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**Supplementary Information
Package (SIP) to the ESIA of the
CBG Expansion Project
Third Release
Volume III - Appendices 9.8 to 9.13**

COMPAGNIE DES BAUXITES DE GUINÉE

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APPENDICES

Appendix 9.8 Framework for conserving biodiversity

Framework for conserving biodiversity

1 INTERNATIONAL CONVENTIONS AND TREATIES

1.1 Introduction

According to the 2008 Report of the Supreme Court of Guinea on Environmental Criminal Law:

[TRANSLATION]

The fundamental law of the Republic of Guinea recognizes the principle of the primacy of international law over domestic law.

Article 79 provides in this regard that duly approved or notified treaties or agreements shall, upon their publication, override laws, subject to reciprocity.

To ensure the implementation of this principle by State actors, in particular legislators and judges, the Republic of Guinea has adopted monism, i.e., the principle of unity between the domestic and international legal system, the effect of which is to seek compliance between domestic law and international law through amendments or changes to legislative and regulatory texts. In other words, ratified international conventions concerning the environment and containing criminal provisions take precedence over Guinean criminal legislation and are integrated into our texts.

The international conventions ratified by Guinea that have possible implications on the biological aspects of the Extension Project ESIA are described in the following subsections.

1.2 International Convention for the Prevention of Pollution of the Sea (IMO - London, 1954)

Signed by Guinea on April 19, 1981. Implementing institution: Ministère de l'Environnement.

One of the first conventions to protect the oceans from contamination.

1.3 International Convention for the Prevention of Pollution of the Sea by Oil (IMO - London, 1967)

Signed by Guinea on April 19, 1981. Implementing institution: Direction nationale de la Marine Marchande.

1.4 Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO - Paris, 1972)

Signed by Guinea on June 18, 1979. Implementing institution: Ministère de l'Enseignement Supérieur.

The goal of the Convention is to identify cultural and natural sites of international significance and assist in their protection.

There is only one international heritage site in Guinea, the Mount Nimba Strict Nature Reserve, listed in 1981 and now considered endangered. There are also three sites on the indicative list, but none in the vicinity of the ESIA study areas.

1.5 Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973 – amended Bonn, 1979)

Signed by Guinea on December 20, 1981. Implementing institution: Ministère de l'Environnement.

This convention on trade in endangered species includes lists of species (Appendices I, II and III) and establishes restrictions on their commerce.

Several species on these lists are present in the ESIA study areas:

Appendix I (endangered species that are or could be affected by trade): e.g., chimpanzees, manatees, crocodiles and marine turtles.

Appendix II (all species that, although not necessarily endangered at present, could become endangered if trade in specimens of these species was not strictly regulated): e.g., hippopotamuses, golden cats, African clawless otters, humpback dolphins and other primates.

Appendix III (all species that a Party declares to be subject, within the limits of its jurisdiction, to some form of regulation aimed at preventing or limiting their trade): none in the case of Guinea.

1.6 Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)

The *Convention on the Conservation of Migratory Species of Wild Animals* (CMS), or Bonn Convention, was ratified by Guinea on May 21, 1993, and came into effect on August 1, 1993. Implementing institution: Direction nationale des Eaux et Forêts.

Appendix I of this convention to protect migratory species lists the migratory species that are endangered. Appendix II lists "migratory species which have an unfavourable conservation status and which require international agreements for their conservation and management, as well as those which have a conservation status

which would significantly benefit from the international co-operation that could be achieved by an international agreement”.

Several species present in the environmental study areas for this ESIA are on these lists (including marine turtles, the humpback dolphin and many species of birds).

The UNEP/CM Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Prey MOU), of which Guinea is a signatory, came into effect on November 1, 2008.

Furthermore, in 2014, an African-Eurasian Migratory Waterbird Action Plan (AEMLAP) was adopted (UNEP/CMS Secretariat, 2014), completing the work begun under the AEWA.

Guinea has transposed this convention into its legislation through its Wildlife Protection Code and hunting regulations.

1.7 Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) (The Hague, 1995)

This agreement is an independent international treaty that was developed under the aegis of the United Nations Environment Programme (UNEP) and the Bonn Convention and was concluded on June 16, 1995, in The Hague. It came into effect on November 1, 1999. Guinea signed the AEWA agreement in 1995 and ratified it on July 26, 1996.

The agreement states the following: “1. Parties shall take co-ordinated measures to maintain migratory waterbird species in a favourable conservation status or to restore them to such a status. To this end, they shall apply within the limits of their national jurisdiction the measures prescribed...” and “2. In implementing the measures prescribed in paragraph 1 above, Parties should take into account the precautionary principle.”

The agreement identifies the status of the species to which it applies.

1.8 Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (Abidjan, 1981)

Signed by Guinea on March 23, 1981. Implementing institution: Ministère de l'Environnement.

In 1981, the Abidjan Conference adopted the Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region and a Protocol concerning Co-operation in Combating Pollution in Cases of Emergency.

Pursuant to the Abidjan Convention, Guinea produced a National Report on the Marine and Coastal Environment (2006).

1.9 African Convention on the Conservation of Nature and Natural Resources (Algiers, 1968 revised in 2003)

Signed by Guinea on December 12, 1989, and officially ratified on May 7, 2012. Implementing institution: Ministère de l'Environnement.

The fundamental principle of this convention is the following:

The Contracting States shall undertake to adopt the necessary measures to ensure conservation, utilization and development of soil, water, flora and faunal resources in accordance with scientific principles and with due regard to the best interests of the people.

The Convention deals specifically with protected species and states:

The Contracting States recognize that it is important and urgent to accord a special protection to those animal and plant species that are threatened with extinction, or which may become so, and to the habitat necessary to their

survival. Where such a species is represented only in the territory of one Contracting State, that State has a particular responsibility for its protection.

These species which are, or may be, listed according to the degree of protection that shall be given to them are placed in Class A or B of the Annex to this Convention, and shall be protected by Contracting States as follows:

a) species in Class A shall be totally protected throughout the entire territory of the Contracting States; the hunting, killing, capture or collection of specimens shall be permitted only on the authorization in each case of the highest competent authority; and

b) species in Class B shall be totally protected, but may be hunted, killed, captured or collected under special authorization granted by the competent authority.

2. The competent authority of each Contracting State shall examine the necessity of applying the provisions of this article to species not listed in the annex, in order to conserve the indigenous flora and fauna of their respective countries. Such additional species shall be placed in Class A or B by the State concerned, according to its specific requirements.

Several species present in the environmental study areas for this ESIA are named in the annex (including chimpanzees, the golden cat, manatees, marine turtles and many birds in Class A).

1.10 United Nations Convention on the Law of the Sea (Montego Bay, 1982)

Signed by Guinea on December 10, 1982, ratified in September 1985 and took effect in November 1994. Implementing institution: Direction nationale de la Marine Marchande.

1.11 Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971)

Also known as the Ramsar Convention. Signed by Guinea on September 24, 1992. Implementing institution: Direction nationale des Eaux et Forêts.

The following description is taken from The Ramsar Convention Manual: A Guide to the Convention on Wetlands (Ramsar, Iran, 1971), 4th edition. Ramsar Convention Secretariat, Gland, Switzerland, 2006.

The mission of the Ramsar Convention ... is the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.

Though the central Ramsar message is the need for the sustainable use of all wetlands, the "flagship" of the Convention is the List of Wetlands of International Importance (the "Ramsar List") – presently, the Parties have designated for this List more than 1,634 wetlands for special protection as "Ramsar Sites", covering 145 million hectares (1.45 million square kilometres).

Under the Convention there is a general obligation for the Contracting Parties to include wetland conservation considerations in their national land-use planning. They have committed themselves to formulate and implement this planning so as to promote, as far as possible, "the wise use of wetlands in their territory" (Article 3.1 of the treaty).

In Guinea, there are 16 recognized Ramsar Wetlands covering a total of 6,422,361 hectares. Two of these are close to the Kamsar Study Area, i.e., the Tristao Islands to the northwest and the Rio Kapatchez at the southern border.

1.12 UN Convention to Combat Desertification (Paris, 1994)

Signed by Guinea on April 19, 1997. Implementing institution: Direction nationale des Eaux et Forêts.

The full title of the Convention is the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa.

The Convention states that "... achieving this objective will involve long-term integrated strategies that focus simultaneously, in affected areas, on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level."

1.13 International Union for Conservation of Nature and Natural Resources (Fontainebleau, 1948)

Generally referred to by its acronym, IUCN.

On August 27, 2012, the International Union declared: "IUCN extends a warm welcome to the Government of the Republic of Guinea, which has officially announced its decision to become a Member of IUCN by endorsing the IUCN Statutes. The Ministry of Environment, Water and Forests has been designated by the Government of the Republic of Guinea as its liaison with the IUCN Secretariat."

http://www.iucn.org/news_homepage/news_by_date/?10764/IUCN-welcomes-the-Republic-of-Guinea-as-a-new-State-Member

The International Union for the Conservation of Nature is the largest and oldest global environmental organization in the world. It is best known for its Red List of Endangered Species and for establishing a rigorous system of species conservation status evaluations upon which certain key IFC Performance Standard 6 decisions are based.

IUCN is also involved in a variety of programs in Africa:

[TRANSLATION]

IUCN's Central and West Africa Program (*Programme Afrique Centrale et Occidentale – PACO*) is based on a variety of country and thematic programs. The Water and Wetlands Program (*Programme Ressources en Eau and Zones Humides – PREZOH*) is a PACO Regional Thematic Programme (*PTR*). The Partnership for Environmental Guidance in West Africa (*Partenariat pour la Gouvernance Environnementale en Afrique de l'Ouest – PAGE*) is a five-year PACO regional program to improve living conditions in West Africa by developing policies and strengthening environmental institutions. The Poverty Reduction and Environmental Management Initiative (*PREMI*) seeks to promote integrated management of natural resources in order to reduce poverty and adapt to climate change in West Africa. The Marine and Coastal Management Program (*Programme Marin et Côtier – MACO*) covers a range of issues including biodiversity conservation, protected marine areas management, fisheries development, integrated management, governance and adaptation to climate change impacts. It builds on IUCN's experience in West Africa, drawing in particular on its Regional Program for Conservation of the Coastal and Marine Zone of West Africa (*PRCM*) (*Programme régional de conservation de la zone côtière and marine*). The coordinating body of the MACO program is contributing to the implementation of the second phase of the PRCM, and to the development of the portfolio of projects of IUCN's offices in West Africa, in addition to developing a marine and coastal program for Central Africa. It coordinates several regional projects in cooperation with major partners such as the Sub-Regional Fisheries Commission (*SRFC*), the West African Economic and Monetary Union (*WAEMU*), the Regional Network of Protected Marine Areas in West African (*Réseau régional des AMP en Afrique de l'Ouest – RAMP AO*), and it promotes the involvement of IUCN commissions and expert groups such as the World Commission on Protected Areas (*WCPA*), the Commission on Environmental, Economic and Social

Policy (CEESP) and the Commission on Education and Communication (CEC).

(https://www.iucn.org/fr/propos/union/secretariat/bureaux/paco/programmes/programme_marin_er_cotier_maco/ce_que_nous_faisons/missions_et_objectifs/and other pages from the same site)

1.14 UN Convention on Biological Diversity (Nairobi, 1991)

Abbreviation: CBD. Guinean accession / ratification on May 7, 1993.
Implementing institution: Ministère de l'Environnement.

