Biodiversity Impact Assessment Report

1.0   Introduction

This document presents information on the ecological survey as well as the baseline biodiversity and impact assessment report undertaken as part of the environmental and social impact assessment for the proposed cashew nut processing plant project at Boke, Guinea.

The project will be undertaken to meet relevant national legislation, the Development Finance Corporation ("DFC"), the International Finance Corporation ("IFC") and other applicable legislation/guidelines/conventions. The IFC Environmental and Social Performance Standards will be considered for this project and the Performance Standard (PS) relevant to the project is:

- PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

1.1   Project Location

The project is located within Boke prefecture, in Boke region, South-West Guinea. The project is situated about 14.3km off Boke town, along the Kalaboui - Boke road, and about 12km from the capital, Conakry. The project site comprises secondary forests and tributaries of water bodies traversing the area. The location of the project area in relation to the local setting is presented in

1.2   Assumptions & Limitations

This report is based on the following assumptions and limitations:

- A late wet season site visit was conducted during the first week of October, 2022, during which seasonal variations in the various taxonomic groups, including migratory faunal species and flowering season of flora species could not be accounted for;
- To limit the seasonal and time constraints during the field assessment, site observations were compared with desktop literature;
- Due to the nature of sampling and the secretive habits of most faunal taxa, it is unlikely that all species would have been observed during a field assessment of limited duration during the late wet season. Some species and taxa within the footprint area may therefore have been missed during the assessment.

2 Legal Framework

2.1 The Guinea Regulatory Framework

Primary authority for regulation and enforcement of environmental laws rests with the Guinea Ministry of Environment and Sustainable Development. The specific policies, acts and guidelines enforced by the Ministry that are relevant to the project include:

2.2 Lender's Requirements

The IFC Environmental and Social PS (2012) will be considered for this project. The PS relevant to the project is:

- PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

2.3 International Legislation and Policy

The following are applicable:

- Convention on Biological Diversity (Rio de Janeiro, 1992);
- The Ramsar Convention (on wetlands of international importance);
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES is an international agreement between governments. It aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival; and
- The International Union for Conservation of Nature (IUCN) (World Conservation Union). The IUCN's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

3 Ecological Description

3.1 Threatened Species of Guinea

According to the IUCN Red List of Endangered Species (IUCN version 2022-1), a total of 422 species were recorded as threatened species across the major taxonomic group for Guinea. Table 1 presents an overview of the number of threatened species recorded for Guinea, dated 2022 (https://www.iucnredlist.org.com).

Table 3: Threatened species within each category for Guinea

Mammals	Birds	Reptiles	Amphibians	Fishes	Molluscs	Other Inverts	Plants
32	22	10	7	119	6	5	221

3.1.1 Mammals

Based on the IUCN database (IUCN, 2022), historically and currently seventy-six (76) mammal species had the potential to occur in the project AoI when restricting the information to the project AoI (Appendix B). Of these species, twenty-nine (29) are species of conservation concern (Table 4). Based on the disturbed nature of the area combined with the high density of human settlement, none of these species has a high likelihood of occurring in the project AoI.

Table 4: Mammal SCCs that could possibly occur in the project area

Order	Scientific Name	Common Name	IUCN	Probability of Occurrence
Primates	*Cercobus atys*	Sooty Mangabey	VU	Low
Primates	*Erythrocebus patas*	Patas Monkey	NT	Low
Carnivora	*Genetta johnstoni*	Johnston's Genet	NT	Low
Carnivora	*Hyaena hyaena*	Striped Hyena	NT	Low
Carnivora	*Panthera leo*	Lion	VU	Low
Primates	*Piliocolobus badius*	Western Red Colobus	EN	Low
Artiodactyla	*Tragelaphus eurycerus*	Bongo	NT	Low
Sirenia	*Trichechus senegalensis*	African Manatee	VU	Low
Carnivora	*Acinonyx jubatus*	Cheetah	VU	Low
Primates	*Cercopithecus diana*	Diana Monkey	EN	Low
Primates	*Pan troglodytes*	Chimpanzee	EN	Low
Primates	*Colobus polykomos*	King Colobus	EN	Low
Carnivora	*Panthera pardus*	Leopard	VU	Low
Artiodactyla	*Hippopotamus amphibius*	Hippopotamus	VU	Low
Proboscidea	*Loxodonta cyclotis*	African Forest Elephant	CR	Low

Order	Scientific Name	Common Name	IUCN	Probability of Occurrence
Pholidota	*Phataginus tetradactyla*	Black-bellied Pangolin	VU	Low
Carnivora	*Caracal aurata*	African Golden Cat	VU	Low
Artiodactyla	*Choeropsis liberiensis*	Pygmy Hippopotamus	EN	Low
Carnivora	*Aonyx capensis*	African Clawless Otter	NT	Low
Carnivora	*Hydrictis maculicollis*	Spotted-necked Otter	NT	Low
Primates	*Procolobus verus*	Olive Colobus	VN	Low
Primates	*Cercopithecus petaurista*	Spot-nosed Monkey	NT	Low
Artiodactyla	*Syncerus caffer*	African Buffalo	NT	Low
Pholidota	*Phataginus tricuspis*	White-bellied Pangolin	EN	Low
Carnivora	*Lycaon pictus*	African Wild Dog	EN	Low
Rodentia	*Protoxerus aubinnii*	Slender-tailed Squirrel	NT	Low
Eulipotyphla	*Crocidura grandiceps*	Large-headed Forest Shrew	NT	Low
Primates	*Papio papio*	Guinea Baboon	NT	Low
Primates	*Perodicticus potto*	West African Potto	NT	Low

(NT= Near Threatened, VU= Vulnerable, DD= Data deficient)

3.1.2 Herpetofauna

The IUCN (2022) data was used to compile a species list of the herpetofauna (Reptiles and Amphibians). Thirty (30) reptiles and eleven (11) amphibian species could possibly occur in the project AoI (Appendix C). Of these numbers, four (4) reptiles and two (2) amphibian species were considered and listed as Species of Conservation Concern (Table 5). Considering the large agricultural plantation, the various human activities as well as high density of humans in the area, the habitat is not ideal for these species. However, the gallery forest along the channels of the freshwater streams and the possible availability of food such as rodents utilizing the agricultural plantation habitat increases the chances of these species occurring in the area.

Table 5: Reptile SCC expected in the project area

Family	Scientific Name	Common Name	IUCN Status	Probability of Occurrence
Amphibian				
Anura Odontobatrachidae	*Odontobatrachus fouta*	Fouta Djallon Torrent-frog	EN	Moderate
Anura Arthroleptidae	*Arthroleptis crusculum*	Guinea Screeching Frog	NT	Moderate
Reptile				
Squamata Viperidae	*Bitis nasicornis*	Rhinoceros Viper	VU	Low
Squamata Pythonidae	*Python regius*	Ball Python	NT	Low
Squamata Pythonidae	*Python sebae*	Central African Rock Python	NT	Low
Testudines Trionychidae	*Cyclanorbis senegalensis*	Senegal Flapshell Turtle	VU	Low

(VU= Vulnerable; EN = Endangered; NT= Near Threatened)

3.1.3 Avifauna

A list of potential avifauna species that have been recorded in the project AoI was compiled by utilising Birdlife Datazone Species information from Avibase (2022). A total of 388 species were identified that could occur in the AoI (Appendix D). Of the numbers, seventeen (17) species were considered as SCCs (Table 6). The larger predatory and scavengers birds will have a low likelihood of occurring based on the threats associated with human development and persecution. The fruit seed dependent and the water birds have a moderate likelihood of occurrence based on the presence of the fruiting canopy trees and network of streams and estuaries of the River Rio Nuñez a further distance of 45km from the project development footprint.

Table 6: Avifauna SCCs expected to occur in the project area

Scientific Name	Common Name	IUCN status	Probability of Occurrence
Phoeniconaias minor	Lesser Flamingo	NT	Low
Haematopus ostralegus	Eurasian Oystercatcher	NT	Low
Numenius arquata	Eurasian Curlew	NT	Moderate
Limosa lapponica	Bar-tailed Godwit	NT	Moderate
Limosa limosa	Black-tailed Godwit	NT	Moderate

Scientific Name	Common Name	IUCN status	Probability of Occurrence
Calidris canutus	Red Knot	NT	Moderate
Calidris ferruginea	Curlew Sandpiper	NT	Moderate
Trigonoceps occipitalis	White-headed Vulture	CR	Low
Necrosyrtes monachus	Hooded Vulture	CR	Low
Gyps africanus	White-backed Vulture	CR	Low
Gyps rueppelli	Rüppell's Griffon	CR	Low
Terathopius ecaudatus	Bateleur	EN	Low
Circaetus beaudouini	Beaudouin's Snake-Eagle	VU	Low
Polemaetus bellicosus	Martial Eagle	EN	Low
Bucorvus abyssinicus	Abyssinian Ground-Hornbill	VU	Moderate
Ceratogymna elata	Yellow-casqued Hornbill	VU	Moderate
Lanius senator	Woodchat Shrike	NT	Moderate

(NT= Near Threatened, VU= Vulnerable, CR= Critically Endangered, EN = Endangered)

3.1.4 Flora

The vegetation expected in the project area was based on ecological survey and biodiversity assessment reports undertaken as part of the different EIA reports supporting the various mining development activities within the Boke region (EEM, 2015 and TBC, 2017). This information was also supported and supplemented by flora species listed on the IUCN (2022) site and compiled a preliminary checklist of threatened plant species of Guinea (Couch *et al*., 2019). According to the information 30 woody flora species and 31 herbaceous species are expected in the project area (Appendix E). A total of eleven (11) of these species are expected are species of conservation concern (Table 7).

