemented are not compromised via participation in stakeholder's consultation meetings and ensuring the mitigation measures proposed are implemented. - Play active role in protecting their biodiversity as part of the heritage through working closely with law enforcement agencies to mitigate species collection for trade or overexploitation as well as conservation of critical habitats
County Government	- Through the Ministry of Environment and Forestry-, (Forests and Climate Change); Ministry of Water and Sanitation and Irrigation (Water resource management, drainage and water storage, land reclamation) Ministry of Tourism and Wildlife (Wildlife department), County Governments (Isiolo, Wajir and Mandera) to ensure that the project has minimal impacts on natural, modified and critical habitats - Create public awareness on the role of local communities and encourage public participation in the environmental impact assessment and processes of developing and implementing relevant action plans to attain desired project mitigation measures. - Ensure compliance with the project development regulations aimed at safeguarding the environment and

Project staff/partner	Role & responsibility
Internal Staff & Contractors	
	biodiversity as part of devolved function under the county governments
Kenya Wildlife Service	- Enforcement of wildlife laws and regulations and monitoring of illegal wildlife crimes in the project areas - Monitor the implementation of BAP to ensure wildlife dispersal areas, migratory corridors and wildlife breeding areas are protected. - Monitor exploitation of vulnerable species and non-timber products, post the project phase, to regulate and check overexploitations
Kenya Forestry Service (KFS)	- Enforce compliance on none-trading of Sandal wood and the currently in force moratorium issued on cutting of trees and dealing with tree products by the Government (usually for charcoal production) from forest resources
National Environmental Management Authority (NEMA)	- Monitor the project compliance with ESIA/Audits, BAP, and Implementations of plans on project impact mitigation measures.
Project Company	- While responsible for implementation and management of the whole project, ensure the road construction complies with the International Finance Corporation Performance Standards 6 (PS6).
KeNHA	- Responsible as the Contracting Authority on behalf of GOK
Local Conservation Agencies	- Ensure the BAP development and implementation of the same meets the biodiversity requirements in the project area - Engage the stakeholders in participation to ensure the plan captures and adequately addresses the needs of protecting and conserving the critical habitats and threatened flora and fauna in the area.

Besides the project players' roles and responsibilities captured above, it's worth to emphasize that during the construction phase, the Project Environmental Manager assisted by an Environmental Officer shall monitor and act upon the following environmental parameters: soil erosion control, storm water drainage, water quality, air quality, solid waste generation, liquid waste effluent. Similarly, the EHS Manager together with the EHS officer shall monitor and follow up on: occupational health and safety risks, environmental risks (fire, floods etc.) human, wildlife and livestock accidents. The Project Environmental Officer, assisted by the Project Biodiversity and Compliance Officer shall

engage in the biodiversity management, and monitoring activities at construction, restoration and operational phases of the project.

CHAPTER 7: ECOSYSTEM SERVICES

According to IFC Guidance Note 6, Ecosystem services are the benefits that people, including businesses, derive from ecosystems. Ecosystem services are organized into four types: (i) provisioning services, which are the products people obtain from ecosystems; (ii) regulating services, which are the benefits people obtain from the regulation of ecosystem processes; (iii) cultural services, which are the nonmaterial benefits people obtain from ecosystems; and (iv) supporting services, which are the natural processes that maintain the other services. Further, Ecosystem services valued by humans are often underpinned by biodiversity. Impacts on biodiversity can therefore often adversely affect the delivery of ecosystem services

Interviews carried out at the Modogashe-Samatar road project area in two towns (Modogashe and Habasweini) and three settlements, involved interviewing 40 persons, and revealed the importance of the Habitats in providing the ecosystem services**.** The Habitats that include Woody vegetation (Trees and shrubs), the Grassland constituting the vast Ewaso Ng'iro plains, the settlement areas (Built-up areas), Lorian swamp, and the water bodies (Ewaso Ng'iro river, seasonal *laggas*, earth dams, water pans), man-made and natural and farmlands. The main scoring scheme used was based on Burkhard et al., (2009) with scores ranging from 0 to 5, where "0 = no relevant capacity, 1 = low relevant capacity, 2 = relevant capacity, 3 = moderate relevant capacity, 4 = high relevant capacity and 5 = very high relevant capacity" to produce estimates of ET capacity to provide ES.
The community members scored highly on the Woody/shrubs Habitats and the Lorian swamp provisional services like; providing for tooth brush, firewood, livestock forage, traditional medicine, and wild fruits and for Lorian swamp the additional provision for thatching grass. Woody/shrubs Habitats scored highly on regulating services involving: Soil erosion protection, flood protection and carbon sequestration and cultural services that include: Tourism, recreation and meeting places, and shade for herders and their livestock. The Lorian swamp scored highly on the regulation service of Carbon sequestration, and cultural provision of shade to the herders and their livestock. The grassland habitat scored highly on cultural service of tourism since it is replete with wildlife and for the regulation service, carbon sequestration. The water bodies scored highly on provision service of water as a basic need for both human and livestock, regulating service of flood control, cultural service of recreation and meeting place. Farmlands scored highly on provisional services of: livestock forage, traditional medicine and toothbrush while the settlements scored highly on provision of charcoal and recreational and meeting places. The ecosystem services were also categorized and scoring was again effected on the flow of the same to enhance livelihoods wellbeing. Based on Burkhard et al., (2009) scoring criteria i.e., 0 to 5, where "0 = no relevant capacity, 1 = low relevant capacity, 2 = relevant capacity, 3 = moderate relevant capacity, 4 = high relevant capacity and 5 = very high relevant capacity" to produce estimates of Ecosystem Type (ET) capacity to provide Ecosystem Service (ES). We used the same concept to interpret the flow of ecosystem services from existing ETs (habitats) towards livelihood benefits. Thus, this translated to: 0 = no flow, 1 = very low flow, 2 = low flow, 3 = medium flow, 4 = high flow, 5 = very high flow.