The website of the French Ministry of Ecology, Sustainable Development and Energy describes the CBD in the following terms: [TRANSLATION] "The Convention on Biological Diversity (CBD) represents a true turning point in international law. For the first time, the Convention recognizes the conservation of biodiversity as a 'common concern of mankind' and an integral part of the development process."

(<http://www.developpement-durable.gouv.fr/La-Convention-sur-la-diversite,12582.html>)

The Convention's goals are three-fold:

1. the conservation of biodiversity;
2. the sustainable use of its components; and
3. the fair and equitable sharing of the benefits arising out of the use of genetic resources.

The National Monograph was prepared in fulfilment of Guinea's obligations under the CBD. Guinea has transposed the Convention into its legislation through the Wildlife Protection Code and hunting regulations.

1.15 Extractive Industries Transparency Initiative (EITI)

Guinea was recognized as compliant in July 2014.

1.16 Environment Initiative of the New Partnership for the Development of Africa (NEPAD)

A new initiative called New Partnership for the Development of Africa (NEPAD) was put forward by African leaders on October 23, 2001, in Abuja, Nigeria.

1.17 Environmental policy of the ECOWAS Commission

A draft ECOWAS environmental policy action plan was developed by the Commission and reviewed from November 11 to 13, 2008, by experts in Abuja, Nigeria. The action plan has been submitted for adoption to the heads of state of the member countries.

2 NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

2.1 Introduction

Several strategic action plans developed by the Government of Guinea must also be taken into consideration in the deployment of the Project. These plans form the primary administrative framework under which the priority environmental issues on the territory are to be considered. The plans whose strategic directions and objectives are relevant to the ESIA and the implementation of the Project include the following.

2.2 National Action Plan for the Environment (Plan d'action national pour l'Environnement – PNAE)

[TRANSLATION]

The National Plan of Action for the Environment (PNAE) was adopted by the Council of Ministers on September 24, 1994. It constitutes the national Agenda 21 and the basis of the environmental policy. It occupies a pivotal position with respect to the sectoral strategies that have an impact on the management of natural resources and is based on all the previous sectoral strategies, particularly the National Forestry Action Plan (PAFN), the Master Plan for the Development of Mangroves (SDAM) and the Agricultural Development Policy Letter [*Lettre de Politique de Development Agricole de 1991 (LPDA-1)*].

The PNAE rests on the fundamental principle of integrating the environment into Guinea's economic and social development policies with two main objectives, namely the rational and sustainable management of natural resources and the definition or strengthening of sectoral policies.

(2011, Development of the policy on the environment)

The National Policy on the Environment (PNE) was published in 2011.

[TRANSLATION]

Since 1986, the Guinean authorities have been aware of the need to plan and implement a strategy to make rational use of the country's natural resources and to protect its environment with a view to sustainable development. To that end, the Government of the Second Republic adopted an Environment Code, a National Action Plan for the Environment (PNAE) and several other legislative and regulatory texts, policies, strategies and action plans. Even so, the importance of the environment is such that it is now necessary to develop a comprehensive environmental

policy to harmonize the various documents relating to natural resource management and environmental protection.

This policy is an expression of the political will to establish a frame of reference for the integration of environmental matters into the decision-making process for Guinea's development policies and strategies.

2.3 National Forestry Action Plan [Plan d'action forestier national (PAFN)]

The National Forestry Action Plan (PAFN-Guinea) was drafted in 1988, and the Guinean forestry policy was adopted by Decree No. 056 /PRG/SGG/90 of February 5, 1990, which defined the forestry sector development strategy for 25 years.

The plan refers, among other things, to the need:

[TRANSLATION]

- to safeguard the biological diversity of wildlife, in particular through a system of national parks and reserves;
- to combat the enemies of the vegetation cover, particularly illegal clearing operations and brush fires; and
- to protect water and soils.

2.4 Mangrove Management Master Plan [(Plan directeur d'aménagement forestier des mangroves -SDAM)]

The master plan dates from 1990.

[TRANSLATION]

This master plan for the development of mangroves in Guinea applies to almost 350,000 hectares of land and

affects nearly 2,000,000 people (one-third of the population): peasants, fishers, foresters, everyone involved in rice growing, fishing and forestry, as well as consumers of all kinds in rural and urban areas; given the fragility of the mangrove environment, development actions need to be based on solid scientific knowledge of its specific sedimentary hydro-mechanisms (the dangers of unplanned actions having been demonstrated by previous instances of overuse of the resource).

The plan was updated in the Charter and Action Plan for Sustainable Mangrove management in the PRCM region (Mauritania, Senegal, Gambia, Guinea-Conakry, Guinea-Bissau and Sierra Leone (2009) proposed by the West Africa Mangrove Initiative (IMAO):

[TRANSLATION]

The mangrove ecosystem is characterized by high biological productivity resulting in significant biodiversity, which benefits many animal and plant species. It therefore offers an abundance of wood and fish products as well as lands that are suitable for various activities, including agriculture and aquaculture. In addition, it serves as a refuge for many endangered species, is an essential part of the route of migratory birds and helps protect shorelines.

...

In Guinea, abundant rainfall along the coast favors the proliferation of mangroves on the banks of many estuaries, the most important being the Kogon, Nuñez, Kapatchez, Fatala, Konkouré, Soumbouya, Forécariah and Bramayah. Drought impacts are low in comparison with the Sahelian zone. Primary productivity is high and natural regeneration is active. Ecosystem degradation results primarily from economic activities, including agriculture and logging for firewood and construction.

A detailed plan has been proposed.

2.5 National Action Plan for Climate Change Adaptation [Plan d'action national d'adaptation aux changements climatiques (PANA-CC)]

The National Action Plan for Climate Change Adaptation, adopted in 2007, includes specific projects related to climate change.

2.6 National Action Plan on Biological Diversity (Plan d'action national sur la diversité biologique)

This plan is set out in two documents: Volumes 1 and 2 of the National Strategy for the Conservation of Biological Diversity and the Sustainable Use of Biological Resources (*Stratégie nationale de conservation de la diversité biologique et l'utilisation durable de ses ressources* – MMGE/PNUD/FEM, 2001 and 2002 respectively).

The plan states:

[TRANSLATION]

The following Strategy makes conservation of biological diversity and sustainable biological resource use a priority for economic and social development. This will require greater cooperation and coordination at the technical level, but also incentives and disincentives and laws and regulations to ensure that the protection and reasonable use of biological resources are successfully integrated into the broader social, cultural and economic context.

The Strategy explains the importance of UNBio:

[TRANSLATION]

In developing the Strategy and action plans, the Ministère de l'Environnement is supported by an advisory body called National Unity for Biological Diversity [Unité Nationale pour la diversité biologique (UNBio)], a national multisectoral and multidisciplinary commission bringing together

representatives of public and private parties, NGOs and funding organizations involved in conservation and biological diversity.

The Strategy sets four main objectives:

[TRANSLATION]

- conservation of biodiversity: detailed in five subobjectives and 35 priorities;
- sustainable use of biodiversity resources: detailed in five subobjectives and 28 priorities;
- general measures for the conservation and sustainable use of biodiversity resources: detailed in 11 subobjectives and 54 priorities; and
- international cooperation: detailed in one subobjective and eight priorities.

Among other things, the Strategy calls for:

[TRANSLATION]

- the creation and development of a network of protected areas that are representative of the diversity of terrestrial and aquatic ecosystems and the biological diversity they contain; and
- steps to encourage stakeholders to take an active part in the conservation and sustainable use of biological diversity outside the protected areas.

The Action Plan identifies a series of projects for implementation, notably:

Project No. 2: Creation of listed forests in the prefectures of Boké, Boffa, Kérouané, Mandiana, Fria and Siguiri.

[TRANSLATION]

Boffa, Boké, Fria, Kérouané, Mandiana and Siguiri are the only prefectures where there are no listed forests.

It should be noted that in most of these prefectures, uncontrolled open-pit mining operations are threatening the biodiversity of ecosystems already weakened by intense and frequent wildfires and excessive poaching.

Listed forests are unquestionably an important means of complementing and supporting the other types of protected area, and their creation in these prefectures will complement the national network of protected areas.

Society would benefit from granting protected area status to a part of the ecosystems in these prefectures to save a large number of animal and plant species that are endangered even though these habitats are very rich in biodiversity.

Project No. 3: National Wildlife Inventory

[TRANSLATION]

With a few exceptions, planners and managers do not have access to reliable information on the distribution and population numbers of the species of wild animals in Guinea. The pressures exerted by demographic growth, the influx of refugees and intensified infrastructure development, especially in rural areas, have no doubt led to the taking of excessive numbers of wild animals, the types and quantities of which are unknown. This lack of information limits the effectiveness of any attempt to protect or sustainably manage this resource.

Project No. 4: Survey on bushmeat consumption and determination of the basis for setting annual wildlife harvesting quotas

[TRANSLATION]

Natural wildlife resources play a significant role in the Guinean economy and Guineans' quality of life, and contribute to food security. Although Guinea's fauna is relatively rich, it has not been monitored, at least not since the country became independent; thus any determination of its potential is impossible.

Many Guineans rely on hunting as their main source of protein. Since wildlife is being harvested at levels that far exceed its natural growth in some parts of the country, it is likely that a considerable number of species will disappear. Guinea is severely threatened by the rise of commercial

hunting driven by national demand for bushmeat and international demand for live animals, skins and trophies. Many Guineans have become professional bird-catchers and hunters who camp for weeks and even months in the bush to kill animals and smoke their meat for the local, regional and national markets, or to capture birds, snakes and the young of certain animals for sale to expatriates or buyers abroad. Because these poachers do not spare gestating females or juveniles, their activity is leading to the disappearance of target species throughout most of the national territory. This phenomenon is worsened by human population growth and the influx of refugees fleeing civil conflicts in neighboring countries.

Project No. 14: Restoration of degraded habitats

[TRANSLATION]

The generalized degradation of the natural environment, particularly woodlands, is obvious to any observer. Even permanent forest lands are being affected by uncontrolled brushfires, agricultural encroachments and unauthorized settlements.

The agro-silvo-pastoral landscape is itself being degraded by soil erosion, overgrazing, uncontrolled forestry and mining activity, shifting agriculture, shortened fallow times, planting in fragile erosion-prone soils and declining soil fertility.

The restoration of natural environments is still a long and costly process. To achieve satisfactory, long-lasting results, it is essential that the people, especially those who live in the vicinity of the degraded areas, support the restoration objectives.

In light of these special conditions, comprehensive responses are required, such as a strong land-use policy that includes the restoration of degraded land so as to ensure food security, and to conserve soil, water and animal and plant resources through grazing deferrals, protection, reforestation, rational resources management and rehabilitation of agriculture and livestock raising. Even

so, complete restoration requires large-scale reforestation under realistic and ongoing programs.

Project No. 42: Restoration of degraded freshwater ecosystems

[TRANSLATION]

Freshwater ecosystems fulfil key ecological functions. The all-out rush to satisfy needs has degraded them, and disturbances of all types have resulted from a wide range of insults, particularly in watershed areas.

Shifting agriculture, based on clearing, slashing-and-burning and slope cultivation carried out with no precautions and in very short cycles, has changed the plant cover in the water catchment areas. Also of note are mining operations, which attack the soil, subsoil and plant cover, damage done to headwaters and river banks, the production of baked bricks, deforestation, runoff, etc.