Table 7: Flora SCCs expected to occur in the project area

Family	Scientific Name	Common Name	IUCN Status	Ecology	Probability of Occurrence
Orchidaceae	*Ansellia africana*	Leopard Orchid	VU		
Rubiaceae	*Pavetta leonensis*	Kansibomba	EN		
Myristicaceae	*Coelocaryon sphaerocarpum*	wild nutmeg	NT		
Rubiaceae	*Pavetta platycalyx*		VU		
	Lipotriche tithonioides	Simandou Daisy	EN		
Rubiaceae	*Nauclea diderrichii*		NT		
Leguminosae-Caesalpinioideae	*Afzelia africana*		VU		

Family	Scientific Name	Common Name	IUCN Status	Ecology	Probability of Occurrence
Meliaceae	*Entandrophragma angolense*	Tiama Mahogany	NT		
Rubiaceae	*Mitragyna stipulosa*		NT		

(NT= Near Threatened, VU= Vulnerable, EN = Endangered)

4.0   Biological Assessment Result

4.1   Flora Assessment Methodology

The Flora study encompassed an assessment of all the vegetation units and habitat types within the project AoI. The focus of the assessment was on the project area with special attention to habitat types as well as the occurrence of any IUCN red list-data species. The survey methodologies include the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity; and
- Identification of floral red-data species

4.1.1   Literature study

A literature review was conducted as part of the assessment to identify the potential habitats present within the project area. The flora species expected in the project area was based on previous ecological survey and biodiversity assessment reports compiled as part of different EIA reports supporting the various mining development project undertaken within the Boke region (EEM, 2015) and (TBC, 2017) and supplemented by species listed on the IUCN (2022) site and a preliminary checklist of Threatened plant species of Guinea (Couch *et al*., 2019).

4.1.2   Floristic sampling

To scope the survey, the proposed project area was traversed by motorbike and on foot. The floristic diversity and search for flora SCC were conducted through meanders within the 5km AoI that was created from the project area. The random meander method is a highly efficient method for conducting floristic analysis specifically in detecting flora SCC and maximising floristic

coverage. In addition, the method is time and cost-effective and highly suited for compiling flora species lists and therefore gives a rapid indication of flora diversity. Current impacts (e.g. plantation stands, wood harvesting for charcoal production etc.) including subjective recording of dominant vegetation species and any sensitive features (e.g. riparian, restricted habitat types etc.) were also undertaken. In addition, opportunistic observations were made while moving through the project area.

4.2   Faunal Assessment Methodology

4.2.1   Mammals & Avifauna

The faunal desktop assessment included the following:

- Compilation of expected species lists;
- Compilation of identified species lists;
- Identification of any Red list Data or species of conservation concern (SCC) present or potentially occurring in the area; and
- Emphasis was placed on the probability of the occurrence of species of conservation importance.

The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, the following:

- Visual observations;
- Identification of tracks and signs; and
- Utilization of local knowledge.

Habitat types sampled included; Fresh water streams, Riparian habitats, Agricultural plantation stands and the modified natural habitat of the area. Mammal and avifauna distribution data were obtained from the following information sources:

- Avibase (2022) that utilises Birdlife Datazone Species information;
- The International Red List of Threatened Species website (IUCN, 2022).

4.2.2   Herpetology (Reptiles & Amphibians)

The herpetofauna assessment component of the project area was undertaken to utilise a variety of active and passive techniques. The cryptic nature and habits of herpetofauna species as well as seasonal and temporal fluctuations dictated that certain species within the assessment area may not have been recorded.

The herpetological field survey comprised the following techniques:

- Diurnal active hand searches - used for reptile species that shelter in or under micro-habitats such as woody debris, leaf litter, peeling bark etc; and
- Visual searches - typically undertaken for fast-moving species that are difficult to detect by hand searches. This involved using binoculars to view species from a distance without them being disturbed.

Herpetofauna distributional and species data were obtained from:

- The International Red List of Threatened Species website (IUCN, 2022).

4.3   Project Area of Analysis

To manage risks associated with the project, the IFC's PS6 is crucial for the identification of Critical Habitat, which in turn requires the definition of an Ecological Area of Analysis (EAA). A spatial EAA has been defined for the project (. The EAA encompasses the area that is:

- Likely to be affected by the project directly, indirect or unplanned events associated with the project. The EAA must take into account the biodiversity as well as the local communities; and
- Associated facilities that would not have been constructed or expanded if the project did not exist;

For each species qualifying for consideration under PS6 Criteria 1-3, the relevant EAAs are first identified. EAAs will likely be similar for many species, but if appropriate, different EAAs can be defined for each species. The selection of AOIs to include Critical Habitat assessment should be informed by an understanding of the scale of a project's potential impacts (so as not to waste effort

studying areas outside the project's influence) and the AOIs should be defined solely by ecological or administrative criteria.

The whole of an EAA containing Critical Habitat-qualifying biodiversity features is considered to be Critical Habitat for those features, even if the qualifying features are found only in a portion of the AOI. However, the assessment of impacts and mitigation actions that will determine if a project can align with PS6 will focus only on the portions of the AOI where the Critical Habitat-qualifying features can be found.

Definable ecological boundaries such as freshwater streams adjacent to the project area were identified. As a result, a 1000m buffer width from the project footprint area was assigned. This provides an area large enough to ensure the impacts of the project on the surrounding habitats are considered.

4.4   Land Use

The surrounding environment has undergone significant transformation due to large-scale cash crop plantation which includes cashew and oil palm plantation, rural subsistent agriculture and harvesting of surrounding trees for fuelwood and building materials. The existing vegetation consists largely of secondary tropical forests and agricultural plantation mainly cash crop such as palm and cashew with mosaic of natural vegetation especially along the fringes of the several fresh water stream distribution in the area.

The Current land uses within the surrounding area are dominated by agricultural uses, mostly consisting of cash crop plantations and subsistence crop cultivation. Villages are present within the surrounding areas and are associated with the surrounding agricultural plantations and farmlands (Plate 4.1 and Plate 4.2).

Plate 4.1: Palm plantation within the project AoI
Source: Richflood, 2022

Plate 4.2: Cashew Plantation within the Project AoI
Source: Richflood, 2022

4.5 Habitat and Floristic Analysis

4.5.1 Ecoregions and landscapes

The main project area falls within the lowland tropical rainforest ecoregion of Guinea, which is characterised by evergreen broadleaf trees, with patches and an undergrowth mixture of shrubs, herbs and grasses. The ecoregion within the project area also extends southwest into the low-lying coastline mangrove forest which is dissected by estuaries and swamps. From a broader perspective, the ecoregion is considered a Guinea savannah forest mosaic, characterised by a plateau covered with scattered wooded savannah, grasslands, and rare patches of dry forests, interspersed by remnants of gallery forests along the water courses (TBC, 2021). Several freshwater streams of variable sizes traverse the vegetation within the project area, flowing towards the coastal area. The streams are bordered by gallery forest which provides watershed conditions within the area. Generally, while the project area is heavily used for plantation agriculture and subsistent farming, the area still maintains a good level of ecosystem functionality.

The vegetation unit is predominantly made up of broadleaf secondary forest tall trees, spread across the landscape and forming gallery forest along the edge of the various flowing streams, as well as stands of plantation (cashew and oil palm), grasses and shrubs. The forest structure consists of tall canopy tree species reaching different heights and stratified at different layers. The crowns of the resident species grow to different heights, with the uppermost storey consisting of trees reaching 50m in height, trees of 20-30m forming the second storey, while the lower and densest layer includes trees of 5 to 20m (Robert, 1983).

The Fouta Djallon mountain range which forms a broad overlap with the ecoregion of the area presents a noticeable level of endemism, especially for small-bodied herpetofauna and freshwater species. This part of Guinea is also one of the last strongholds of Western Chimpanzees (*Pan troglodytes verus*) in West Africa as noted by the IUCN SSC Primate Specialist Group (TBC, 2021).

Considering that the littoral zone within the project area remains relatively sparsely populated and undeveloped, the vegetation units have not been greatly threatened (EEM, 2015).

However, the activities of mining within Sangarédi and Kamsar about 70km northeast and 45km southwest of Boke have had a significant impact on natural ecosystems, both in coastal areas

around the Rio Nuñez estuary and the Sangarédi plateau area. Areas of higher ecological value in the southern ecoregion around Kamsar city include the Rio Kapatchez and Îles Tristao Ramsar sites Important Bird Area (IBAs) and the Île Alcatraz and Île du Naufrage marine IBAs (TBC, 2021).