Mapping of Ecosystem services	Matrix Scores																
Ecosystem Service Class	**Provisioning Services**									**Regulating Services**				**Cultural Services**			
Ecosystem Type (ET)/LULC	Fire wood	Charcoal	Poles	Thatching	Livestock forage	Water source	Medicine	Toothbrush	wild food	Erosion protection	Flood control	Nutrient regulation	Carbon sequestration	Shade for livestock and herders	Recreation and meeting place	Sacred/Grave sites	Tourism sites
Shrubs and Trees	4	3	3	2	4	3	4	4	4	4	4	3	4	4	3	3	3
Grassland	1	1	1	4	4	3	3	1	2	2	2	2	3	2	1	2	4
Lorian Swamp	2	1	3	4	4	4	3	4	4	3	2	3	3	4	3	2	4
Settlements	1	3	1	1	1	2	1	1	1	2	1	1	1	2	3	1	2
farmlands	2	1	2	3	2	2	3	3	2	2	2	2	2	2	2	1	1
Water bodies	0	0	0	1	3	4	2	3	3	2	4	2	2	3	4	1	2

0 = no flow, 1 = very low flow, 2 = low flow, 3 = medium flow, 4 = high flow, 5 = very high flow

Figure 7.1. Ecosystem services Matrix for the Modogashe-Samatar road project

CHAPTER 8: SPECIFIC BIODIVERSITY MEASURES

For the list of all specific mitigation measures refer to the same in attached BAP-Excel sheet (Appendix III).

8.1 Endangered Species and restricted range species

The Reticulated giraffe, Beisa Oryx and, the restricted range fish: Ewaso Nyiro barb, Ewaso Nyiro labeo, Boji plains nothobranch and three endemic species of plants viz: *Ethulia scheffleri, Sphaeranthus samburuensis, Sclerocarya gillettii, Lagarosiphon hydrilloide*, trigger critical habitat. Ewaso Nyiro catchment is CH due to the presence of restricted range fish.

8.2 Highly threatened and/or unique Ecosystems

Ewaso Ng'iro north catchment that includes the Lorian swamp, the lowland that floods along the Rhamu-Mandera road (viz; the seasonal swamps/temporary wetlands that form from Didima, Gudediye, Gingro, Hafadi, Jirma, Shafshafe to Handadu) and river Daua floodplain.

8.3. Mitigation Measures

8.3.1 Endangered Species and restricted range species

Project design phase: Avoid the disruption and fragmentation of habitats that intersect with the road corridors, especially near water points and common road crossing areas for Giraffes (1.113413° N, 39.577543°E--approximately 6km SW of Kanjara; 1.08733°N, 39.577543°E—adjacent to an earth dam, about 3km NE of Lagdima and, 1.039107°N, 39.525229°E—approximately 4km NE of Habasweini). This is possible by road realignment design (where feasible), near water points, and/or crossing points. The design can provide for speed check facilities at the crossing points. If Avoidance cannot be feasible due to budgetary, geomorphological, or administrative reasons (the road alignment pass through several counties with the exception of the Rhamu-Mandera road, and several different ethnic communities), then **Minimization** of impacts is the next best cause of action. At the design phase a provision should be made for a Giraffe crossing point following recommendations of Kenya wildlife Service for similar projects. The road also intersects the Beisa Oryx's EOO.