The combination of this range of attacks disturbs waterflow patterns and changes the course and configuration of streams, rivers and bodies of water.

Erosion-induced sedimentation and accelerated silting change the physical-chemical characteristics of water before altering the biological equilibriums of aquatic environments and ultimately leading to the filling of many springs, lakes, ponds, pools and streams. Species dominances are shifting so significantly and flow patterns are changing to the point where steps to restore these ecosystems have become urgent. The population's support and participation are key to the success of this project.

Project No. 44: Biodiversity conservation and sustainable development in Guinea's southern mangroves

[TRANSLATION]

As a transition zone where inland and ocean waters mix, mangrove forests play a very important role in the bioproductivity of estuaries. Mangroves are generally rich in organic matter and they protect shores and banks. They

are a migration corridor for many species of birds, reptiles and primates.

Five forest zones, of which three are north of Conakry (Soumba-Konkouré, Matéba-Rio Pongo and Rio Nuñez) and two are in the south (Tabounssou and Forécariah), account for 30% of the area occupied by mangroves in Guinea. These zones are rich in animal and plant species, provide food and shelter for many migrating birds and serve as breeding grounds for many species.

These important areas support a wide range of economic activities, including those of many people involved in harvesting wood used to smoke fish, prepare salt and provide a variety of services and firewood for households.

Project No. 45: Protection of Guinea's marine turtles

[TRANSLATION]

Marine turtles occupy a very important place in the food chain. Their absence from the coastal ecosystem has resulted in the proliferation of jellyfish, which are a threat to fish. Protecting turtles and allowing them to multiply could help restore balance between the three following groups of organisms: turtles, jellyfish and fish. Turtles feed on jellyfish, and by doing so reduce the number of jellyfish, which prey on fish. Given the turtles' regulatory role in the biotic community, their populations need to be developed and increased through protective measures and the search for other possible reproduction sites along the entire Guinean coast.

As yet, no data are available on the population dynamics of Guinea's marine turtles. It must be noted that turtles and their eggs are eaten by people. Their shells are sold to tourists and also used as ashtrays or household decorations. Turtle blood is used in traditional medicine. For these reasons turtles continue to be hunted despite being protected by law.

Project No. 47: Organization of the mangrove wood industry

[TRANSLATION]

Along 300 km of coastline, mangroves occupy the entire coastal fringe and support a large number of diversified economic activities. Mangrove forests cover 250,000 hectares, with mud flats dewatered at low tide that are very important for shorebirds and migratory birds. Mangroves are useful and valuable in many ways. They are a habitat and a spawning ground. They stabilize shores and banks, retain sediment and break the wind. Mangrove trees are a source of wood used in rural and urban areas, including Conakry, as construction materials, charcoal and firewood for cooking.

Huge swaths of mangrove are directly or indirectly destroyed by human activities aimed at securing immediate benefits to the detriment of sustainable benefits that draw upon both the economic and natural values of the resource.

...

Mangroves represent a land reserve that is not only home to an exceptional wealth of wildlife, but is also the very basis of the marine food chain for shoreface aquatic species.

Project No. 48: Management of Ramsar sites

[TRANSLATION]

Guinea's wetlands are particularly productive environments that abound in biological resources. Paradoxically, they are exploited in ways that do not always consider the balance between short-term efficiency, on the one hand, and on the other, the sustainability of production and the maintenance of the many functions and services the wetlands provide for.

The coastal wetland ornithological inventories carried out by Guinean technical services (*Direction Nationale de l'Environnement, Direction nationale des Eaux et Forêts*) in cooperation with WIWO/CIPO have shown that the following five sites are of international importance as

habitats for migratory birds, and Guinea has had them added to the Ramsar Convention list: the Tristao Islands, the Alkatraz Islands, Kapatcheze Island, the Rio Pongo and the Konkouré River delta.

No work has been done to classify or develop these sites, which cover 225,011 hectares. Even so, to limit encroachment and the loss of their fundamental ecological, economic and scientific functions, efforts must be made to ensure that they are sustainably managed through greater efforts to take biodiversity conservation and the sustainable use of biological resources into consideration, to see that all economic and community shareholder groups work together and to establish mechanisms for active community participation and international cooperation.

2.7 National Action Plan to Combat Desertification [Plan d'action national de lutte contre la désertification (PANL-LCD)]

The National Action Plan to Combat Desertification was adopted in 2006, after Guinea signed the United Nations Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa (UNCCD).

One of the priorities identified in the Plan is to involve mine operators in the restoration of abandoned pits.

Subprogram 5 concerns the rebuilding of degraded ecosystems and the improvement of production systems:

[TRANSLATION]

The degradation of natural resources, particularly forest resources, is a matter of serious concern for decision-makers. The root causes of this degradation lie at several levels, the main ones being mining operations and the clearing of land for cultivation.

In the areas where mining has taken place, the consequences of a systematic change in the structure of the soils and the vegetation are perceptible. The plant cover has disappeared from mine pits, which have been completely stripped of soil and in places where traditional artisanal mine shafts have been dug. This distressing situation has led to a shortage of potable water because of high levels of pollution in rivers and streams, flooding that is detrimental to crops planted downstream and a tendency for springs to dry up early.

The solution is clearly to rehabilitate the disused pits, so as to restore the vegetation and to help reestablish waterflow patterns in the rivers and streams. Rehabilitation will also improve living conditions in the affected areas by initiating agroforestry planting and thus help reduce poverty.

3 NATIONAL MONOGRAPH ON THE BIODIVERSITY OF GUINEA

The National Monograph on the Biodiversity of Guinea (*Monographie nationale sur la biodiversité de Guinée* – 1997) is an important document in several respects. The monograph is an outcome of the UN Conference on Environment and Development held in Rio de Janeiro in June 1992 and obligations under the UN Convention on Biological Diversity. It represents the first draft of a national plan of action for biodiversity, which was subsequently developed in the Strategy and the 2001-2002 action plan described above. It is also a useful compendium of the information available at the time on the status of species in Guinea. Although the lists in the monograph need updating given how quickly changes of information and status can occur in biodiversity, it remains a useful reference on the species considered in this study and their status in Guinea.

4 LEGISLATION

4.1 Introduction

According to the Report of the Supreme Court of Guinea on Environmental Criminal Law (*Rapport de la Cour suprême de Guinée sur le droit pénal de l'environnement* - 2008), Guinean legal authorities are invested with broad powers to protect the environment:

[TRANSLATION]

Article 94 of the Environment Code grants the Judicial Police a broad power to access locations where evidence may be found. It authorizes any Judicial Police officer or agent to enter, at any time, a property, vehicle, facility, platform, vessel or building other than a dwelling house, for the purpose of gathering facts, and particularly to collect samples and install measurement or analytical devices or to visit a given site when it is presumed that a person is engaging or has engaged in an activity that may constitute a violation of the Environment Code and the regulations thereunder. The said officer or agent may seize, confiscate or impound those objects that constitute evidence. The Maritime Administration may inspect any vessel caught in the act of discharging contaminants.

The violations referred to include:

[TRANSLATION]

- Harm caused to animal or plant species or to their natural environments.
- The operation, on the national territory without authorization, of establishments engaging in the raising, sale, leasing or transportation of nondomestic species of animals as well as the operation of establishments for the

purpose of selling live specimens of national or foreign wildlife to the public.

- The immersion or disposal by any means whatsoever of waste materials in continental and maritime waters under Guinean jurisdiction.
- The possession and use of harmful or hazardous chemical substances.
- The violation of restrictions on noises and odors.
- The falsification of the findings of an impact assessment or the deliberate alteration of the parameters used to conduct the impact assessment.
- The destruction of sites and monuments of scientific, cultural, touristic or historical interest.

The main elements of the legal framework that apply to the Project and are of biological significance are the following:

- The Code for the Protection and Enhancement of the Environment (*Code de la Protection et de la Mise en Valeur de l'Environnement*), or Environment Code (*Code de l'environnement*), establishes the national framework for natural resource management and prescribes mechanisms, such as ESIA's, for minimizing negative environmental impacts.
- Law L/96/010/An (*Loi L/96/010/An du 22 juillet 1996 portant sur la réglementation des taxes à la pollution applicables aux établissements classés*) governs the application of pollution taxes to classified establishments.
- The Presidential Decree on Environmental Impact Assessments (*Décret présidentiel N° 199/PRG/SGG/89 codifiant les Études d'Impact sur l'Environnement* (November 1989) – establishes requirements for the conduct of ESIA's for certain types of project, including ports, power stations, mines, etc.
- Decree 201/PRG/SGG/89 (*Décret 201/PRG/SGG/89 du 8 novembre 1989 portant sur la préservation du milieu marin*) on the conservation of the marine environment.

- Decision 990/MRNE/SGG/90 (*Arrêté N° 990/MRNE/SGG/90*) establishes the procedures and methodology for conducting an ESIA.
- Decision A/2013/474/MEEF/CAB on the adoption of the General Environmental Assessment Guide (*Arrêté N° A/2013/474/MEEF/CAB portant sur l'adoption du Guide général d'évaluation environnementale*) establishes the structure, content requirements and implementation stages for ESIA's.
- Law L/95/036/CTRN on the Mining Code of the Republic of Guinea (*Loi L/95/036/CTRN du 30 juin 1995, portant sur le Code minier de la République de Guinée*) governs mining exploration, operations, commerce and processing in the mining industry, with reference to the Environment Code.
- The Water Code (*Code de l'eau*), enacted under Loi L/94/005/CTRN CTRN du 15 février 1994), establishes the framework for the management of the country's water resources.
- The Forest Code (*Code forestier – Loi L/99/013/AN, 1999*) establishes the framework for the management of forest resources.
- The Wildlife Protection Code and hunting regulations (*Loi L/99/038/AN adoptant et promulguant le Code de protection de la faune sauvage et réglementation de la chasse*).
- The Mining Code (*Loi L/2011/006/CNT*).
- The Framework Law on Freshwater Fishing [*Loi-cadre sur les activités de la pêche en eau douce (L/96/067/AN du 22 juillet 1996)*].
- The Pastoral Code (*Code pastoral*) establishes the conditions for using lands and resources to pasture livestock.

In view of the particular importance of the Wildlife Protection Code for the assessment of biological impacts, it is described in more detail in the following section.

4.2 Wildlife Protection Code

The law adopting and enacting the Wildlife Protection Code and hunting regulations (*Loi L/99/038/AN*) has been in effect since 1998.

The principles of particular interest in the Code are the following:

[TRANSLATION]

Wildlife is an endowment of general interest. Accordingly, it is recognized for its economic and social interest and its importance as a source of food as well as for its scientific, aesthetic, recreational and educational value.

It is the duty of all to contribute to its maintenance or development.

Wildlife conservation is ensured by all appropriate means, including the protection of vital environments and plant species. It is also ensured through education of the entire population, through teaching in schools and by all audiovisual means available, in order to foster a national awareness that wildlife conservation is a necessity.

Wildlife is a renewable resource that must be preserved through favorable habit and management conditions.

All animal species are an integral part of the national endowment and must be protected as such.

...

The conservation, maintenance or restoration of a sufficient diversity of environments and habitats needed for wildlife is also a national obligation. The environments in which wild fauna live are normally used for agricultural, grazing, forestry, aquatic or marine activities.

Special measures to protect biotopes may be instituted on part of the national territory, whenever the status of certain animal species so warrants.