4.5.2   Habitats Types

Five habitat types were delineated for the project footprint area and the associated AoI. These habitats are shown in Figure 4.5 and are briefly discussed below.
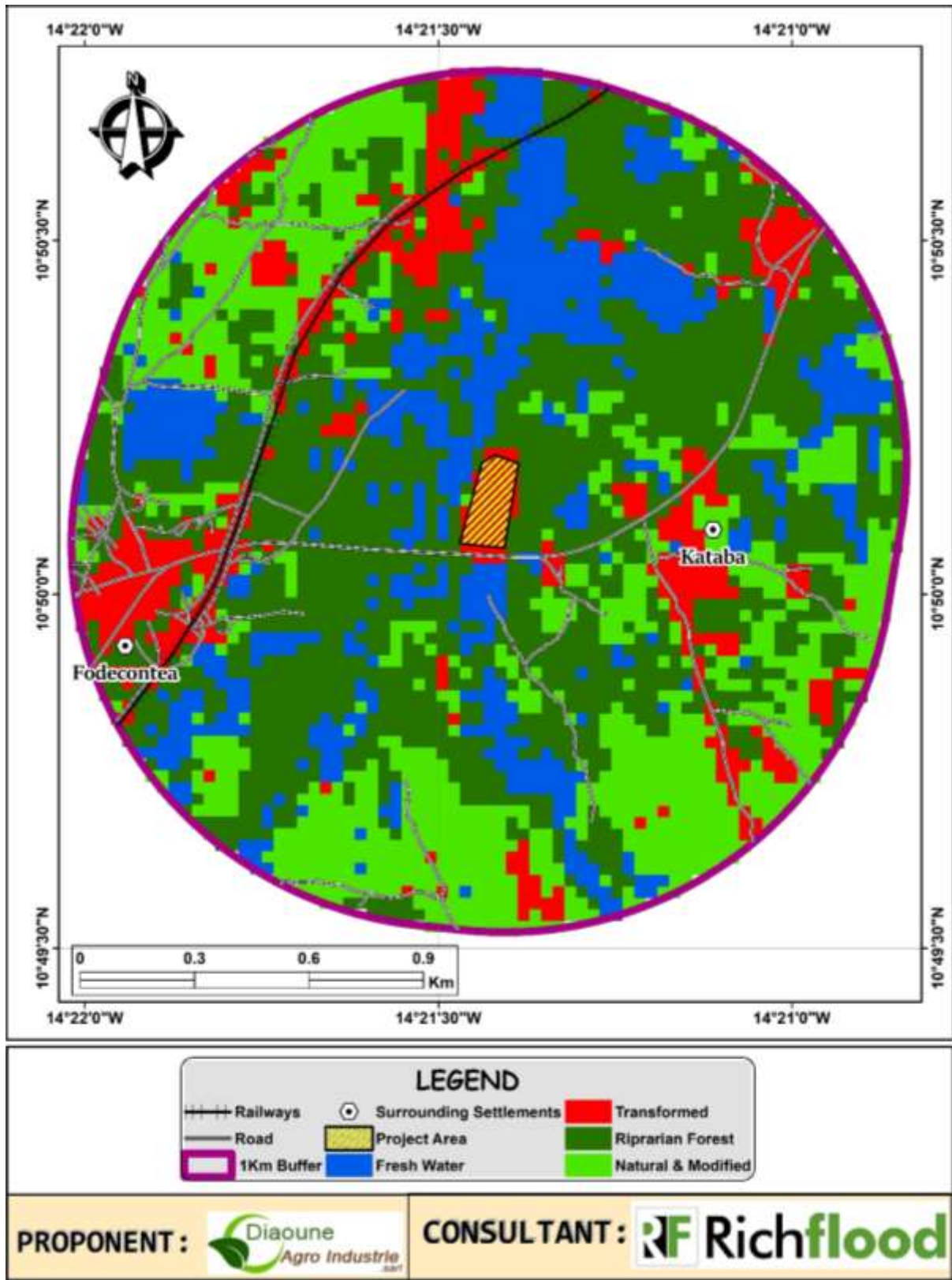
Figure 4.5: Land cover and Habitat delineated for the project area

Riparian Forest

The riparian habitat constitutes the low-lying gallery forest along the several flowing streams traversing the project AoI. Riparian habitat was observed within the west section and the edge of the project footprint. The presence of river Rio Nuñez, northwest of the project greatly influences the ecosystem dynamics of the project area with the network of streams draining the project area and providing riparian habitat conditions. The river Rio Nuñez splits south of the project AoI, with its tributaries flowing south towards the coastal area. In low-lying areas, the stream provides wetland conditions for rice farming which is a major subsistent agricultural activity in the area.

The Riparian forest plays crucial roles as a habitat and movement corridor for several faunal species especially birds, small species of reptiles and amphibians which are known or believed to occur within the project AoI, and dependent on the riparian forest and freshwater ecosystem. Downstream, the habitat also serves as a water resource for the local community.

This habitat unit can be regarded as highly important, not only within the local landscape but also regionally. The habitat sensitivity is considered moderate. Limited direct impacts are predicted on the riparian habitats from the project activities to be undertaken by DAI. No IUCN Red-listed species were recorded within this habitat unit.

Agricultural Plantation

Agricultural plantations within the project AoI majorly consist of cashews and stands of Palm oil which constitute the predominant cash crop cultivated by residents in the area. Plantations were found at different clusters around the villages where farmers reside and serve as one of the major sources of livelihood in the area. The agricultural plantation is derived from the transformation of Natural habitats and is considered to support low biodiversity compared to the natural habitats. Despite supporting low biodiversity, the agricultural plantation habitat forms a unique habitat within the region, playing an important role within the faunal species makeup by providing refugia and food for faunal species especially birds and lower invertebrates. The habitat sensitivity is considered low. Direct impacts from the project are predicted on this habitat condition, with increased demand for cashew translating to associated expansion in cashew plantations and loss of natural habitat. The habitat is highly modified and No SCC specie was recorded within this habitat unit.

Plate 4.3a: Agricultural plantation (Palm plantation observed) in the area
Source: Richflood, 2022

Plate 4.3b: Agricultural plantation (Cashew farm) observed in the area
Source: Richflood, 2022

Freshwater

The presence of the river Rio Nuñez in the project AoI is associated with perennial streams of freshwater traversing the project AoI. A network of streams was found in low-lying areas which drain the area. The freshwater habitat plays a crucial role in the ecosystem function of the area and accounts for the presence of freshwater-dependent species, especially fish species as well as aquatic flora and fauna species.

Limited direct impacts are foreseen on freshwater habitats due to the activities undertaken as part of the project. The main potential impact of the project activities stems from erosion-induced water run-off and increased turbidity/sedimentation on water streams. No SCC was recorded within this habitat.

Plate 4.4: The freshwater stream observed at the edge of the project footprint

Source: Richflood, 2022

Transformed

This habitat is characterised by areas cleared of natural vegetation mainly for housing and infrastructure as well as some of the roads and railway lines within the project AoI. The project footprint where the project will be situated is also classified as transformed habitat. The vegetation structure consists of short shrubs and grassland including some non-native crops and weeds. No IUCN Red-listed Data species were recorded within this habitat unit. This habitat is assigned a low sensitivity.

Plate 4.5: Transformed habitat along Railway as observed within the project area
Source: Richflood, 2022

Natural and Modified Habitats

This habitat is a mosaic of Natural and Modified forests within the project AoI. The habitat consists mostly of primary dense forest and modified woodland forest transformed from the loss of primary forest. In between these areas, some patches of modified shrub, grassland, and fallow land (arable land used for rotational crop cultivation and cash crop plantation) in various states of utilisation and recovery were found. The mosaic Natural and Modified habitats have undergone the variable level of anthropogenic pressure including charcoal production, bushfires, and use of timber associated with the local community. The vegetation found here consists of tall woodland trees and shrubs as well as grasses and herbaceous species that are known to grow in more disturbed areas.

There are large areas of lowland forest in Guinée Forestière (Forest Guinea) with most of these forests are highly fragmented (Couch *et al.*, 2019).

No species of conservation concern were recorded within this habitat during the baseline survey for the project. Terrestrial mosaics of Natural and Modified Habitats are considered a priority biodiversity feature of stakeholder concern and therefore an NNL target is required (TBC, 2015).

The DAI project site has undergone a varying degrees of anthropogenic pressure which has modified its intrinsic value and the project is not expected to have direct impacts on terrestrial habitats.

Plate 4.6: Mosaic Natural and Modified Habitats
Source: Richflood, 2022

4.5.3 Floristic Analysis

A total of 37 plant species were observed during the field survey and are provided in Table 4.1. Plants were recorded across 19 families, with Fabaceae having the highest proportion of species. All of the species have at least one known secondary ecosystem service that it provides to the local community. The three main categories of ecosystem services are medicine, food source or commodity (e.g. thatch or wood).

All the species recorded were non-endemic and none were Species of Conservation Concern (SCC), this speaks to the disturbed nature of the habitat in the project area. A selection of photographs taken during the survey of plants is provided in Plate 18. Critical habitat assessment for flora as per IFC Performance Standard 6 found no critical habitats to be present within the project area.