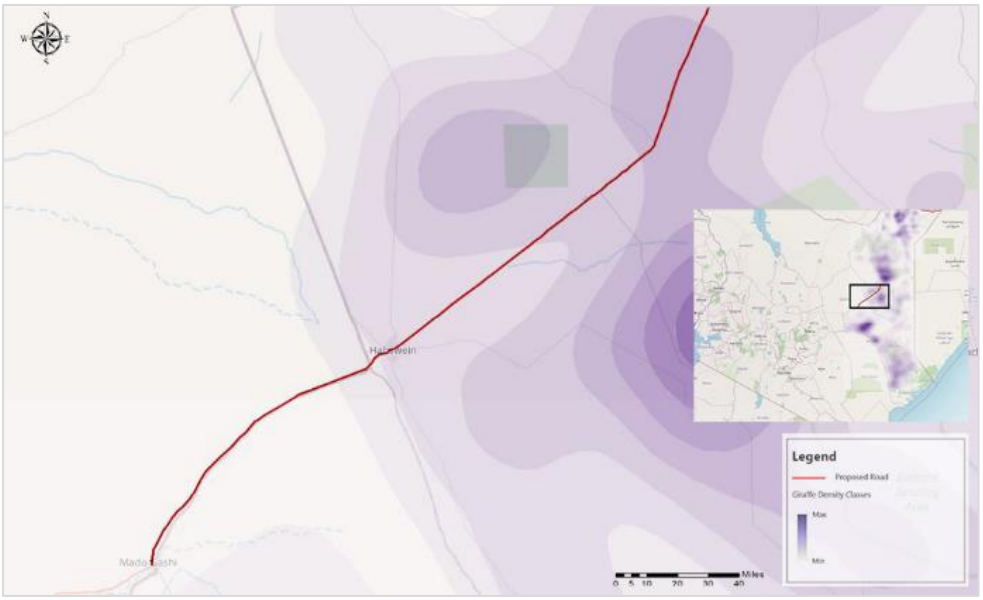

Figure 8.1: Reticulated Giraffe's AOO transected by the Modogashe-Samatar road's AOI

Construction Phase:

During construction, it is imperative to M**inimize** the Habitat disruption by reducing to a minimum level land modification that would result in vegetal matter removal, soil excavation, compaction by machinery and equipment and modification of the natural flow of water course ways thereby disrupting the habitats hydrological functions. The contractor should ensure that minimum vegetation is cut by confining activities to work areas only and use of deviations/bypasses that are parallel and near the work area. Due to the fragile nature of the soils and the fact that the area is degraded, the contractor should ensure that the environment is not polluted (air pollution) by using well serviced machinery and equipment.

To forestall this, the contractor should water all the work areas with bowsers twice in a day viz; early morning before commencement of work and towards evening to sustain adequate moisture levels to suppress fugitive soil particulates. The dust should be within the NEMA threshold [(0.14 mg/m3). Blasting if required, should be done further afield and away from the sensitive habitats and the contractor should strive to keep the noise at ambient levels for construction operations [(85Db) NEMA/WHO]. The contractor should adhere to the approved designs while constructing culverts bridges and storm water drains and confine his workforce to the work areas. The projects Environment, Health and Safety (EHS) Manager, should ascertain that induction courses are effected for all the staff before commencement of works and together with a biodiversity officer to educate the workers about the biodiversity present in the area. Matters relating to the prohibition of hunting/trapping of wildlife for their body parts should form part of the induction course. Further, daily toolbox talks before commencement of works should be effected to ensure that the workers understand their roles in regard to their own safety and safety of the habitats and biodiversity. The biodiversity officer shall be guided by the BAP to carry out daily tasks.

The species reported by experts within the project area, which might be exploited for trade in their products include: Reticulated giraffe, African Leopard, Grevy's zebra, Cheetah, Lion, and Python which could be sought for trade in their skins and partly for meat. Protected plant species occurring in the project region that could be poached during the various phases of the project, include African Sandalwood (*Osyris lanceolata*) and Aloe spp. (*A. turkanensis* and *A. Secundiflora*). The two species are protected under presidential decrees (in 2007 and 1986, respectively), which instituted ban on trade of wild collected sandalwood and aloe products. Thus, enforcement of these national and international policies as well as the presidential decree during the project phase will have positive impacts in limiting illegal collection and trade on key biodiversity occurring within the project area. The project personnel and local communities need to be aware of these policies to strengthen law enforcement and protection of the species against such wildlife crimes.

Operation Phase

During the operational phase, KeNHA/Project company should contract a biodiversity expert who would **Monitor** the continued presence of the CH-qualifying species (endangered). Quarterly surveys and periodic census should be carried out and observations made on use of designated crossing point(s). Information gathered would be useful in the design of similar projects and enriching the BAP of similar environments and habitats. Further, the biodiversity expert shall monitor the endangered species and their habitats to verify if the development has disrupted their environment and recommend the actions to be effected to solve emerging issues.

The Contractor should support giraffe collaring work, support the community's giraffe and oryx conservation through the northeastern conservancies.

8.52 Endemic Species

Project design phase: Avoid the disruption of the habitat occupied by the fish species and plant species in section 9.1. This is possible at the design phase by altering the road alignment to avoid the sensitive ecological habitats that harbor these aquatic fauna and flora. In order to carry out this effectively, it is imperative to map and zone out these habitats at the survey stage by the contractor with the assistance of a biodiversity expert. If Avoidance cannot be feasible due to budgetary, geomorphological, or administrative reasons (the road alignment pass through several counties with the exception of the Rhamu-Mandera road, and several different ethnic communities), then **Minimization** of impacts is the next best cause of action. For the aquatic fauna, at the design stage, recommended culverts and bridges with appropriate span to accommodate the seasonal wetlands must follow the approved design by KeNHA for a trunk road.