A major part of the law is devoted to the protection of species:

[TRANSLATION]

Article 42: All animal species must be protected. Those whose populations are in a sufficient state to allow them to be hunted may be hunted in accordance with management practices that ensure that their numbers are maintained or increased.

Article 47: All particularly rare or endangered animals, the list of which is set by a decree implementing this Code, are fully protected throughout the entire national territory. This list may be amended by decree, based on a joint proposal by the departmental authorities responsible for hunting and scientific research.

The hunting and capture of animals of fully protected species, including juveniles, and the harvesting of eggs, are strictly prohibited. An exception may be granted to holders of scientific permits to hunt and capture.

Article 56: For all animals of partially protected species, the list of which is set by a decree implementing this Code, authorization shall be required before any hunting activity. The said authorization shall be stated on the hunting permit.

Some of the species found in the ESIA study areas are fully protected (e.g., golden cats and chimpanzees) or partially protected (e.g., servals, porcupines and hippopotamuses).

[TRANSLATION]

Guinea has adopted legislative texts establishing guidelines for the protection of plant life and the management of wildlife and wildlife habitats. These texts include:

- *Loi L/97/038/AN du 9 décembre 1997* adopting and enacting the Wildlife Protection Code and hunting regulations; and
- *Loi L/99/013/AN du 22 juin 1999* adopting and enacting the Forest Code (*Code forestier*).

These various legislative texts provide for:

- the total protection of wildlife in wetlands;

- the terms of coordination meetings with all types of users;
- the introduction of environmental education at Ramsar sites;
- the establishment of a national waterbird population tracking network;
- the management of wetlands by the Ramsar national committee;
- the regulation of hunting for feathered game;
- fines for poaching waterbirds or breaking the law in wetlands and on protected sites; and
- the prohibition of firearms and the use of lead shot in wetlands.

(Kourouma Christine Sagno, National Director for Waters and Forests – AEWA Focal Point – Guinea. 2006. Guinean National Report 2004-2005. The Agreement on the Conservation of African-Eurasian Migratory Waterbirds)

5 FINANCE AND INDUSTRY GUIDELINES

5.1 Equator Principles

The Project was also developed in compliance with the Equator Principles III (2011), a financial industry benchmark for taking social responsibilities and environmental management into account.

The 10 basic principles are:

- Principle 1: Review and Categorization: The Equator Principles Financial Institution (EPFI) must categorize the project according to the magnitude of its potential environmental and social risks and impacts. Such screening is based on the environmental and social criteria of the International Finance Corporation (IFC).

- Principle 2: Environmental and Social Assessment: The EPFI must require the client to conduct an assessment of the environmental and social risks and impacts and to propose relevant management and mitigation measures for reducing the impacts to an acceptable level;
- Principle 3: Applicable Environmental and Social Standards: Social and environmental performance must be evaluated according to the IFC Performance Standards and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines), as well as the host country law;
- Principle 4 – Environmental and Social Management System and Equator Principles Action Plan: The client must develop a plan for implementing the mitigation, remedial and follow-up measures needed to address the impacts and risks identified in the assessment process;
- Principle 5 – Stakeholder Engagement: For projects with potentially significant adverse impacts on host communities, the client must conduct an informed consultation and participation process beforehand, facilitate the communities' informed participation and make the assessment documents and action plan publicly available in a culturally appropriate manner;
- Principle 6 – Grievance mechanism: As part of the ESMS, the client must establish a grievance mechanism and inform the affected communities about it;
- Principle 7 – Independent review: An independent environmental and social consultant must carry out a review of the assessment, action plan and stakeholder engagement process in order to assess Equator Principles compliance;
- Principle 8 – Covenants: The client must covenant, in the financing documentation, to comply with the host country requirements, to implement the action plan, to provide periodic reports on the project's social and environmental performance, and to decommission and dismantle the facilities where applicable;

- Principle 9 – Independent monitoring and reporting: Reports and monitoring information must be checked by an independent environmental and social consultant; and
- Principle 10 – Reporting and transparency: EPFIs must report annually on their Equator Principles implementation processes and experience.

5.2 Overseas Private Investment Corporation (OPIC)

The OPIC Environmental and Social Policy Statement (OPIC, 2010) and other relevant documentation were also considered and applied.

5.3 Performance Standards of the International Finance Corporation (IFC)

Compliance with the IFC Performance Standards on Environmental and Social Sustainability (January 1, 2012) is a cornerstone of the ESIA report, along with the Equator Principles, for the management of the environmental and social impacts of international investment projects.

The IFC Performance Standards establish essential criteria, in terms of social and environmental sustainability, for accessing international capital. The set of eight operational standards requires that environmental and social management systems be developed, implemented and followed in order to ensure that risks and impacts related to the basic themes of sustainable development are effectively and systematically managed throughout the life of a project.

For each theme, specific methodological criteria, essential subjects and support principles are established to guide the process. The themes applicable to biological impact assessments are as follows:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labor and Working Conditions
Performance Standard 3: Resource Efficiency and Pollution Prevention; and
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

Performance Standards 1 and 3 cover general principles with applications for biology, whereas Standard 6 deals specifically with matters of biology.

5.4 Performance Standard 6 of the International Finance Corporation (IFC)

The objectives of Standard 6 are:

- to protect and conserve biodiversity;
- to maintain the benefits from ecosystem services; and
- to promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

The following texts are drawn from Standard 6 but have been reformatted to include the related notes and to highlight the salient points. The paragraph numbers of Standard 6 have been retained to ensure that the Standard is correctly understood.

5.4.1 General

7. As a matter of priority, the client should seek to avoid impacts on biodiversity and ecosystem services. When avoidance of impacts is not possible, measures to minimize impacts and restore biodiversity and ecosystem services should be implemented. Given the complexity in predicting project impacts on biodiversity and ecosystem services over the long term, the client should adopt a practice of adaptive management in which the implementation of mitigation and management measures is responsive to changing

conditions and the results of monitoring throughout the project's lifecycle.

8. Where paragraphs 13–15 are applicable, the client will retain competent professionals to assist in conducting the risks and impacts identification process. Where paragraphs 16–19 are applicable, the client should retain external experts with appropriate regional experience to assist in the development of a mitigation hierarchy that complies with this Performance Standard and to verify the implementation of those measures.

10. For the protection and conservation of biodiversity, the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization and restoration measures have been applied. A biodiversity offset should be designed and implemented to achieve measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in critical habitats. The design of a biodiversity offset must adhere to the "like-for-like or better" principle and must be carried out in alignment with best available information and current practices. When a client is considering the development of an offset as part of the mitigation strategy, external experts with knowledge in offset design and implementation must be involved.

The Standard is applicable to four types of habitats:

5.4.2 Modified habitat

11. Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones and reclaimed wetlands.

12. This Performance Standard applies to those areas of modified habitat that include significant biodiversity value, as determined by the risks and impacts identification process required in Performance Standard 1. The client should minimize impacts on such biodiversity and implement mitigation measures as appropriate.

5.4.3 Natural habitat

13. Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

14. The client will not significantly convert or degrade natural habitats, unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified habitat;
- Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation (conducted as part of the stakeholder engagement and consultation process, as described in Performance Standard 1); and
- Any conversion or degradation is mitigated according to the mitigation hierarchy.

Significant conversion or degradation is (i) the elimination or severe diminution of the integrity of a habitat caused by a major and/or long-term change in land or water use; or (ii) a modification that substantially minimizes the habitat's ability to maintain viable populations of its native species.

15. In areas of natural habitat, mitigation measures will be designed to achieve no net loss of biodiversity where feasible. Appropriate actions include:

- avoiding impacts on biodiversity through the identification and protection of set-asides;
- implementing measures to minimize habitat fragmentation, such as biological corridors;
- restoring habitats during operations and/or after operations; and implementing biodiversity offsets.

No net loss is defined as the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimize the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale (e.g., local, landscape-level, national, regional).

Set-asides are land areas within the project site, or areas over which the client has management control, that are excluded from development and are targeted for the implementation of conservation enhancement measures. Set-asides will likely contain significant biodiversity values and/or provide ecosystem services of significance at the local, national and/or regional level. Set-asides should be defined according to internationally recognized approaches or methodologies (e.g., High Conservation Value, systematic conservation planning).

5.4.4 Critical habitat

16. Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

The species in (i) are those listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) If the species is listed nationally / regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project-by-project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorizations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment.

17. In areas of critical habitat, the client will not implement any project activities unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;

- The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/ regional population of any Critically Endangered or Endangered species over a reasonable period of time; and
- A robust, appropriately designed and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

Biodiversity values and their supporting ecological processes will be determined on an ecologically relevant scale.

Net reduction is a singular or cumulative loss of individuals that impacts on the species' ability to persist at the global and/or regional/national scales for many generations or over a long period of time. The scale (i.e., global and/or regional/national) of the potential net reduction is determined according to the species' listing on either the (global) IUCN Red List and/or on regional/national lists. For species listed on both the (global) IUCN Red List and the national/ regional lists, the net reduction will be based on the national/regional population.

The timeframe in which clients must demonstrate "no net reduction" of Critically Endangered and Endangered species will be determined on a case-by-case basis in consultation with external experts.

18. In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated.

Net gains are additional conservation outcomes that can be achieved for the biodiversity values for which the critical habitat was designated. Net gains may be achieved through the development of a biodiversity offset and/or, in instances where the client could meet the requirements of paragraph 17 of this Performance Standard without a biodiversity offset, the client should achieve net gains through the implementation of programs that could be implemented

in situ (on the ground) to enhance habitat and to protect and conserve biodiversity.

19. In instances where biodiversity offsets are proposed as part of the mitigation strategy, the client must demonstrate through an assessment that the project's significant residual impacts on biodiversity will be adequately mitigated to meet the requirements of paragraph 17.

5.4.5 Legally protected and internationally recognized areas

20. In circumstances where a proposed project is located within a legally protected area or an internationally recognized area, the client will meet the requirements of paragraphs 13 through 19 of this Performance Standard, as applicable. In addition, the client will:

- demonstrate that the proposed development in such areas is legally permitted;
- act in a manner consistent with any government recognized management plans for such areas;
- consult protected area sponsors and managers, Affected Communities, Indigenous Peoples and other stakeholders on the proposed project, as appropriate; and
- implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area (implementing additional programs may not be necessary for projects that do not create a new footprint.)

This Performance Standard recognizes legally protected areas that meet the IUCN definition: "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." For the purposes of this Performance Standard, this includes areas proposed by governments for such designation.

An internationally recognized area is exclusively defined as UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under

the Convention on Wetlands of International Importance (the Ramsar Convention).

5.4.6 Guidance Note 6

Guidance Note 6 (IFC, 2012b) was a key additional document relating to the implementation of Performance Standard 6.

5.5 Other guidelines

Additional guidance was provided by the following:

- IPIECA/OGP ,2005. *A Guide to Developing Biodiversity Action Plans for the Oil and Gas Sector* and the
- ICM, 2006. *Good Practice Guidance for Mining and Biodiversity*.
- BBOP, 2010. *Biodiversity Offsets and the Mitigation Hierarchy: a review of current application in the banking sector*.
- Rio Tinto, 2012. *Staged Approach to Biodiversity Action Planning – Guidance Note*
- IFC, 2012c. *Biodiversity Offsets – Overview of the revised Performance Standard 6 and initial experiences*.
- IUCN, 2014. *Biodiversity Management in the Cement and Aggregates Sector*

APPENDICES

Appendix 9.9 Review of selected impacts

Review of selected impacts

Some additional impact assessment work was requested at the Paris meeting and in the TBC. More detailed assessment on impacts to Endangered species and the critical habitats defined based on their presence will be done after the fieldwork specified to take place during the BAP production (Section 10.3).