Table 4.2: Flora species recorded in the proposed project area

Scientific Name	Common Name	Family	IUCN Status	Endemic Status	Growth Form	Uses
Parkia biglobosa	African Locust Beans	Fabaceae	LC	Non-Endemic	Tree	Consumed as Food
Anthocleista djalonensis	Cabbage Tree	Gentianaceae	LC	Non-Endemic	Shrub	Used as medicine
Ageratum conyzoides	Goatweed	Asteraceae	LC	Non-Endemic	Herb	Medicinal use
Tamarindus indica	Tamarind	Caesalpiniodeae	LC	Non-Endemic	Tree	Medical purpose, ingredient for local drink
Chromolaena odorata	Chromolaena	Asteraceae	LC	Non-Endemic	Herb	Medicinal purpose
Ceiba pentandra	Silk Cotton Tree	Bombacaceae	LC	Non-Endemic		For food and construction
Bambusa vulgaris	Common Bamboo	Poaceae	LC	Non-Endemic	Grass	For construction
Piliostigma thonningii	Cattle Foot	Fabaceae	NA	Non-Endemic	Tree	Medicinal purpose
Elaeis guineensis	Oil Palm	Arecaceae	LC	Non-Endemic	Tree	Consumed as Food
Milicia excelsa	African Teak	Moraceae	NT	Non-Endemic	Tree	Construction purpose
Xylopia aethiopica	Custard Apples	Annonaceae	LC	Non-Endemic	Tree	For consumption
Albizia adianthifolia	Flat-Crown	Fabaceae	LC	Non-Endemic	Tree	Medical purpose
Combretum grandiflorum	Bushwillow	Combretaceae	LC	Non-Endemic	Shrub	Making dyes
Uapaca heudelotii	-	Euphorbiaceae	LC	Non-Endemic	Tree	Medicinal purpose
Terminalia catappa	Tropical Almond	Combretaceae	LC	Non-Endemic	Tree	For food consumption
Allophylus africanus	African Allophylus	Sapindaceae	LC	Non-Endemic	Shrub	Consumed as food
Annona senegalensis	Wild Soursop	Annonaceae	LC	Non-Endemic	Shrub	Consumed as food
Treculia africana	African Breadfruit		LC	Non-Endemic	Tree	Medicinal purpose
Pennisetum purpureum	Elephant Grass	Poaceae	LC	Non-Endemic	Herb	Consumed as food
Andropogon tectorum	Beard Grass	Poaceae	LC	Non-Endemic	Herb	For furniture
Cantinoa americana	Black Sesame	Lamiaceae	LC	Non-Endemic	Herb	Medicinal purpose
Dioscorea hirtiflora	Wild yam	Dioscoreaceae	LC	Non-Endemic	Climber	Consumed as food
Rungia eriostachya	-	Acanthaceae	NT	Non-Endemic	Herb	Medicinal purpose
Afzelia africana	African oak	Fabaceae	VU	Non-Endemic	Tree	Medicinal purpose
Dichrostachys cinerea	Sickle bush	Fabaceae	LC	Non-Endemic	Tree	Medicinal purpose
Lophira lanceolata	Dwarf Red Ironwood	Ochnaceae	LC	Non-Endemic	Tree	for construction purpose

Daniellia oliveri	African Copaiba Balsam Tree	Fabaceae	LC	Non-Endemic	Tree	Medicinal purpose
Dialium guineense	Black Velvet Tamarind	Leguminosae	LC	Non-Endemic	Tree	Medicinal purpose
Newbouldia laevis	Boundary Tree	Bignoniaceae	LC	Non-Endemic	Tree	For food and construction purpose
Hevea brasiliensis	Rubber Tree	Apocynaceae	LC	Non-Endemic	Tree	Medicinal purpose
Diospyros heudelotii	-	Ebenaceae	LC	Non-Endemic	Tree	Food, medicine, and wood for construction
Anisophyllea laurina	Monkey Apple	Anisophylleaceae	LC	Non-Endemic	Tree	Medicinal purpose
Rutidea parviflora	-	Rubiaceae	LC	Non-Endemic	Shrub	Medicinal purpose
Bombax costatum	Red-Flowered Silk Cotton Tree	Malvaceae	LC	Non-Endemic	Tree	Medicinal purpose
Dilophotriche occidentalis	-	Poaceae	LC	Non-Endemic	Grass	Consumed as food
Utricularia rigida	Bladderworts	Lentibulariaceae	LC	Non-Endemic	Herb	Medicinal purpose
Ficus platyphylla	Broadleaf fig	Moraceae	LC	Non-Endemic	Tree	Consumed as food

Source: Richflood, 2022

4.5.4 Critical Habitat Assessment for Flora

Performance Standard 6 (PS6; IFC 2012a) and the associated Guidance Note 6 (GN6; IFC 2012b) focuses on the protection and conservation of biodiversity. In most cases, the required conservation outcome under PS6 is no-net-loss of biodiversity value achieved using the "like-for-like" or better principle of biodiversity offsets. However, when a project occurs in critical habitat (CH) supporting exceptional biodiversity value, a net gain in biodiversity value is required.

CH identification is required by PS6 to manage risks and avoid, mitigate and offset impacts to areas with high biodiversity value including: 1) habitat of significant importance to Critically Endangered (CR) and/or Endangered (EN) species; 2) habitat of significant importance to endemic and/or restricted-range species; 3) habitat supporting significant global concentrations of migratory species and/or congregator species; 4) highly threatened and/or unique ecosystems; and/or 5) areas associated with key evolutionary processes. CH exists independent of a project and can be identified without reference to a project; a project may be proposed in CH, but the CH is present under baseline conditions and is not defined by the size of the project footprint, or other project effects. CH should be determined on a case-by-case basis according to the concepts of irreplaceability and vulnerability. The CH assessment for vegetation is shown in Table 11. Based on this, no CH was identified for this component of the project.

Table 11: Critical habitat assessment of flora

Criterion	Description	Flora
1	The occurrence of critically endangered or endangered species.	Tier 1 critical habitat is considered as unlikely - it is unlikely that the project area will support 10% or more of the global population of any floral species.
2	Habitat types sustain any endemic species with >95% or ≥1% but <95% of its global population restricted to this habitat. And/or, taxa are restricted-range species with an extent of occurrence of 50,000km² or less.	None of the floral taxa in the project area were restricted-range species with an extent of occurrence of 50,000km² or less.
3	Migratory or congregator species are present on the site, with abundance values exceeding 1% of the global population size	N/A

| 4 | This criterion has relevance to highly threatened or unique ecosystems containing unique assemblages of species, including concentrations of biome-restricted species. | The assessment did not find any endemic species, the habitat assemblages were also found to be disturbed. The direct impact of the development will thus not influence any unique species or habitat. |
| 5 | This criterion has relevance to areas associated with key evolutionary processes (i.e. important landscape level features, which allow for key evolutionary processes to take place). | Perennial river habitat is considered under Criterion 5, but no key evolutionary processes were identified. |

4.6 Mammals

4.6.1 National and Regional Context

Guinea has a total of 315 mammal species of which nine is critically endangered, twenty-two are endangered (IUCN, 2022). The species composition also consists of 214 Least Concerned species, 24 vulnerable species and 19 data deficient species (Table 14). The species compositions are dependent on the habitat types, rainforest, savannah or mountains. The species ranges from large mammals to small rodents and bats.

Table 14: Guinea mammal composition and their IUCN threat status

Total Mammal Species	CR	EN	VU	LC	DD

4.6.2 Field Observations

As a large portion of the project area is covered with agricultural plantation and modified vegetation, rodent species were the predominant mammal species occurring in the area. During field observations three mammal species; Giant Rat (*Cricetomys gambianus*), Grasscutter (*Thryonomys swinderianus*) and Tree Squirrel (*Xerus erythropus*) were observed in the project area. This is likely due to the disturbed nature of the area from human anthropogenic activities with resultant loss of habitat and utilisation as food source. As a large portion of the project area is covered with agricultural stand, rodent species are still very likely to occur.

4.6.3 Critical Habitat Assessment for Mammals

The critical habitat assessment for mammals in the project area is shown in Table 15. No critical habitat was identified for this component.

Table 15: Critical habitat assessment of mammals

Criterion	Description	Mammals
1	The occurrence of critically endangered or endangered species.	No CR or EN mammal species were recorded or expected to be present in the project area. Tier 1 critical habitat is considered as unlikely - it is unlikely that the project area will support 10% or more of the global population of any mammalian species.
2	Habitat types sustain any endemic species with >95% or ≥1% but <95% of its global population restricted to this habitat. And/or, taxa are restricted-range species with an extent of occurrence of 50,000km² or less.	No endemic / range restricted mammal species were recorded or are expected in the project area.
3	Migratory or congregator species are present on the site, with abundance values exceeding 1% of the global population size.	There are no migratory mammal species that occur in the area that would fulfil the quantitative threshold for Critical Habitat under Criterion 3.
4	This criterion has relevance to highly threatened or unique ecosystems containing unique assemblages of species, including concentrations of biome-restricted species.	The perennial river habitat which is unlikely to be affected by the proposed developments, must however be mentioned that it can be considered to be unique
5	This criterion has relevance to areas associated with key evolutionary processes (i.e. important landscape level features, which allow for key evolutionary processes to take place).	Whilst the systems separate habitat features and ecosystems, no mammal populations are divided by the river system and this river has not created a particular habitat exploited by only a single range restricted species.