Construction Phase:

During construction, it is imperative to Minimize the Habitat disruption by reducing to a minimum level land modification that would result in vegetal matter removal, soil excavation, compaction by machinery and equipment and modification of the natural flow of water course ways thereby disrupting the habitats hydrological functions. To achieve this, zoning of the particular habitats

occupied by the identified aquatic fauna (section 9.1) should be done through surveying the areas and delineating these sensitive ecological quadrants following the recommended designs. Further, while working near these habitats, the contractor should ensure that the environment is not polluted (air pollution) by using well serviced machinery and equipment. The soil of these zones are pulverized and powdery and easily susceptible to windborne erosion. With equipment and vehicular disruptions, the condition would be exacerbated, meaning frequent dust storms and air pollution. To forestall this, the contractor should water all the work areas with bowsers twice in a day viz; early morning before commencement of work and towards evening to sustain adequate moisture levels to suppress fugitive soil particulates. The dust should be within the NEMA threshold [(0.14 mg/m3) Blasting if required should be done further afield and away from the sensitive habitats and the contractor should strive to keep the noise at ambient levels for construction operations [(85db) NEMA/WHO]. The contractor should adhere to the approved designs while constructing culverts and bridges and confine his workforce to the work areas. If endangered plant species are encountered, the area should be zoned out and removal of the species (Section 9.1) with the assistance of a biodiversity expert, for translocating elsewhere (on-site-offset) in suitable habitat outside the work area.

The project's Environment, Health and Safety (EHS) Manager, should ascertain that induction courses are effected for all the staff before commencement of works and together with a biodiversity officer to educate the workers about the sensitive ecological habitats and obtaining risks to biodiversity while working in theses environments. The workers should be made aware that terrestrial predators are present in the area and should avoid being in their territory when spotted especially near water points. Further, daily toolbox talks before commencement of works should be effected to ensure that the workers understand their roles in regard to their own safety and safety of the habitats and biodiversity. The biodiversity officer shall be guided by the BAP to carry out daily tasks.

Operational Phase:

During the operational phase KeNHA should contract a biodiversity expert who would monitor the sensitive habitats quarterly to ensure that conservation of the same is sustained. The biodiversity expert shall monitor the CH species and their habitats to verify if the development has disrupted their environment and recommend the actions to be effected to solve emerging issues. The contractor should carry out a pre-construction survey of biodiversity in the Lorian swamp to determine the status of the endemic fish and water levels. For the aquatic environment in both road corridors (section: 9.2), the contractor should put in measures for water quality monitoring. The EHS manager shall liaise with the biodiversity expert in all the project phases to ensure that the projects activities do not pollute the aquatic environment and instigate appropriate mitigation measures covered in the EMP.

8.5.3 Other species of Concern

Birds: White headed vulture, lappet faced vulture, Martial eagle, secretary bird; **Mammals:** Elephants, Striped hyena, Cheetah* and Lion*. Though the Lion and Cheetah do not qualify for CH species and are classified as vulnerable; their presence in the study area and their influence in

controlling the large herds of antelopes is considered important (*The presence of the species is recognized but there is insufficient data about its population).

Project design phase: Avoid the disruption and fragmentation of habitats that intersect with the road corridors, especially near water points. This is possible by road realignment design (where feasible), near water points, and/or crossing points for elephants that cross seasonally from Isiolo via the Lorian swamp past Habaswein, towards Garissa and back (Modogashe-Samatar road corridor) and Lorian swamp. This project area harbors predators (Table 3.1) and other species of concern. The Rhamu-Mandera road corridor intersects with a migratory/dispersal area for wildlife utilizing protected areas in Malka Mari National Park and Gerale National Park in Somalia where the endangered African elephant and Reticulated Giraffe are also found in the former, among other animals, and also act as a dry refuge for wildlife during dry spell. The Gerale National Park conserves unique assemblage of wildlife in the Somali-Masai-Biome. The Park harbors elephant, hunting dogs, cheetah and Reticulated giraffe. The elephant utilizes the Daua zone ecosystem migrating across Kenya, Ethiopia and Somalia.

If Avoidance cannot be feasible due to budgetary, geomorphological, or administrative reasons (the road alignment pass through several counties save for the Rhamu-Mandera road, and several different ethnic communities), then minimization of impacts is the next best cause of action. At the design phase a provision should be made for slowing traffic at known animal crossing points through erection of speed bumps/rumble strips and appropriate warning signs. This should be done with the advice of KWS taken into consideration and local conservancies that may have information on animal movement. The birds of concern like the Lappet faced vulture, may also be affected by the project especially as seen near town where slaughtering of livestock for food takes place. The vultures are attracted by the slaughter that takes place in informal unsheltered areas. At design phase, a provision should be made for an appropriate design of a slaughter house within camp(s) and a waste management system also incorporated.