1 ASSESSMENT OF HABITAT TYPES WITHIN THE MINING AREAS

The following table summarizes the distribution of habitat types in the total local area (mapped habitat area shown on ESIA maps) and the areas to be mined.

Table 1 Area of habitat types within mining areas

Habitats	Total Area by type (ha)	% in total area	Area in mining areas (ha)	% total in mining area	% of mining area
Bare ground / Built-up	5231.19	7.06%	369.08	7.06%	11.54%
Grassland	32379.54	43.68%	2166.30	6.69%	67.75%
Dense forest	4941.19	6.67%	7.00	0.14%	0.22%
Shrubland	5192.26	7.00%	84.23	1.62%	2.63%
Thicket	4423.95	5.97%	28.64	0.65%	0.90%
Watercourse	181.95	0.25%	0.00	0.00%	0.00%
Wooded grassland	7398.28	9.98%	244.25	3.30%	7.64%
Woodland	14382.58	19.40%	297.94	2.07%	9.32%
Total	74130.94	100%	3197.44	4.31%	

Dense forest is critical habitat for a range of species including several endangered species. In the study area, dense forest occurs practically only as gallery forest in

the valley bottoms. This spatial occurrence means that the mines on the plateaus nearly never intersect with the dense forest in the valleys. There is a total of 7 h of dense forest mapped as within the mining areas. These are to be checked in the field and may be artifacts of the satellite image analysis. However in any case these are nearly always small isolated patches. This represents 0.14% of the dense forest present in the vicinity of the mining area and 0.22% of the habitat within the mining areas.

The majority (68%) of the habitat to be cleared is grasslands, including bowal. Another 12% consists of bare ground and built-up areas. Therefore 80% of the area to be cleared consists of open, treeless areas. The 20% remaining consists primarily of woodland (9%) and wooded grassland (8%). The mining areas represent 4% of the total surface area in the area mapped for natural habitat in the vicinity of the mining areas.

2 ASSESSMENT OF HABITAT TYPES WITHIN SET DISTANCES FROM MINING AREAS

The determination of habitat types within set distances of the mining areas is useful in assessing the nature of potential impacted areas offsite from noise and other factors. Dust deposition as a source of offsite impacts is discussed in Section 8.4.

The area of different habitat types within specific distances from the mining areas is summarized in Table 5. It must be noted however that these are total areas from all mining areas. In practice, for disturbances such as noise, the impacts would be felt only during actual mining at a specific site. The maps that show the buffers are in the SIP.

In going from 50m to 1000m, grasslands and bare ground and built-up areas continue to be the dominant habitat types within the buffers, ranging from 75% to

60%. The proportion of treed habitats increases as the buffers become larger, culminating at about 30% at 1000m.

The amount of the total dense forest within proximity of the mining areas present in the buffers varies with the buffer size and varies from 0.41% at 50m to 27% at 1000m. At up to 300m, only 6% of the dense forest is within that buffer area.

As further planned fieldwork specifies the important areas for key species such as chimpanzees, more specific noise impact assessments will be made.

Table 2 Areas of habitat types within specified distances from mining areas

Habitats	Area in hectares (mining areas plus specified buffer)					
	50m buffer	100m buffer	200m buffer	300m buffer	500m buffer	1000m buffer
Bare ground /						
Built-up	741.17	1034.68	1441.74	1671.70	1917.07	2405.72
Grassland	3624.50	4821.90	6742.32	8256.65	10539.53	14527.57
Dense forest	27.26	62.25	163.02	291.77	618.31	1322.36
Shrubland	176.97	289.93	525.47	736.19	1071.56	1638.66
Thicket	57.67	99.88	202.38	325.15	580.72	1094.76
Watercourse	0.00	0.00	0.70	5.60	9.87	23.39
Wooded grassland	403.12	551.30	849.38	1135.55	1637.71	2543.07
Woodland	528.47	782.51	1324.89	1840.56	2730.78	4404.91
Total	5559.16	7642.44	11249.90	14263.16	19105.55	27960.44

Habitats	Area in hectares (specified buffer only w/o mining area)					
	50m buffer	100m buffer	200m buffer	300m buffer	500m buffer	1000m buffer
Bare ground /						
Built-up	372.09	665.60	1072.66	1302.62	1547.99	2036.64
Grassland	1458.20	2655.60	4576.02	6090.35	8373.23	12361.27
Dense forest	20.26	55.25	156.02	284.77	611.31	1315.36
Shrubland	92.74	205.70	441.24	651.96	987.33	1554.43
Thicket	29.03	71.24	173.74	296.51	552.08	1066.12
Watercourse	0.00	0.00	0.70	5.60	9.87	23.39
Wooded grassland	158.87	307.05	605.13	891.30	1393.46	2298.82
Woodland	230.53	484.57	1026.95	1542.62	2432.84	4106.97
Total	2361.72	4445.00	8052.46	11065.72	15908.11	24763.00

Percentage of specific buffer area by habitat type						
Habitats	50m buffer	100m buffer	200m buffer	300m buffer	500m buffer	1000m buffer
Bare ground / Built-up	15.76%	14.97%	13.32%	11.77%	9.73%	8.22%
Grassland	61.74%	59.74%	56.83%	55.04%	52.63%	49.92%
Dense forest	0.86%	1.24%	1.94%	2.57%	3.84%	5.31%
Shrubland	3.93%	4.63%	5.48%	5.89%	6.21%	6.28%
Thicket	1.23%	1.60%	2.16%	2.68%	3.47%	4.31%
Watercourse	0.00%	0.00%	0.01%	0.05%	0.06%	0.09%
Wooded grassland	6.73%	6.91%	7.51%	8.05%	8.76%	9.28%
Woodland	9.76%	10.90%	12.75%	13.94%	15.29%	16.59%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Percentage of total area by habitat type in specific buffers						
Habitats	50m buffer	100m buffer	200m buffer	300m buffer	500m buffer	1000m buffer
Bare ground / Built-up	7.11%	12.72%	20.51%	24.90%	29.59%	38.93%
Grassland	4.50%	8.20%	14.13%	18.81%	25.86%	38.18%
Dense forest	0.41%	1.12%	3.16%	5.76%	12.37%	26.62%
Shrubland	1.79%	3.96%	8.50%	12.56%	19.02%	29.94%
Thicket	0.66%	1.61%	3.93%	6.70%	12.48%	24.10%
Watercourse	0.00%	0.00%	0.39%	3.08%	5.43%	12.86%
Wooded grassland	2.15%	4.15%	8.18%	12.05%	18.83%	31.07%
Woodland	1.60%	3.37%	7.14%	10.73%	16.92%	28.56%
Total	3.19%	6.00%	10.86%	14.93%	21.46%	33.40%

3 ASSESSMENT OF HABITAT TYPES WITHIN SET DISTANCES FROM SELECTED MINE HAUL ROADS

Map 7 and Table 6 detail the amount of habitat types within specified distances of selected haul roads. The selected haul roads are those that represent major new crossings of the valleys, away from the plateaus and existing roads. Most of the mine haul road network is expected to be located on the plateaus and would follow the gradual development of the mining areas. These three areas are of particular concern because they require valley crossings with potential impact to dense forest and their corridor function. These are areas requiring detailed environmental input into the final engineering design.

The areas involved are comparatively small but include, as expected, a higher percentage of treed vegetation including dense forest. The impacts of these crossings on the corridor function of the wooded valley bottoms are potentially of greater concern than the actual loss of habitat (represented very conservatively by the 20m buffer).

Map 1 Habitat types within specified distances from selected haul roads

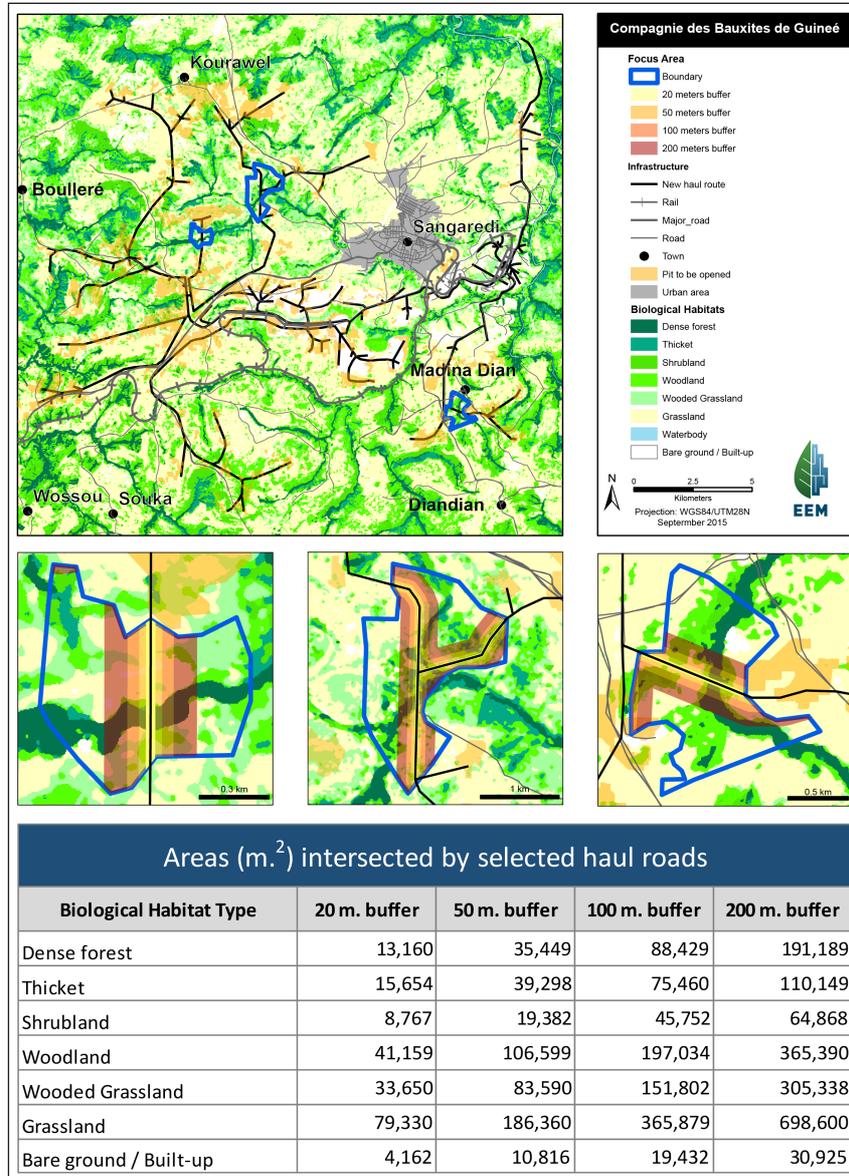


Table 3 Habitat types within specified distances from selected haul roads

	Areas (ha) intersected by selected haul roads			
	Buffer size			
	20 meters	50 meters	100 meters	200 meters
Dense forest	1.32	3.54	8.84	19.12
Thicket	1.57	3.93	7.55	11.01
Shrubland	0.88	1.94	4.58	6.49
Woodland	4.12	10.66	19.70	36.54
Wooded Grassland	3.37	8.36	15.18	30.53
Grassland	7.93	18.64	36.59	69.86
Bare ground / Built-up	0.42	1.08	1.94	3.09
Waterbodies	0	0	0	0
Total	19.59	48.15	94.38	176.65

	Percentage of total buffer area			
	Buffer size			
	20 meters	50 meters	100 meters	200 meters
Dense forest	6.72%	7.36%	9.37%	10.82%
Thicket	7.99%	8.16%	8.00%	6.24%
Shrubland	4.48%	4.03%	4.85%	3.67%
Woodland	21.01%	22.14%	20.88%	20.68%
Wooded Grassland	17.18%	17.36%	16.08%	17.29%
Grassland	40.50%	38.70%	38.77%	39.55%
Bare ground / Built-up	2.12%	2.25%	2.06%	1.75%
Waterbodies	0.00%	0.00%	0.00%	0.00%
Total	100.00%	100.00%	100.00%	100.00%

4 ASSESSMENT OF HABITAT TYPES WITHIN DUST DEPOSITION RANGES

The following maps and tables summarize data on dust deposition impacts around the plant at Kamsar and the mining areas at Sangarédi, based on particulate dispersion by SENES/ARCADIS.