4.7 Avifauna

4.7.1 National Context

As of 2019 a total of 969 bird species have been recorded within Guinea of which 436 are confirmed breeding residents, 180 are suspected breeding residents, about 150 are Palearctic migrants and 90 are intra-African migrants (Lepage, 2019). Currently the country supports 30 globally threatened and four endemic species. The rich diversity is attributed to the varied

topography and climate. Altitude increases gradually from sea-level in the south to about 600 m a.s.l. in the northern interior, although some mountains as well as the highland region of the Jos Plateau exceed 1500 m a.s.l. This gradient is accompanied by a decrease in annual precipitation and increase in climatic seasonality towards the interior, driving the diverse array of habitats ranging from lowland evergreen, mangrove and swamp forests in the south to a mosaic of semi-desert grasslands and savannas in the north, interspersed by patches of Afromontane forest (Ezealor, 2000).

Avifaunal assemblages are associated with each of the four main biomes which together support some 279 biome restricted species (and likely more since this estimate was made 19 years ago). These include the Sahel (biome A03, 13 spp.) in north-east, the Sudan–Guinea Savanna (A04, 42 spp.) in the centre and north, the Guinea–Congo Forests (A05, 187 spp.) in the south and the Afrotropical Highlands (A07, 37 spp.) confined to the south-eastern corner. The country supports 27 Important Bird Areas (IBAs) and two Endemic Bird Areas (EBAs) namely the Cameroon and Gabon lowlands (EBA 085) and the Cameroon mountains (EBA 086) (Ezealor, 2000).

Major hotspots for birdlife include (1) Okomu National Park Guinea, the largest remaining stand of lowland rainforest in south-western Guinea and a stronghold for both Black-casqued Hornbill (Ceratogymna atrata) and Yellow-casqued Hornbill (Ceratogymna elata), three species of spinetail and all four species of nigritas, (2) Obudu Plateau in the far south-east near the Cameroon border (Cross river State) which supports Grey-necked Picathartes (Picathartes oreas) as well as 18 endemics associated Cameroon Montane EBA 2, (3) the Hadejia-Nguru Wetlands north-east of Kano which together with Lake Chad is renowned as one of the most important wetland areas in West Africa for migratory waterbirds while its surrounding savannas represent major overwintering areas for species from Europe and (4) the Amurum Woodlands of the Jos Plateau which supports 2 restricted range endemics, the Rock Firefinch (Lagonosticta sanguinodorsalis) and its brood-parasite the Plateau Indigobird (Vidua maryae) (African Bird Club, 2013).

4.7.2 Field Observations

This section provides an overview of the species recorded during the field assessment. A total of forty-one (41) species were observed during the field assessment and are listed in Table 4.9. Most of the species are regarded as generalist common species that are well adapted to human

disturbances. None of the species recorded are species of conservation concern. Some of the species observed area shown in Figure 21.

Table 4.3: Avifaunal species recorded in the project area during the field assessment

Scientific Name	Common Name	IUCN Status	Endemic Status
Polyboroides typus	African Harrier Hawk	LC	Not endemic
Lophoceros semifasciatus	African Pied Hornbill	LC	Not endemic
Cinnyris venustus	Variable Sunbird	LC	Not endemic
Vidua chalybeata	Village Indigobird	LC	Not endemic
Crithagra mozambica	Yellow-fronted Canary	LC	Not endemic
Euplectes ardens	Red-collard Widowbird	LC	Not endemic
Lagonosticta rubricata	African Firefinch	LC	Not endemic
Chrysococcyx klaas	Klaas's Cuckoo	LC	Not endemic
Illadopsis fulvescens	Brown Illadopsis	LC	Not endemic
Gypohierax angolensis	Palm-nut vulture	LC	Not endemic
Chrysococcyx caprius	Diederik Cuckoo	LC	Not endemic
Cyanomitra olivacea	Olive Sunbird	LC	Not endemic
Platysteira cyanea	Brown-throated Wattle-eye	LC	Not endemic
Streptopelia semitorquata	Red-eyed Dove	LC	Not endemic
Streptopelia vinacea	Vinaceous Dove	LC	Not endemic
Ploceus cucllatus	Village Weaver	LC	Not endemic
Pogoniulus bilineatus	Yellow-rumped Tinkerbird	LC	Not endemic
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	LC	Not endemic
Corvus albus	Pied Crow	LC	Not endemic
Camaroptera brevicaudata	Grey-backed Camaroptera	LC	Not endemic
Pycnonotus barbatus	Common Bulbul	LC	Not endemic
Numenius arquata	Eurasian Curlew	NT	Not endemic
Tringa totanus	Senegal Coucal	LC	Not endemic
Prinia subflava	Tawny-flanked Prinia	LC	Not endemic
Terpsiphone rufiventer	Red-billed Paradise Flycatcher	LC	Not endemic
Passer griseus	Northern Grey-headed Sparrow	LC	Not endemic
Cypsiurus parvus	African Palm Swift	LC	Not endemic
Butorides striata	Green-backed Heron	LC	Not endemic
Kaupifalco monogrammicus	Lizard Buzzard	LC	Not endemic
Accipiter tachiro	African Goshawk	LC	Not endemic
Pternistis bicalcaratus	Double-spurred Francolin	LC	Not endemic
Actophilornis africanus	African Jacana	LC	Not endemic
Turtur afer	Blue-spotted Wood Dove	LC	Not endemic
Chrysococcyx cupreus	African Emerald Cuckoo	LC	Not endemic
Halcyon malimbica	Blue-breasted Kingfisher	LC	Not endemic
Eurystomus gularis	Blue-throated Roller	LC	Not endemic
Bycanistes sharpii	Piping Hornbill	LC	Not endemic
Nicator chloris	Western Nicator	LC	Not endemic
Spermestes cucullata	Bronze Mannikin	LC	Not endemic
Vidua macroura	Pin-tailed Whydah	LC	Not endemic
Lagonosticta senegala	Red-billed Firefinch	LC	Not endemic

Plate 21: Some of the avifauna recorded in the project area: A) Northern Red-billed Hornbill, B) Senegal Coucal, C) Western Cattle Egret, D) Yellow-billed Shrike, E) Long-tailed Glossy Starling and F) Abyssinian Roller

4.7.3 Critical Habitat Assessment for Avifauna

The critical habitat assessment for avifauna is shown in Table 17. The modified secondary forest as observed during field assessment still harbours a rich species of avifauna. Also, the fresh water stream habitat is regarded as important habitat for avifauna, but based on these criteria, no critical habitat was identified for the avifauna component of the project.

Table 17: Critical habitat assessment of avifauna

Criterion	Description	Avifauna
1	The occurrence of critically endangered or endangered species.	No IUCN listed critically endangered or endangered species were observed within the project area. Although the potentially of water bird SCCs does occur.
2	Habitat types sustain any endemic species with >95% or ≥1% but <95% of its global population restricted to this habitat. And/or, taxa are restricted-range species with an extent of occurrence of 50,000km² or less.	None of the species found has an extent of occurrence of 50,000km² or less nor could they be said to occupy significant proportion of their global population.
3	Congregatory species present on the site, with abundance values exceeding 1% of the global population size.	No globally significant congregations of local or migratory waterfowl were observed nor are they likely to occur given the available habitat within the project area
4	This criterion has relevance to highly threatened or unique ecosystems containing unique assemblages of species, including concentrations of biome-restricted species.	Watercourse habitat is known to support a unique assemblage of avifauna. Additionally, the habitat provides an important movement corridor for birdlife. Two biome restricted species were found, they were however not recorded in high number and can thus be regarded as incidental records.
5	This criterion has relevance to areas associated with key evolutionary processes (i.e. important landscape level features, which allow for key evolutionary processes to take place).	The project area does not support landscape features which could be considered important in driving avifaunal speciation. The ridges on the edge of the project area is not large enough to be a geographical barrier for avifauna species.

4.8   Herpetofauna

4.8.1   National and Regional Context

4.8.2   Field Observations

Critical habitat assessment for herpetofauna found no critical habitats to be present within the project area.

Relatively few species of herpetofauna were recorded within the assessment area, with only five (5) observed during the survey period (Table 4.3). The species recorded comprised of three (3) reptiles and two (2) amphibian species. The relatively low richness of herpetofauna was likely due to the synergistic effect of habitat degradation due to anthropogenic activities. Furthermore, no herpetofauna species of global conservation concern were recorded, and none of the species recorded are regarded as endemics.