Construction Phase:

The contractor assisted by the EHS manager should ensure that revegetation is done in onsite-offsets where vegetation has been removed in the road corridors. They should liaise with Kenya Forestry Research Institute (KEFRI) and Kenya forest Service (KFS) to ensure that the right tree varieties and herbaceous material have been planted and natured for proper growth. The EHS manager should supervise the construction of the slaughter house to ascertain that all aspects of waste management have been adhered to according to the EMP and that the disposal of offal and other waste is done properly. This would prevent the attraction to the area of the Lappet faced vultures which were found to be common in the project area. The biodiversity expert should monitor animal movement like the elephant, and supervise the provision of road signs and appropriate speed checks in appropriate known animal crossing areas. General night lighting especially in the camps should be such that the beams of light should not face skywards to avoid blinding the birds in flight especially in the evenings and early mornings. Toolbox talks should be effected to educate the workers about the presence of predators and caution them on hunting or dealing with wildlife products.

Operational Phase:

During the operational phase KeNHA should contract a biodiversity expert who would Monitor the continued presence of other species of concern. Semi-annual surveys and periodic census should be carried out and observations made on use of designated crossing point(s). Information gathered would be useful in the design of similar projects and enriching the BAP of similar environments and habitats. Further, the biodiversity expert shall monitor the species of concern and their habitats to verify if the development has disrupted their environment and recommend the actions to be effected to solve emerging issues.

8.54 Highly threatened and/or unique Ecosystems

Project Design phase:

These habitats are degraded, harboring only seasonal dependent vegetation, hence fragile. The CH-qualifying aquatic species *Ethulia scheffleri, Sphaeranthus samburuensis, Sclerocarya gillettii, Lagarosiphon hydrilloide* are found in the degrading Lorian swamp in the Ewaso Ng'iro catchment. The seasonal wetlands in the low lands and River Daua floodplains in the Rhamu-Mandera road corridor harbor the Reticulated giraffe and the Beisa oryx. The area also harbors other species of concern like the elephants that migrate between Kenya and Ethiopia. These habitats support the vegetation utilized by these animals for sustenance (section: 3.4) and support important ecosystem services that contribute to the wellbeing of the local community livelihoods (Chapter 7).

Project Design Phase: Avoid the disruption and fragmentation of habitats that intersect with the road corridors, especially near water points. This is possible by road realignment design (where feasible), near water points, and/or crossing points.

Construction phase:

Develop a Method Statement for construction works within or in the vicinity of the Lorian swamp, watercourses (Ewaso Ng'iro north river, the lowland that floods along the Rhamu-Mandera road viz; the seasonal swamps/temporary wetlands that form from Didima, Gudediye, Gingro, Hafadi, Jirma, Shafshafe to Handadu and several streams that drain into River Daua). Adhere to the design specifications for bridges, culverts and storm water drains (for the trunk roads as specified by KeNHA) to ensure adequate drainage and interconnectivity of hydrological functions and habitats.

Ensure that the sections harboring important plant species resources for the local community (Chapter 7) are safeguarded by confining activities to work areas and ensuring alternate construction access ways run parallel to the road alignment. If any tree(s) fitting this category are to be removed, the biodiversity advisor should be consulted first for advice.

Operational phase:

Provide adequate signage for crossings and ensure speed bumps are erected where necessary especially animal crossing points. The projects' EHS manager and Biodiversity officer should carry out periodic monitoring of the habitats and ecosystem to see if the development has affected ecological functions.

8.55 Other supportive Measures

Generally, the removed vegetation during the road construction entails offset measures to attain a Net-Gain scenario. An on-site offset strategy is recommended since the project area as it is, has sparse vegetation. Consequently, the equivalent of vegetation lost in terms of quality hectares should be planted and restored, for a net gain to occur. This should not be difficult since most of the land available for the project is Trust land and the habitats selected for offsets are the same and interconnect. In all of the features identified, introduction and spread of invasive species during construction should be minimized, and all the attendant protocols detailed in the BAP Table strictly applied.

Table 9.1: Action Category descriptions and results of the prioritization process where there is clear Risk

Item	**Risk and Approach well understood**			
	1.Immediate attention	**2. Proactive avoidance**	**3.Proactive monitoring**	**4. Remain aware**
Features	*Mammals: Reticulated Giraffe, Beisa Oryx, fish: Ewaso Nyiro barb, Ewaso Nyiro labeo, Boji plains nothobranch*	Lorian Swamp, Ewaso Ng'iro north river; the lowland that floods along the Rhamu-Mandera road viz ;the seasonal swamps/temporary wetlands that form from Didima, Gudediye, Gingro, Hafadi, Jirma, Shafshafe to Handadu and several streams that drain into River Daua)	**Birds:** lappet faced vulture, Mammal: African elephant	White headed vulture, Hooded vulture, white backed vulture, Rüppell's griffon, Martial eagle, secretary bird;
Definition	High risk that the feature will be impacted as the result of the project and the consequences of the risk is considered to be significant for the species. The project will prioritize actions to avoid and minimize impacts, further research will help focus mitigation measures.	High risk that the feature will be impacted by the project but the consequence of the risk is unlikely to be significant	Low likelihood that the species will be impacted but if impact occurs, the consequences of impact would be significant for the species	Low likelihood that the species will be impacted and, the consequences of the risk is unlikely to be significant for the species
Action	Ensure species specific mitigation measures are undertaken (as discussed in the relevant sub-heading) and conduct additional research to increase the effectiveness of measure (Collaring of Giraffe for a long-term study/2-3 years) to define their ranging pattern and more so common crossing point(s) across habitats.	Implement control measures as discussed in the relevant sub-heading and BAP 13	Implement control measures as discussed in relevant sub-headings.	Implement general control measures