It should be noted that the results for Kamsar are applicable to each of the scenarios mapped (existing, 18.5 MTPA, 22.5 MTPA and 27.5 MTPA). For Sangarédi the maps show representative years within each scenario (existing = 2014, 18.5 MTPA = 2017, 22.5 MTPA = 2019 and 27.5 MTPA = 2027). This is because the pattern of dust production is in constant evolution as the mining areas change.

The values for the mining deposition per habitat type for Sangarédi overestimate the amount of more significant habitats affected. The values on the tables do not take into account the complex pattern of clearing and mining and use the pre-mining habitat distribution. Thus considerable areas of grassland and woodland are double-counted, once for initial clearing and once for dust deposition impacts. This is shown on Map 9 where it is clear that most of the major and critical dust levels are actually within proposed mining areas (in red). As the focus on certain areas of importance to Endangered species is confirmed, more accurate estimates will be made for those areas.

The ESIA for the Rio Tinto Simandou Project (Simandou Project, 2013a) has proposed impact levels for vegetation and these are retained for the impact analysis (Table 7)

For Kamsar, the following maps and tables confirm the very limited effects of dust deposition from the plant on the local habitats.

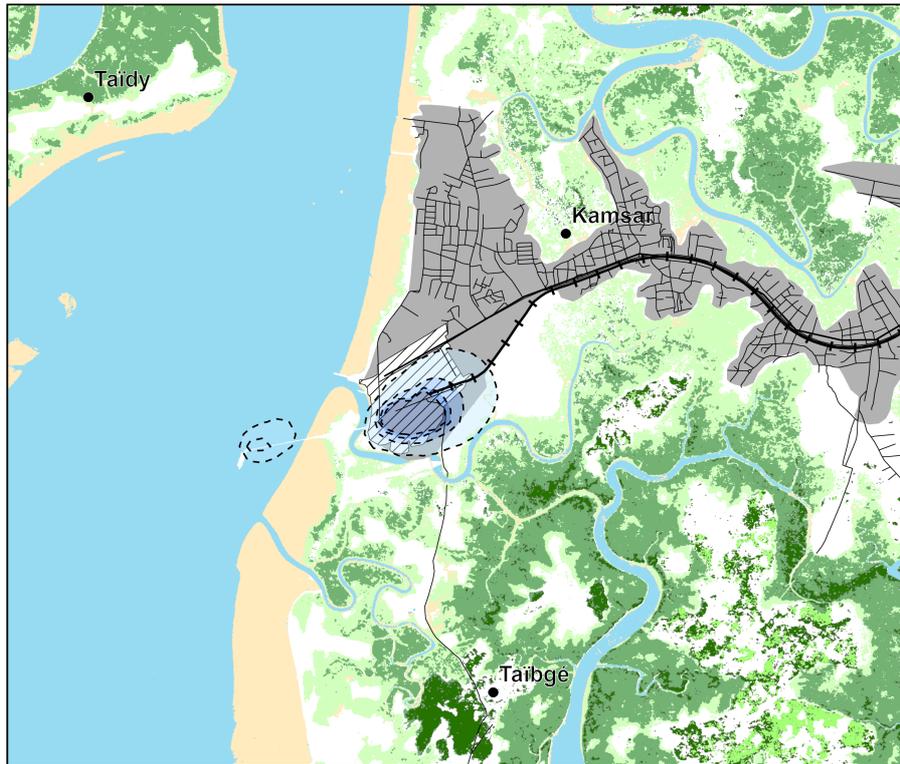
For Sangarédi, the situation is more complex with a constantly evolving pattern of dust deposition associated with the development of mining areas and haul roads. As stated the area of habitat

affected yearly is over-estimated. The area of dense forest affected is always low however.

Table 4 Vegetation impact levels from dust deposition

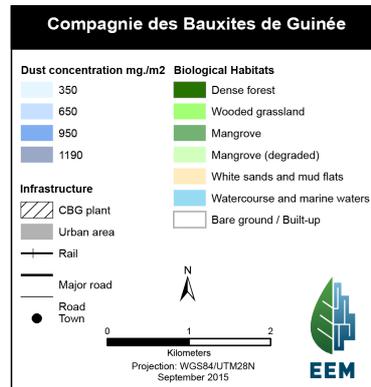
Average annual deposition rate	Effect	Importance
< 350 mg/m ² /day	Nuisance and damage to plants unlikely	<i>Not significant</i>
from 350 to 650 mg/m ² /day	Nuisance and damage to plants possible	<i>Negative - Minor</i>
from 650 to 950 mg/m ² /day	Nuisance and damage to plants probable	<i>Negative - Moderate</i>
from 950 to 1190 mg/m ² /day	Nuisance and damage to plants very probable	<i>Negative - Major</i>
> 1 190 mg/ m ² /day	Serious complaints probable and serious damage to plants	<i>Negative - Critical</i>

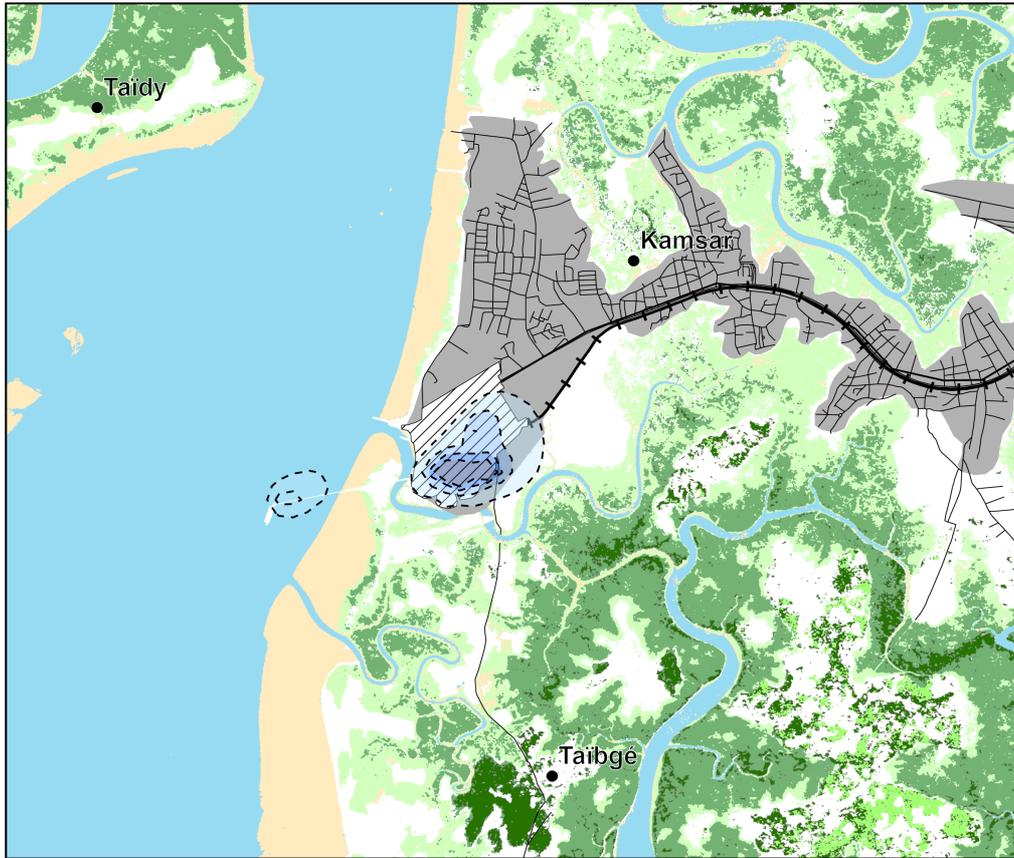
Map 2 Dust deposition maps



Areas (km.²) affected by dust deposition ≥ 350 mg./m.²
Existing scenario

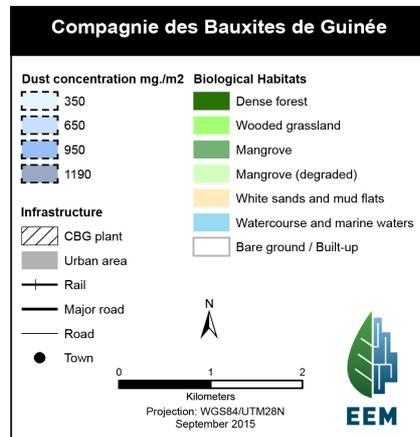
Biological Habitat Type	Concentration			
	350 mg./m. ²	650 mg./m. ²	950 mg./m. ²	1190 mg./m. ²
Dense forest	x	x	x	x
Shrubland	x	x	x	x
Mangrove	x	x	x	x
Mangrove (degraded)	0.020	x	x	x
Sand banks and mud flats	0.019	x	x	x
Bare ground / Built-up	1.481	0.633	0.384	0.288
Watercourse / Marine waters	0.293	0.032	x	x