Table 4.3: Herpetofauna recorded in the project area during the field assessment

Scientific Name	Common Name	IUCN Status	Endemic Status
Reptile			
Agama agama	Common Agama	LC	Non-endemic
Hemidactylus angulatus	House Gecko	LC	Non-endemic
Varanus niloticus	Nile Monitor	LC	Non-endemic
Amphibians			
Hyperolius spatzi	African reed frog	LC	Non-Endemic
Leptopelis viridis	Rusty Forest Tree frog	LC	Non-Endemic

Source: Richflood, 2022

4.8.3   Critical Habitat Assessment for Herpetofauna

The critical habitat assessment for herpetofauna is shown in Table 13 below. Based on these criteria, no critical habitat was identified for the herpetofauna component of the project.

Table 13: Critical habitat assessment of herpetofauna for the project

Criterion	Description	Herpetofauna
1	The occurrence of critically endangered or endangered species.	No IUCN listed critically endangered or endangered species were observed.
2	Habitat types sustain any endemic species with >95% or ≥1% but <95% of its global population restricted to this habitat. And/or, taxa are restricted-range species with an extent of occurrence of 50 000km² or less.	None of the herpetofauna taxa in the project area were restricted-range species with an extent of occurrence of 50,000km² or less

3	Migratory or congregatory species are present on the site, with abundance values exceeding 1% of the global population size.	None of the herpetofauna taxa are believed to have abundance values in the project area that exceed 1% of their global population size and/ or exceeds 1% of the global population size within a definitive AOI. Furthermore, there are no terrestrial migratory herpetofauna in this region and the only congregatory herpetofauna are amphibians which congregate in aquatic habitats to breed. However, these congregations are localized and are not likely to be impacted by the proposed activities. No specific congregation of a single herpetofauna species is known to occur within the project area that would fulfil this criterion.
4	This criterion has relevance to highly threatened or unique ecosystems containing unique assemblages of species, including concentrations of biome-restricted species	None of the habitat types supported assemblages of species that are considered to be unique.
5	This criterion has relevance to areas associated with key evolutionary processes (i.e. important landscape level features, which allow for key evolutionary processes to take place).	In general, large rivers are usually associated with key evolutionary processes as they often divide landscapes and therefore promote speciation by preventing gene flow across the river. However, no herpetofauna populations are divided by the river or has this river created a particular habitat exploited by only a single range restricted species.

4.4.7 Ecosystem Services

The project AoI is low-lying, cut by tributaries of river Rio Nunez providing an ideal environment for riparian forests. Because project AoI remains relatively sparsely populated and undeveloped, except in the vicinity of Boke town, the vegetation has not been greatly threatened. The Guinean coastal mangrove ecosystems, therefore, continue to provide a habitat for marine wildlife and a host of social and economic benefits to the resident population.

Some of the obvious uses of forest species which includes firewood, timber and charcoal clearly have been recognized and incorporated into local lifestyle among villagers. Other, less

apparent products (foods, oils, medicines) play major roles in traditional usage amongst local people.

4.4.9 Current impacts to ecological resources

Based on field observations, it is evident that ecological resources in the project area are currently impacted by a range of factors. Figure 4.10 illustrates a number of these factors which include:

- Presence of alien invasive plant species;
- Roads and railway lines;
- Agricultural Plantation;
- Production of charcoal;
- Cutting of trees (vegetation removal); and
- Developments, farmsteads and houses.

Plate 4.7: Ecological Impacts observed: Wood burning to produce Charcoal

Source: Richflood, 2022

4.4.8 Habitat Sensitivity

Habitats provide ecosystem services in the form of food and aesthetic value. The riparian forest and fresh water streams within the project area are rated as moderately sensitive. The habitat has already been modified by impacts such as replacement for palm plantation agriculture. The extent of the habitat that will be altered as a result of the project can thus not be regarded as extensive.

Areas that are classed as sensitive are generally those which are considered to be in a natural condition or were found to contain (or provide habitat for) threatened faunal or floral species. The following classifications are used to describe the possible sensitivity rankings:

- Low – insignificant amounts of natural habitat or vegetation present. Existing habitat has been extensively transformed. Remaining vegetation dominated by alien invasive plant species;

- Low-Moderate – existing habitats have been heavily transformed and little natural vegetation or habitats are present. Species diversity is considered low. Area may be considered otherwise moderately important (such as a movement corridor for fauna);

- Moderate – existing habitats have been modified or transformed but an equal percentage of natural vegetation and habitats remain. Species diversity is considered moderate. Such habitat is considered to have a strong chance of successful rehabilitation if left to restore through natural succession processes;

- Moderate-High – the majority of area is considered to be in a near-natural state. Species diversity is high, and the ecosystem function is healthy. Minor impacts may be present; and

- High – the area is considered to be in a largely natural condition with high levels of species diversity and also a good probability of Critical Habitat classification. Alternatively, an area may be regarded as having a high sensitivity (even if the habitat is modified) but is found to be habitat, or a breeding area, for any Species of Conservation Concern.

Each habitat unit was assessed and assigned a habitat sensitivity rating.

Appendix A: Mammal species expected to occur in the project area as per the IUCN (2022)

Scientific Name	Common Name	IUCN
Nycteris arge	Bates's Silt-faced Bat	LC
Cercobus atys	Sooty Mangabey	VU
Lchneumia albicauda	White-tailed Mongoose	LC
Atherurus africanus	African Brush-tailed Porcupine	LC
Hylochhorus meinertzhageni	Forest Hog	LC
Xerus erythropus	Striped Ground Squirrel	LC
Crocidura buettikoferi	Buettikofer's Shrew	LC
Erythrocebus patas	Patas Monkey	NT
Nandinia binotata	African Palm Civet	LC
Ogilby's Duiker	Cephalophus ogilbyi	LC
Hipposideros cyclops	Cyclops Roundleaf Bat	LC
Genetta johnstoni	Johnston's Genet	NT
Paraxerus poenis	Green Bush Squirrel	LC
Arvicanthis rufinus	Guinean Arvicanthis	LC
Potamochoerus porcus	Red River Hog	LC
Mungos gambianus	Gambian Mongoose	LC
Cephalophus niger	Black Duiker	LC
Hyaena hyaena	Striped Hyena	NT
Panthera leo	Lion	VU
Piliocolobus badius	Western Red Colobus	EN
Vulpes pallida	Pale Fox	LC
Redunca redunca	Bohor Reedbuck	LC
Tragelaphus eurycerus	Bongo	NT
Trichechus senegalensis	African Manatee	VU
Papio anubis	Olive Baboon	LC

Acinonyx jubatus	Cheetah	VU
Banded Mongoose	Mungos mungo	LC
Cercopithecus diana	Diana Monkey	EN
Pan troglodytes	Chimpanzee	EN
Canis adustus	Side-striped Jackal	LC
Chlorocebus sabaeus	Green Monkey	LC
Colobus polykomos	King Colobus	EN
Panthera pardus	Leopard	VU
Tragelaphus spekii	Sitatunga	LC
Hippopotamus amphibius	Hippopotamus	VU
Loxodonta cyclotis	African Forest Elephant	CR
Phataginus tetradactyla	Black-bellied Pangolin	VU
Caracal aurata	African Golden Cat	VU
Kobus ellipsiprymnus	Waterbuck	LC
Ourebia ourebi	Oribi	LC
Alcelaphus buselaphus	Hartebeest	LC
Canis lupaster	African Wolf	LC
Choeropsis liberiensis	Pygmy Hippopotamus	EN
Kobus Kob	Kob	LC
Aonyx capensis	African Clawless Otter	NT
Hydrictis maculicollis	Spotted-necked Otter	NT
Procolobus verus	Olive Colobus	VN
Phacochoerus africanus	Common Warthog	LC
Tragelaphus scriptus	Bushbuck	LC
Crocuta crocuta	Spotted Hyaena	LC
Cercopithecus petaurista	Spot-nosed Monkey	NT
Philantomba maxwellii	Maxwell's Duiker	LC
Syncerus caffer	African Buffalo	NT
Phataginus tricuspis	White-bellied Pangolin	EN
Lycaon pictus	African Wild Dog	EN
Suncus etruscus	Pygmy White-toothed Shrew	LC

Thryonomys swinderianus	Cane Rat	LC
Cricetomys gambianus	Gambian Rat	LC
Mastomys erythroleucus	Guinea Multimammate Mouse	LC
Lepus victoriae	African Savanna Hare	LC
Atilax paludinosus	Marsh Mongoose	LC
Galago senegalensis	Northern Lesser Galago	LC
Civettictis civetta	African Civet	LC
Protoxerus aubinnii	Slender-tailed Squirrel	NT
Mops brachypterus	Sierra Leone Mops Bat	LC
Crocidura grandiceps	Large-headed Forest Shrew	NT
Dendrohyrax dorsalis	Western Tree Hyrax	LC
Atelerix albiventris	Four-toed Hedgehog	LC
Heliosciurus gambianus	Gambian Sun Squirrel	LC
Genetta pardina	Pardine Genet	LC
Orycteropus afer	Aardvark	LC
Myonycteris leptodon	Sierra Leone Collared Fruit Bat	LC
Papio papio	Guinea Baboon	NT
Heliosciurus refobrachium	Red-legged Sun Squirrel	LC
Perodicticus potto	West African Potto	NT
Crocidura olivieri	Olivier's Shrew	LC