Net gain/No Net loss	Consider compensatory action to achieve Net gain for fragmented habitat (operation phase) and if long term studies reveal the need for conservation measures, then relocations in suitable habitats may be appropriate. Liaise with local conservancies for planning purposes and the contractor for support as a CSR undertaking.	Necessary only if impacts are confirmed significant, verify presence in offset site.	Necessary only if impacts are confirmed significant	
Monitoring	Species specific monitoring required where habitat is not an appropriate monitoring proxy, highest level of assurance required. Follow recommendations captured in relevant sub-heading.	Monitor the scale of the impact	Use habitat as a proxy to monitor scale of impact (if inappropriate consider species monitoring)	

Table 9.2 Action Category descriptions and results of the prioritization process where there is unclear Risk

Item	Precautionary approach to be updated based on further information	
	5.Specific mitigation	**6. Habitat-focused mitigation**
Features	None	Mammals: Lion, Hyena, Cheetah, African wild dog, Plants: Aloe spp. *A. turkanensis and A. Secundiflora, Sandalwood*.
Definition	The species distribution is unknown but well-defined specific mitigation measures are identified for the species and will be implemented by the project. Further, research is unlikely to alter the choice or intensity of mitigation measures	The species distribution is unknown but its habitat association is clear and measures to reduce habitat impacts will also benefit the species. The project will implement measures to reduce impacts to the species habitat, if appropriate species-specific measures will be undertaken
Action	Ensure species specific mitigation measures are implemented. Re-asses if encountered during pre-disturbance surveys	Ensure control measure for the species habitat are implemented. Re-asses if encountered during pre-disturbance surveys
Net gain/No Net loss	Required where mitigation measures are not effective, verify presence in offset site	Not required unless impacts confirmed significant, verify presence in offset site.

Item	Precautionary approach to be updated based on further information	
Monitoring	Clarify the scale of impact on species through monitoring implementation control measures	Clarify the scale of impact on habitat through monitoring implementation of control measures

CHAPTER 9: RESIDUAL IMPACTS ON IDENTIFIED FEATURES AS A RESULT OF THE PROPOSED PROJECT.

The loss of critical habitat for Modogashe-Road corridor assessed upon development, is approximately 128Ha, while the Rhamu-Mandera road corridor would lose ~173Ha. Both habitats are CH for the Reticulated giraffe and Beisa oryx and compensation actions will be required to address these losses. Minimization of direct species mortality and disturbance during construction, water quality monitoring for the Lorian swamp and the seasonal swamps/temporary wetlands (Didima, Gudediye, Gingro, Hafadi, Jirma, Shafshafe to Handadu) where the road alignment bisects the lowlands and wetlands, will be monitored and a quarterly report detailing species mortality, water quality status, and mitigation measures required, will be presented to the contractor during the construction phase. Water samples will be collected and analyzed once in a month and corrective measures effected for identified mitigation requirements. This will be supervised by the project's Environment, Health and Safety Manger and the Project's Biodiversity Expert. Waste management protocols as detailed in BMP (BM-05, BMP-09 and BM13) will be strictly followed. In the aquatic environments where temporary toilets are required, portable toilet facilities (Eco-toilets) or septic tank systems will be used. The waste will be disposed off in line with NEMA protocols for waste handling. Camps will not be erected in wetlands whether the wetlands are dry or not. If these mitigations are followed strictly, residue impacts for the CH-features will be minimized and controlled. During the operation phase of the project, the mitigation measures will continue as stipulated in BMP (BMP-16 to BMP-20).

CHAPTER 10: MONITORING ACTIONS TO VERIFY IMPLEMENTATION AND OUTCOMES.

The BAP will need to be monitored to ensure the biodiversity measures are implemented. It is important to note that further work will be required with respect to the residual impacts such as offsets/compensation. Expert consultation will include the design of offset activities to deliver net gains. The report will include an implementation plan (a table with actions, timeframes and indicators to track progress on implementation) and program cost for the life of the project. There will also be a stakeholders' workshop to explore available options and to develop a consensus. The options will incorporate the views of stakeholders including residents, the conservancies within the project area and the County Government, among others. The contractor and biodiversity expert will lead the consultations to discuss any issues such as land donation, acquisition, planting material sourcing, labor requirements to effect the offsets for net gain consideration and the budget required for implementation. The biodiversity team will then come up with the offset action plan that will incorporate monitoring actions.