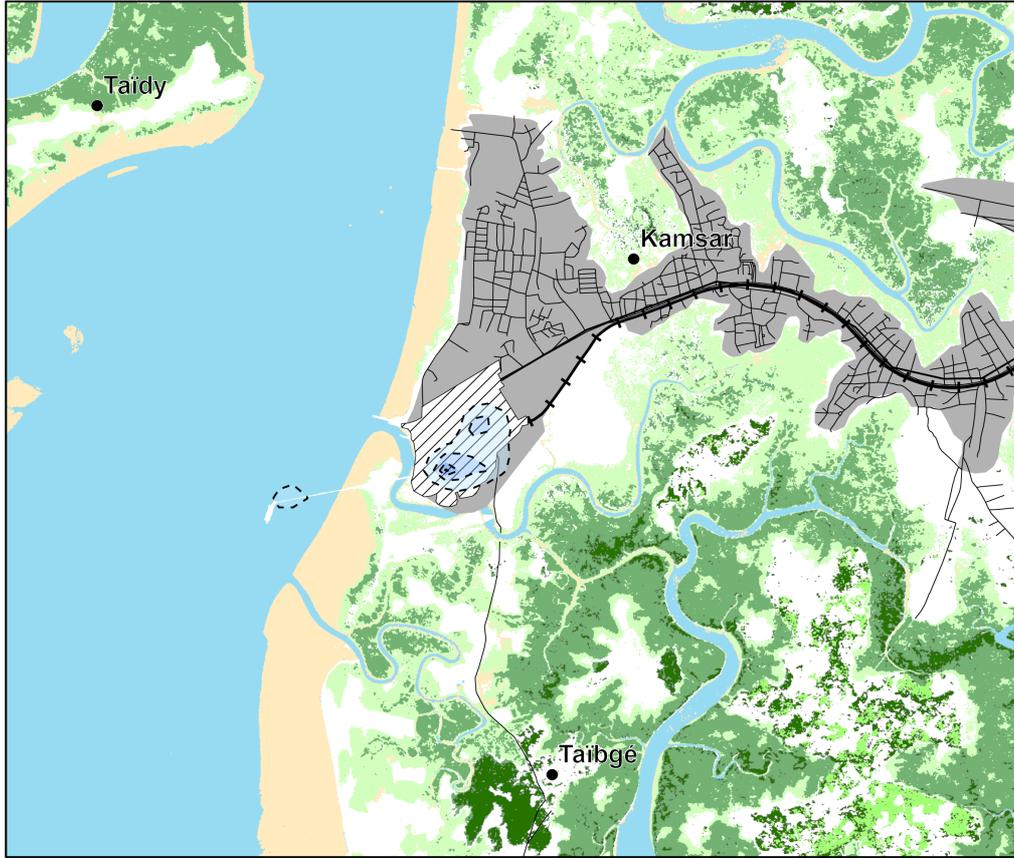




Areas (km.²) affected by dust deposition ≥ 350 mg./m.²
18.5 MT scenario

Biological Habitat Type	Concentration			
	350 mg./m. ²	650 mg./m. ²	950 mg./m. ²	1190 mg./m. ²
Dense forest	x	x	x	x
Shrubland	x	x	x	x
Mangrove	x	x	x	x
Mangrove (degraded)	0.002	x	x	x
Sand banks and mud flats	0.008	x	x	x
Bare ground / Built-up	1.249	0.551	0.234	0.131
Watercourse / Marine waters	0.254	0.026	x	x

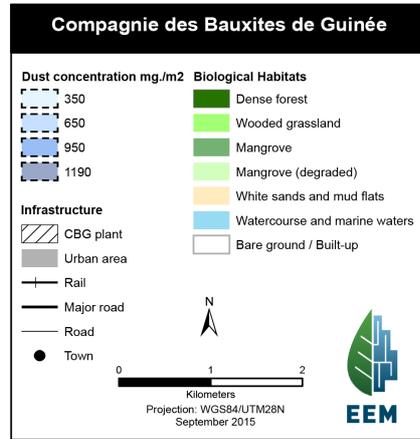




Areas (km.²) affected by dust deposition ≥ 350 mg./m.²
22.5 MT scenario

Biological Habitat Type	Concentration			
	350 mg./m. ²	650 mg./m. ²	950 mg./m. ²	1190 mg./m. ²
Dense forest	x	x	x	x
Shrubland	x	x	x	x
Mangrove	x	x	x	x
Mangrove (degraded)	x	x	x	x
Sand banks and mud flats	x	x	x	x
Bare ground / Built-up	0.593	0.150	0.015	*
Watercourse / Marine waters	0.058	x	x	x

*A trace amount of "Bare ground / Built-up" is also affected by dust deposition at this concentration.

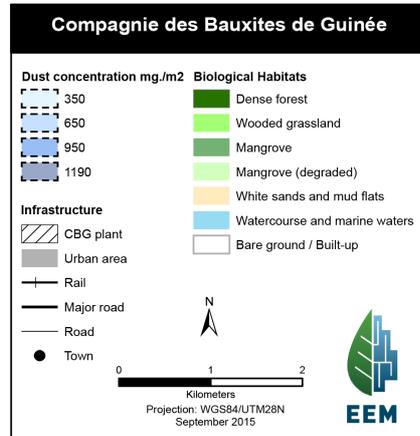


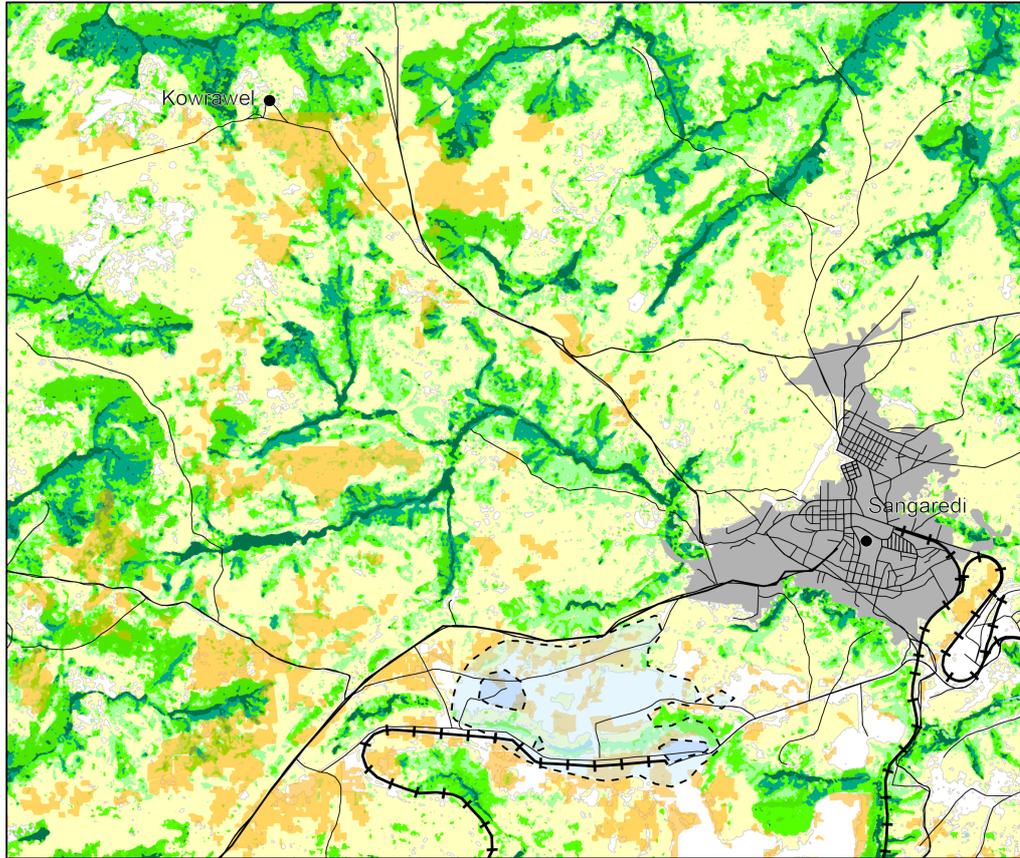


Areas (km.²) affected by dust deposition ≥ 350 mg./m.²
27.5 MT scenario

Biological Habitat Type	Concentration			
	350 mg./m. ²	650 mg./m. ²	950 mg./m. ²	1190 mg./m. ²
Dense forest	x	x	x	x
Shrubland	x	x	x	x
Mangrove	x	x	x	x
Mangrove (degraded)	x	x	x	x
Sand banks and mud flats	x	x	x	x
Bare ground / Built-up	0.593	0.150	0.015	*
Watercourse / Marine waters	0.058	x	x	x

*A trace amount of "Bare ground / Built-up" is also affected by dust deposition at this concentration.

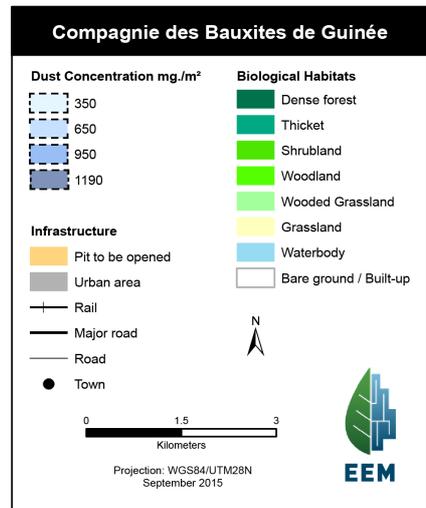


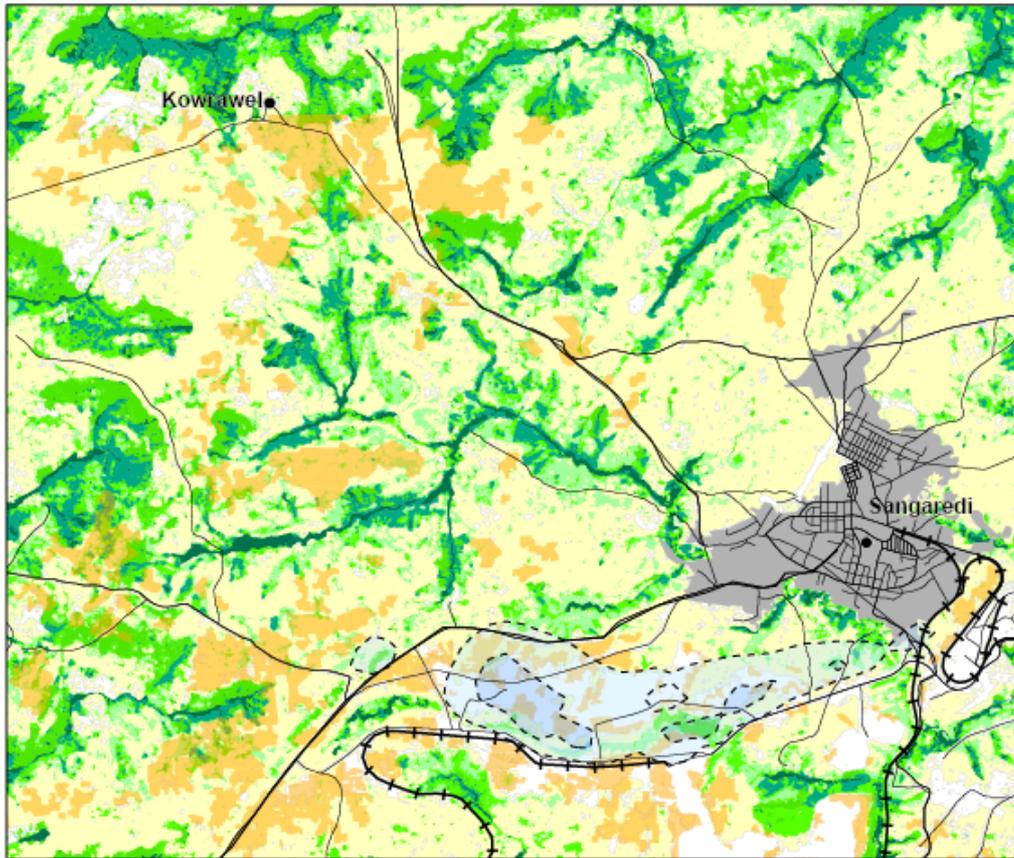


Areas (km.²) affected by dust deposition \geq 350 mg./m.²
Existing scenario

Biological Habitat Type	Concentration			
	350 mg./m. ²	650 mg./m. ²	950 mg./m. ²	1190 mg./m. ²
Dense forest	x	x	x	x
Thicket	x	x	x	x
Shrubland	0.005	x	x	x
Woodland	0.247	*	x	x
Wooded Grassland	0.435	0.008	x	x
Grassland	1.956	0.008	x	x
Bare ground / Built-up	4.515	0.493	x	x
Waterbodies	0.041	x	x	x

*A trace amount of "Woodland" is also affected by dust deposition at this concentration.