Appendix B: Herpetofauna species expected to occur in the project area as per the IUCN (2021)

Family	Scientific Name	Common Name	IUCN
Amphibian			
	Kassina lamottei	Rainforest Running Frog	LC
	Hoplobatrachus occipitalis	African Groove-crowned Frog	LC
	Phrynobatrachus liberiensis	Liberia River Frog	LC
	Pyxicephalus edulis	Lesser Bull-frog	LC
	Phrynobatrachus guineensis	Guinea River Frog	LC
	Odontobatrachus fouta	Fouta Djallon Torrent-frog	EN
	Sclerophrys pentoni	Penton's Toad	LC
	Hemisus guineensis	Guinea Snout-burrower	LC
	Leptoplis viridis		LC
	Hyperolius nitidulus	Plain Reed Frog	LC
	Arthroleptis crusculum	Guinea Screeching Frog	NT
Reptile			
	Varanus exanthematicus	Savanna Monitor	LC
	Pseudohaje nigra	Black Tree Cobra	LC
	Hemidactylus muriceus	Guinea Leaf-toed Gecko	LC
	Causus maculatus	Spotted Night Adder	LC
	Atheris chlorechis	Green Bush Viper	LC
	Hemidactylus fasciatus	Banded Leaf-toed Gecko	LC
	Bitis nasicornis	Rhinoceros Viper	VU
	Python regius	Ball Python	NT
	Panaspis tristaoi	Tristoi's Snake-eyed Skink	LC
	Philothamnus heterolepidotus	Slender Green Snake	LC
	Python sebae	Central African Rock Python	NT
	Lygodactylus conraui	Cameroon Dwarf Gecko	LC
	Natriciteres olivacea	Olive Marsh Snake	LC
	Dendroaspis polylepis	Black Mamba	LC
	Bitis rhinoceros	Rhinoceros Viper	LC
	Dendroaspis viridis	Western Green Mamba	LC
	Dasypeltis fasciata	Western Forest Egg Eater	LC
	Agama agama	Agama Lizard	LC
	Dendroaspis jamesoni	Jameson's Mamba	LC

	Afrotyphlops punctatus	Spotted Blind Snake	LC
	Varanus niloticus	Nile Monitor	LC
	Philothamnus heterodermus	Emerald Green Snake	LC
	Cyclanorbis senegalensis	Senegal Flapshell Turtle	VU
	Cynisca liberiensis	Liberia Worm Lizard	LC
	Trachylepis aureogularis	Orange-throated Skink	LC
	Boaedon lineatus	Striped House Snake	LC
	Mochlus guineensis	Guinea Forest Skink	LC
	Chamaelycus fasciatus	African Banded Snake	LC
	Bothrophthalmus lineatus	Red-Black Striped Snake	LC
	Holaspis guentheri	Sawtail Lizard	LC

Appendix C: Avifauna species expected to occur in the project area

Scientific Name	Common Name	IUCN status
Dendrocygna viduata	White-faced Whistling-Duck	LC
Sarkidiornis melanotos	Knob-billed Duck	LC
Alopochen aegyptiaca	Egyptian Goose	LC
Plectropterus gambensis	Spur-winged Goose	LC
Nettapus auritus	African Pygmy-Goose	LC
Spatula querquedula	Garganey	LC
Anas acuta	Northern Pintail	LC
Numida meleagris	Helmeted Guineafowl	LC
Guttera verreauxi	Western Crested Guineafowl	LC
Ptilopachus petrosus	Stone Partridge	LC
Coturnix coturnix	Common Quail	LC
Pternistis ahantensis	Ahanta Spurfowl	LC
Pternistis bicalcaratus	Double-spurred Spurfowl	LC
Phoeniconaias minor	Lesser Flamingo	NT
Columba guinea	Speckled Pigeon	LC
Streptopelia hypopyrrha	Adamawa Turtle-Dove	LC
Streptopelia semitorquata	Red-eyed Dove	LC
Streptopelia vinacea	Vinaceous Dove	LC
Spilopelia senegalensis	Laughing Dove	LC
Turtur abyssinicus	Black-billed Wood-Dove	LC
Turtur afer	Blue-spotted Wood-Dove	LC
Oena capensis	Namaqua Dove	LC
Treron calvus	African Green-Pigeon	LC
Lissotis melanogaster	Black-bellied Bustard	LC
Tauraco persa	Guinea Turaco	LC
Crinifer piscator	Western Plantain-eater	LC
Centropus senegalensis	Senegal Coucal	LC
Centropus grillii	Black Coucal	LC
Clamator glandarius	Great Spotted Cuckoo	LC
Clamator levaillantii	Levaillant's Cuckoo	LC
Clamator jacobinus	Pied Cuckoo	LC
Chrysococcyx klaas	Klaas's Cuckoo	LC
Chrysococcyx caprius	Dideric Cuckoo	LC
Chrysococcyx cupreus	African Emerald Cuckoo	LC
Cuculus clamosus	Black Cuckoo	LC
Cuculus gularis	African Cuckoo	LC
Caprimulgus longipennis	Standard-winged Nightjar	LC
Caprimulgus climacurus	Long-tailed Nightjar	LC
Telacanthura ussheri	Mottled Spinetail	LC
Apus apus	Common Swift	LC
Apus affinis	Little Swift	LC
Cypsiurus parvus	African Palm Swift	LC
Gallinula chloropus	Eurasian Moorhen	LC
Porphyrio alleni	Allen's Gallinule	Rare/Accidental
Zapornia flavirostra	Black Crake	LC

Podica senegalensis	African Finfoot	LC
Burhinus senegalensis	Senegal Thick-knee	LC
Pluvianus aegyptius	Egyptian Plover	LC
Pluvialis squatarola	Black-bellied Plover	LC
Vanellus spinosus	Spur-winged Lapwing	LC
Vanellus senegallus	Wattled Lapwing	LC
Charadrius hiaticula	Common Ringed Plover	LC
Charadrius marginatus	White-fronted Plover	LC
Actophilornis africanus	African Jacana	LC
Numenius arquata	Eurasian Curlew	NT
Limosa lapponica	Bar-tailed Godwit	NT
Limosa limosa	Black-tailed Godwit	NT
Calidris canutus	Red Knot	NT
Calidris ferruginea	Curlew Sandpiper	NT
Calidris temminckii	Temminck's Stint	Rare/Accidental
Ciconia nigra	Black Stork	Rare/Accidental
Ciconia microscelis	African Woolly-necked Stork	LC
Ardea goliath	Goliath Heron	LC
Ardea purpurea	Purple Heron	LC
Ardea alba	Great Egret	LC
Ardea intermedia	Intermediate Egret	LC
Egretta garzetta	Little Egret	LC
Egretta gularis	Western Reef-Heron	LC
Egretta ardesiaca	Black Heron	LC
Bubulcus ibis	Cattle Egret	LC
Ardeola ralloides	Squacco Heron	LC
Butorides striata	Striated Heron	LC
Nycticorax nycticorax	Black-crowned Night-Heron	LC
Ixobrychus minutus	Little Bittern	LC
Scopus umbretta	Hamerkop	LC
Elanus caeruleus	Black-winged Kite	LC
Polyboroides typus	African Harrier-Hawk	LC
Gypohierax angolensis	Palm-nut Vulture	LC
Aviceda cuculoides	African Cuckoo-Hawk	LC
Trigonoceps occipitalis	White-headed Vulture	CR
Necrosyrtes monachus	Hooded Vulture	CR
Gyps africanus	White-backed Vulture	CR
Gyps rueppelli	Rüppell's Griffon	CR
Terathopius ecaudatus	Bateleur	EN
Circaetus beaudouini	Beaudouin's Snake-Eagle	VU
Circaetus cinereus	Brown Snake-Eagle	LC
Circaetus cinerascens	Banded Snake-Eagle	LC
Macheiramphus alcinus	Bat Hawk	LC
Polemaetus bellicosus	Martial Eagle	EN
Lophaetus occipitalis	Long-crested Eagle	LC
Hieraaetus wahlbergi	Wahlberg's Eagle	LC
Aquila spilogaster	African Hawk-Eagle	LC
Kaupifalco monogrammicus	Lizard Buzzard	LC