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Websites Links

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5. https://www.nature.scot/sites/default/files/2018-06/Guidance-Recommended (bird survey methods)
6. https://ewsdata.rightsindevelopment.org/. (bird's observation)
7. https://portals.iucn.org/library/node/ (IUCN's A Global Standard for the Identification of Key Biodiversity Areas and Red List Categories and Criteria)
8. https://somaligiraffe.org
9. https://neca.or.ke

APPENDICES

Appendix I: FGD's list of participants

Name	Position	Tel Number	Locality
Abdirahim Mohamud	Youth		Lagdima
Mohamed Abdi	Youth		Lagdima
Adan Hassan	Youth		Lagdima
Ali Farah	Youth		Lagdima
Maryan Abdulahi	Elder		Lagdima
Adan Ali	Youth		Lagdima
Hassan Ali	Elder		Lagdima
Muhamed Omar	Elder		Lagdima
Farah Ahmed	Community chairman		Sabena
Abdisitar Mohamud	Community member		Sabena
Jele Hussein	Community member		Sabena
Mohamed Jele	Community member		Sabena
Fatuma Mohamud	Community member		Sabena
Mahat Abdi	Community member		Sabena
Jamal Gure	Community member		Sabena
Dekow Ahmed	Community member		Sabena
Sugal Jele	Community member		Sabena
Abdirahman Hussein	Chief		Modogashe
Abdullahi Abdi	Youth		Modogashe
Abdihakim Ibrahim	Youth		Modogashe
Khali Hussein	Community		Modogashe
Fatuma Diriye	Community		Modogashe
Habon Sambur	Community		Modogashe
Rashid Abdi	Community		Modogashe
Hire Daud	Community		Modogashe
Mohamoud Mohamed	Youth		Modogashe
Haret Ahmed	Ass /chief		Habaswein Central
Sahar Abdi	Youth		Habaswein Central
Abdi Mohamed	Elder		Habaswein Central

Adan Humow	Elder		Habaswein Central
Khalif Abdi	Elder		Habaswein Central
Abdi Dakane	Youth		Habaswein Central
Adan Farah	Youth		Habaswein Central
Farhiya Issack	Youth		Habaswein Central
Rukiya Abdullahi	Youth		Habaswein Central
Osman Adan	Elder		Samatar
Abdullahi Abdi	Chairman		Samatar
Mohamed Farah	Elder		Samatar
Ali Abdi	Elder		Samatar
Hassan Abdi	Youth		Samatar
Zeinab Abdi	Youth		Samatar
Habiba Sheikh	Elder		Samatar
Amina Dayib	Elder		Samatar

Appendix II Vegetation Found in the

List of Plant Species (Somali-Masai Biome) Plant species	IUCN STATUS	Families
Commiphora erlangeriana Engl.	Not available	*Burseraceae*
Acacia bussei Harms ex Sjöstedt	LC	*Fabaceae*
Acacia drepanolobium Sjöstedt	LC	*Fabaceae*
Acacia edgeworthii T.Anderson	Not available	*Fabaceae*
Acacia etbaica Schweinf.	LC	*Fabaceae*
Acacia gerrardii Benth.	Not available	*Fabaceae*
Acacia horrida L.	Not available	*Fabaceae*
Acacia mellifera (Vahl) Benth.	LC	*Fabaceae*
Acacia nilotica (L.) Willd. ex Delile	LC	*Fabaceae*
Acacia oerfota (Forssk.) Scheinf.	LC	*Fabaceae*
Acacia reficiens Wawra	L.C	
Acacia senegal (L.) Wild	Not available	*Fabaceae*
Acacia seyal dedile	LC	*Fabaceae*
Acacia tortilis (Forssk.) Hayne	LC	*Fabaceae*
Acacia zanzibarica (S.Moore) Taub.	LC	*Fabaceae*
Achrocline glumacea	Not available	**
Adenium obesum (Forssk.) Roem & Schult.	LC	*Apocynaceae*
Aerva javanica (Burm.f.) Schult.	Not available	*Amaranthaceae*
Aloe breviscapa	LC	*Aloeacea*
Aloe scobinifolia	EN	*Aloeaceae*
Aristida adscensionnis L.	Not available	*Poaceae*
Balanites aegyptiaca (L.) Delile	LC	*Balanitaceae*
Balanites pedicellaris Mildbr. & Schltr	LC	*Balanitaceae*
Balanites rotundifolia	LC	*Balanitaceae*
Blepharis linariifolia	Not available	**
Boscia angustifolia A.Rich	Not available	*Capparaceae*
Boscia coriaceae Pax	Not available	*Capparaceae*
Boswellia rivae	LC	*Capparaceae*
Cadaba favinosa Forrsk.	Not available	*Capparaceae*
Cadaba glandulosa Forrsk.	Not available	*Capparaceae*
Cadaba mirabilis Gilg.	Not available	*Capparaceae*
Cadaba rotundifolia Forssk.	Not available	*Capparaceae*
Calotropis procera Aiton) W.T.Aiton	Not available	*Asclepiadaceae*
Capparis cartiloginea Decne.	Not available	*Capparaceae*
Cenchrus pennisotiformis Steud.	Not available	*Poaceae*
Centropodia glauca	Not available	**
Charmanthera dependens Engl. & Diels	Not available	*Annonaceae*
Chrysopogon plumulosus Hochst.	Not available	*Poaceae*

List of Plant Species (Somali-Masai Biome) Plant species	IUCN STATUS	Families
Cissus rotundifolia (Forssk.) Vahl	Not available	*Vitaceae*
Cocculus hirsutus (L.) Diels	Not available	*Menispermaceae*
Combretum aculeatum Vent.	Not available	*combretaceae*
Commiphora africana(A.Rich.) Engl.	LC	*Burseraceae*
Commiphora erythraea Engl.	Not available	*Burseraceae*
Commiphora guidottii Chiov.	VU	*Burseraceae*
Commiphora habessinica (O.Berg) Engl.	Not available	*Burseraceae*
Commiphora incisa Chiov.	Not available	*Burseraceae*
Commiphora kua (Royle) Vollesen	Not available	*Burseraceae*
Commiphora myrrha (Nees) Engl	Not available	*Burseraceae*
Commiphora samharnesis Schweinf.	Not available	*Burseraceae*
Commiphora sphaerocarpa Chiov	LC	*Burseraceae*
Cordeauxia edulis	EN	*Fabaceae*
Cordia sinensis Lam.	LC	*Boraginaceae*
Dactylactenium aegyptiana	Not available	
Delonix elata (L.) Gamble	LC	*Fabaceae*
Dobera glabra (Forssk.) Poir.	Not available	*Salvadoraceae*
Duosporma eremophilum	Not available	
Eragrestis mahrana	Not available	
Euphorbia columnaris	Not available	*Euphorbiacea*
Euphorbia cuneata	LC	*Euphorbiacea*
Euphorbia mosaica	Not available	*Euphorbiacea*
Euphorbia multiclava	Not available	*Euphorbiacea*
Euphorbia sepulta	Not available	*Euphorbiacea*
Farsetia longisiliqua	Not available	*Cruciferae*
Grewia similis K.Schum.	Not available	*Tiliacea*
Grewia tenax (Forssk.) Fiori	LC	*Tiliacea*
Indigofera spinosa	Not available	*Fabaceae*
Ipomoea donaldsonii Rendle	Not available	*Convovulaceae*
Ipomoea suctana	Not available	*Convovulaceae*
Jatropha pelargoniifolia Courbon	Not available	*Euphorbiacea*
Lannea triphyla (A.Rich.) Engl.	Not available	*Anacardiaceae*
Lawsonia inermis L.	LC	*Lytharaceae*
Leprothrium senegalense (Kunth) Clayton	Not available	*Poaceae*
Leptadenia hastata	Not available	**
Leucas tomentosa Gürke	Not available	*Labitae*
Lycium europaeum L.	Not available	*Solanaceae*
Lycium shawii Gürke	LC	*Solanaceae*
Maerua crassifolia Forssk.	LC	*Capparaceae*

List of Plant Species (Somali-Masai Biome) Plant species	IUCN STATUS	Families
Maerua oblongifolia (Forssk.) A.Rich.	Not available	Capparaceae
Momordica sessilifolia Cogn.	Not available	Cucurbitaceae
Momordica spinosa (Gilg) Chiov.	Not available	Cucurbitaceae
Oropetium capense Stapf	Not available	Poaceae
Pelargonium christophoranum	**	**
Salvadora persica L.	Not available	Salvadoraceae
Sarcastemma viminale (L.) R.Br.	Not available	Asclepiadaceae
Senna alexandrina Miller	LC	Fabaceae
Senna longiracemosa (Vatke) Lock	Not available	Fabaceae
Sericocomopsis hildebrandtii Schinz	Not available	Amaranthaceae
Sericocomopsis pallida (S.Moore) Schinz	Not available	Amaranthaceae
Sesamothamnus busseanus Engl.	Not available	Pedaliaceae
Sesbania sesban (L.) Merr.	L.C	Fabaceae
Sporobolus helivolus (Trin.) T.Durand & Schinz	Not available	Poaceae
Sporobolus pellucidus Hochst.	Not available	Poaceae
Sporobolus spicatus (Vahl) Kunth	Not available	Poaceae
Sterculia africana (Lour. 1790) Fiori	L.C	Malvaceae
Suaeda monoica Forssk. ex J.F.Gmel.	Not available	Chenopodiaceae
Tamarindus indica L.	Not evaluated	Fabaceae
Tamarix aphylla (L.) H. Karst.	Not evaluated	Tamaricaceae
Tamarix nilotica (Ehrenb.) Bunge	L.C	Tamaricaceae
Terminalia brevipes Pamp.	Not available	combretaceae
Tetrapogon cenchiformis (A.Rich.) Clayton	Not available	Poaceae
Tragus bertaronianiana Schult	Not available	Poaceae
Vernonia cinerascens (Sch. Bip)H. Rob.	Not available	Asteraceae
Wrightia demartiniana Chiov.	Not available	Apocynaceae
Ziziphus spina-christi (L.)Desf.	Not available	Rhamnaceae
Diospyros wajirensis F.White	NT	Ebeneceae
Dalbergia eremicola Polh	NT	Fabaceae

Appendix III

BAP (Excel sheet) attached separately