Accipiter tachiro	African Goshawk	LC
Accipiter badius	Shikra	LC
Milvus migrans	Black Kite	LC
Otus senegalensis	African Scops-Owl	LC
Ptilopsis leucotis	Northern White-faced Owl	LC
Bubo cinerascens	Grayish Eagle-Owl	LC
Bucorvus abyssinicus	Abyssinian Ground-Hornbill	VU
Lophoceros fasciatus	African Pied Hornbill	LC
Lophoceros nasutus	African Gray Hornbill	LC
Ceratogymna elata	Yellow-casqued Hornbill	VU
Bycanistes fistulator	Piping Hornbill	LC
Corythornis cristatus	Malachite Kingfisher	LC
Ispidina picta	African Pygmy Kingfisher	LC
Halcyon leucocephala	Gray-headed Kingfisher	LC
Halcyon senegalensis	Woodland Kingfisher	LC
Halcyon malimbica	Blue-breasted Kingfisher	LC
Ceryle rudis	Pied Kingfisher	LC
Merops bulocki	Red-throated Bee-eater	LC
Merops pusillus	Little Bee-eater	LC
Merops hirundineus	Swallow-tailed Bee-eater	LC
Coracias abyssinicus	Abyssinian Roller	LC
Coracias naevius	Rufous-crowned Roller	LC
Coracias cyanogaster	Blue-bellied Roller	LC
Eurystomus glaucurus	Broad-billed Roller	LC
Pogoniulus bilineatus	Yellow-rumped Tinkerbird	LC
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	LC
Lybius vieilloti	Vieillot's Barbet	LC
Lybius dubius	Bearded Barbet	LC
Chloropicus goertae	African Gray Woodpecker	LC
Campethera nivosa	Buff-spotted Woodpecker	LC
Campethera maculosa	Little Green Woodpecker	LC
Falco alopex	Fox Kestrel	LC
Falco ardosiaceus	Gray Kestrel	LC
Falco biarmicus	Lanner Falcon	LC
Poicephalus senegalus	Senegal Parrot	LC
Coracina pectoralis	White-breasted Cuckooshrike	LC
Oriolus oriolus	Eurasian Golden Oriole	LC
Oriolus auratus	African Golden Oriole	LC
Platysteira cyanea	Brown-throated Wattle-eye	LC
Dryoscopus gambensis	Northern Puffback	LC
Tchagra senegalus	Black-crowned Tchagra	LC
Dicrurus occidentalis	Western Square-tailed Drongo	LC
Dicrurus divaricatus	Glossy-backed Drongo	LC
Terpsiphone rufiventer	Black-headed Paradise-Flycatcher	LC
Terpsiphone viridis	African Paradise-Flycatcher	LC
Lanius corvinus	Yellow-billed Shrike	LC
Lanius senator	Woodchat Shrike	NT
Corvus albus	Pied Crow	LC

Elminia longicauda	African Blue Flycatcher	LC
Nicator chloris	Western Nicator	LC
Sylvietta brachyura	Northern Crombec	LC
Melocichla mentalis	Moustached Grass-Warbler	LC
Eremomela pusilla	Senegal Eremomela	LC
Camaroptera brachyura	Green-backed Camaroptera	LC
Prinia subflava	Tawny-flanked Prinia	LC
Hypergerus atriceps	Oriole Warbler	LC
Chlorocichla simplex	Simple Greenbul	LC
Atimastillas flavicollis	Yellow-throated Greenbul	LC
Eurillas virens	Little Greenbul	LC
Phyllastrephus scandens	Leaf-love	LC
Passer griseus	Northern Gray-headed Sparrow	LC
Spermestes cucullata	Bronze Mannikin	LC
Quelea erythrops	Red-headed Quelea	LC
Euplectes franciscanus	Northern Red Bishop	LC
Turdus pelios	African Thrush	LC
Illadopsis fulvescens	Brown Illadopsis	LC
Turdoides plebejus	Brown Babbler	LC

Appendix D: Flora species Expected to occur in the project area

Family	Scientific Name	Common Name	Growth form	IUCN
Chromolaena odorata	Ipomoea alba	Moonflower		LC
Ceiba pentandra	Ficus sycomorus			LC
Bambusa vulgaris	Uapaca heudelotti			LC
Piliostigma thonningii	Berlinia grandiflora			LC
Elaeis guineensis	Gardenia ternifolia			LC
Milicia excelsa	Harungana madagascariensis			LC
Xylopia aethiopica	Parkia biglobosa	African Locust Beans		LC
Chromolaena odorata	Uapaca mole			LC
Ceiba pentandra	Chamaecrista mimosoides	Fish-bone Cassia		LC
Bambusa vulgaris	Nuclea latifolia			LC
Piliostigma thonningii	Hevea brasiliensis	Rubber Tree		LC
Elaeis guineensis	Cleistopholis patens			LC
Milicia excelsa	Treculia Africana	African Breadfruit		LC
Xylopia aethiopica	Ansellia Africana	Leopard Orchid		VU
Albizia adianthifolia	Pavetta leonensis	Kansibomba		EN
Combretum grandiflorum	Newbouldia laevis			LC
Uapaca heudelotii	Tetrapleura chevalieri			LC
Terminalia catappa	Coelocaryon sphaerocarpum			NT
Allophylus africanus	Voacanga thouarsii			LC
Annona senegalensis	Heterotis rotundifolia			LC
Treculia africana	Macaranga heudelotii			LC
Pennisetum purpureum	Combretum platypterum			LC
Andropogon tectorum	Vitex madiensis			LC
Cantinoa americana	Terminalia leiocarpa			LC
Dioscorea hirtiflora	Pavetta platycalyx			VU
Rungia eriostachya	Nymphaea heudelotii			LC
Afzelia africana	Garcinia quadrifaria			LC
Dichrostachys cinerea	Blighia sapida			LC
Lophira lanceolata	Xylopia longipetala			LC
Chromolaena odorata	Terminalia avicennioides			LC
Chromolaena odorata	Ficus thonningii			LC
Ceiba pentandra	Cola nitida	Kola nut		LC

Bambusa vulgaris	Diospyros mespiliformis	African Ebony		LC
Piliostigma thonningii	Dichrostachys cinerea			LC
Elaeis guineensis	Cassia sieberiana			LC
Milicia excelsa	Alchornea hirtella	Forest Bead-string		
Xylopia aethiopica	Dialium guineense			LC
Albizia adianthifolia	Melochia corchorifolia	Chocolate Weed		LC
Combretum grandiflorum	Lipotriche tithonioides	Simandou Daisy		EN
Uapaca heudelotii	Nauclea diderrichii			NT
Terminalia catappa	Afzelia Africana			VU
Allophylus africanus	Monodora myristica	African nutmeg		LC
Annona senegalensis	Osmunda regalis	Royal Fern		LC
Treculia africana	Phragmites australis	Common Reed		LC
Pennisetum purpureum	Milicia regia	Iroko		VU
Chromolaena odorata	Milicia excelsa	African Teak		NT
Ceiba pentandra	Entandrophragma angolense	Tiama Mahogany		NT
Bambusa vulgaris	Mitragyna stipulosa			NT
Piliostigma thonningii	Cyperus intactus			LC
Elaeis guineensis	Elaeis guineensis	African Oil Palm		LC
Milicia excelsa	Annona senegalensis			LC
Xylopia aethiopica	Uapaca guineensis			LC
Albizia adianthifolia	Panicum subalbidum	Elbow Buffalo Grass		LC
Combretum grandiflorum	Paratheria prostrate			LC
Uapaca heudelotii	*Combretum Grandiflorum*	Bushwillow		
Terminalia catappa	*Combretum Micranthum*			LC
Allophylus africanus	Daniellia oliveri			LC
Annona senegalensis	Musanga cecropioides	Umbrella Tree		LC
Treculia africana	Cenchrus unisetus	Natal Grass		LC
Pennisetum purpureum	Vitex grandifolia			LC
Andropogon tectorum	Guiera senegalensis			LC
Cantinoa americana	Xylopia aethiopica	Custard Apples		LC
Dioscorea hirtiflora	Anthocleista djalonensis	Cabbage Tree		LC
Rungia eriostachya	Ficus exasperata			LC
Afzelia africana	Pentaclethra macrophylla	African Oil Bean		LC
Dichrostachys cinerea	Ngon Ndamba	Funtumia Africana		LC
Lophira lanceolata	Lovoa trichilioides	African Walnut		LC

Chromolaena odorata	Piper guineense			LC
Ceiba pentandra	Mimosa pigra			LC
Bambusa vulgaris	Vitex doniana	Black Plum		LC
Piliostigma thonningii	Terminalia glaucescens	Glaucous Badamier		LC
Elaeis guineensis	Bombax buonopozense			LC
Milicia excelsa	Alchornea cordifolia			LC
Xylopia aethiopica	Ficus sycomorus			LC
Albizia adianthifolia	Oxytenanthera abyssinica	West African Bamboo		
Combretum grandiflorum	Ageratum conyzoides	Goatweed		
Uapaca heudelotii	Tamarindus indica	Tamarind		
Terminalia catappa	Chromolaena odorata	Chromolaena		
Allophylus africanus	Ceiba pentandra	Silk Cotton Tree		
Annona senegalensis	Bambusa vulgaris	Common Bamboo		
Treculia africana	*Piliostigma thonningii*	Cattle Foot		
Pennisetum purpureum	Sarcocephalus latifolius	African Peach		
Andropogon tectorum	*Albizia adianthifolia*	Flat-Crown		LC
Cantinoa americana	*Napoleonaea vogelii*			LC
Dioscorea hirtiflora	*Erythrophleum suaveolens*	Red Wood		
Rungia eriostachya	Terminalia Catappa	Tropical Almond		
Afzelia africana	*Dioscorea hirtiflora*	Wild yam		LC
Dichrostachys cinerea	*Lophira Lanceolata*	Dwarf Red Ironwood		