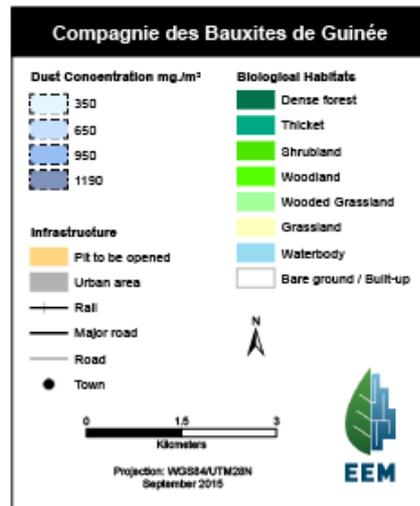


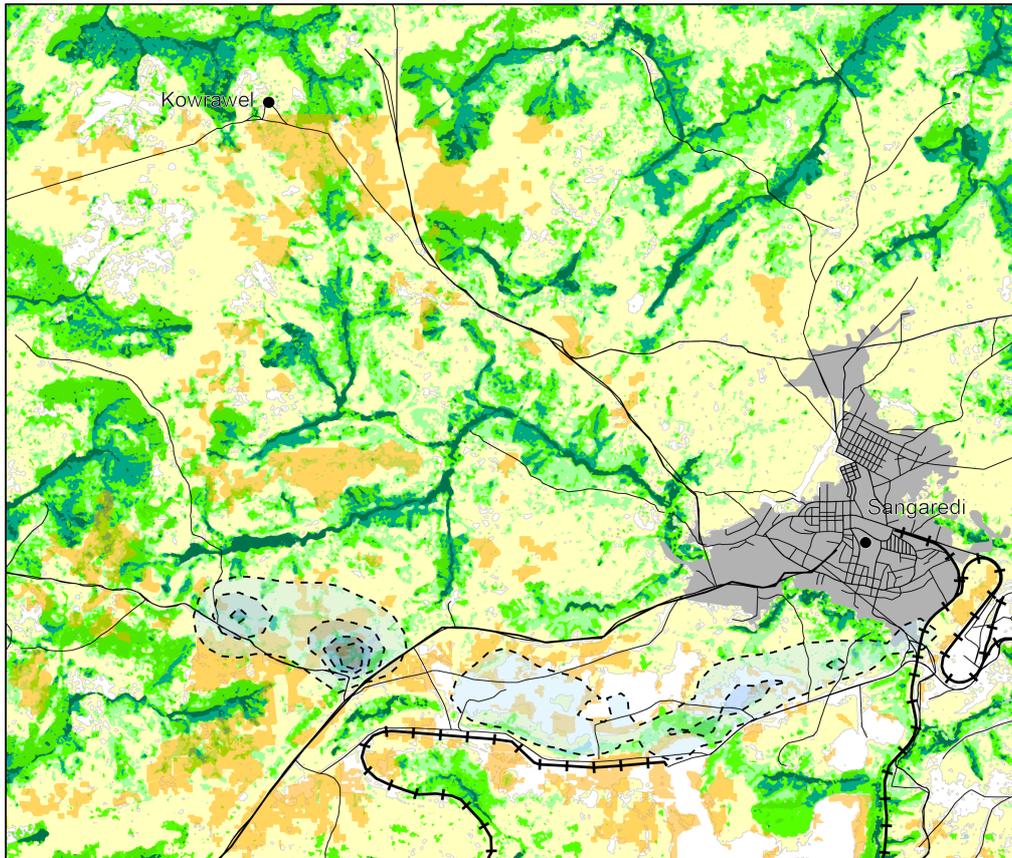


**Areas (km²) affected by dust deposition ≥ 350 mg./m.²
18.5 MT scenario**

Biological Habitat Type	Concentration			
	350 mg./m. ²	650 mg./m. ²	950 mg./m. ²	1190 mg./m. ²
Dense forest	X	X	X	X
Thicket	0.005	X	X	X
Shrubland	0.046	*	X	X
Woodland	0.59	0.108	X	X
Wooded Grassland	0.682	0.14	X	X
Grassland	2.672	0.509	X	X
Bare ground / Built-up	5.48	0.97	X	X
Waterbodies	0.04	0.03	X	X

*A trace amount of "Shrubland" is also affected by dust deposition at this concentration.

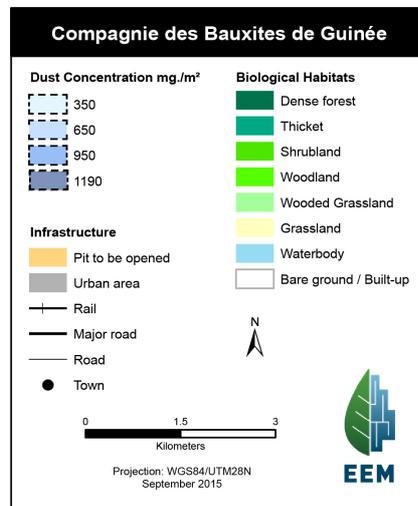


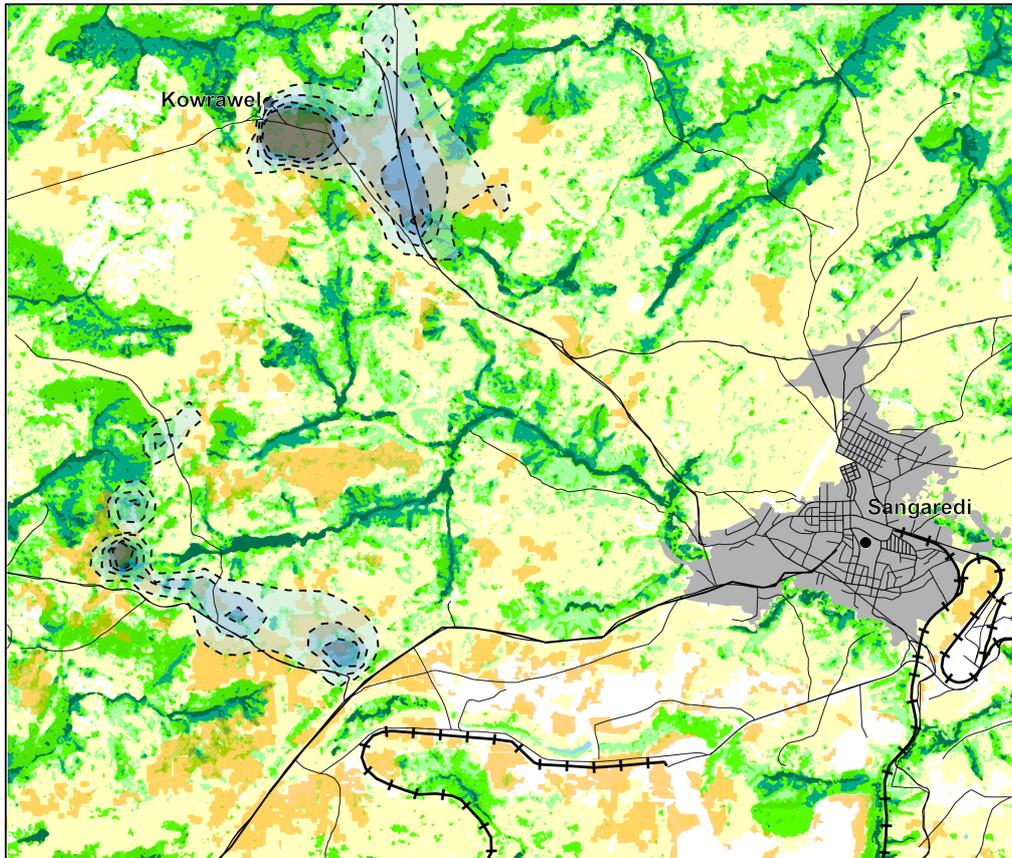


**Areas (km²) affected by dust deposition ≥ 350 mg./m.²
22.5 MT scenario**

Biological Habitat Type	Concentration			
	350 mg./m. ²	650 mg./m. ²	950 mg./m. ²	1190 mg./m. ²
Dense forest	0.001	x	x	x
Thicket	0.026	0.002	*	x
Shrubland	0.062	0.023	0.001	x
Woodland	0.619	0.138	0.025	0.007
Wooded Grassland	1.165	0.309	0.074	0.022
Grassland	4.796	0.999	0.223	0.084
Bare ground / Built-up	3.699	0.231	0.023	0.011
Waterbodies	0.041	x	x	x

**A trace amount of "Thicket" is also affected by dust deposition at this concentration.*





**Areas (km²) affected by dust deposition ≥ 350 mg./m.²
27.5 MT scenario**

Biological Habitat Type	Concentration			
	350 mg./m. ²	650 mg./m. ²	950 mg./m. ²	1190 mg./m. ²
Dense forest	0.156	0.031	0.008	0.003
Thicket	0.233	0.061	0.023	0.017
Shrubland	1.257	0.386	0.111	0.051
Woodland	1.009	0.386	0.141	0.077
Wooded Grassland	1.645	0.778	0.330	0.192
Grassland	7.942	4.133	1.479	0.501
Bare ground / Built-up	0.271	0.116	0.046	0.018
Waterbodies	x	x	x	x

*A trace amount of "Thicket" is also affected by dust deposition at this concentration.

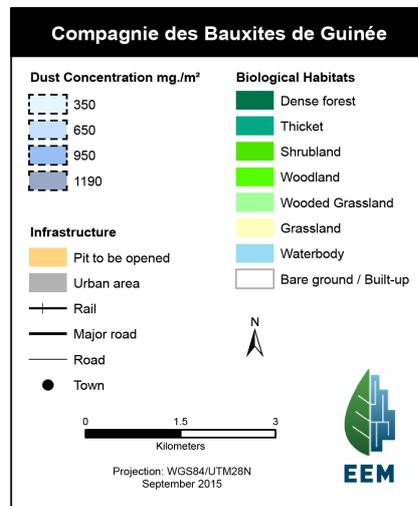


Table 5 Kamsar dust deposition

	Areas (ha) affected by dust deposition $\geq 350 \text{ mg./m.}^2$ existing scenario			
	Effect			
	Negative - minor	Negative - moderate	Negative - major	Negative - critical
Dense forest				
Shrubland				
Mangrove				
Mangrove (degraded)	2.00			
Sand banks and mud flats	1.90			
Bare ground / Built-up	148.10	63.30	38.40	28.8
Watercourse / Marine waters	29.30	3.20		

	Areas (ha) affected by dust deposition $\geq 350 \text{ mg./m.}^2$ - 18.5 MT scenario			
	Effect			
	Negative - minor	Negative - moderate	Negative - major	Negative - critical
Dense forest				
Shrubland				
Mangrove				
Mangrove (degraded)	0.20			
Sand banks and mud flats	0.80			
Bare ground / Built-up	124.90	55.10	23.40	13.10
Watercourse / Marine waters	25.40	2.60		

	Areas (ha) affected by dust deposition $\geq 350 \text{ mg./m.}^2$ - 22.5 MT scenario			
	Effect			
	Negative - minor	Negative - moderate	Negative - major	Negative - critical
Dense forest				
Shrubland				
Mangrove				
Mangrove (degraded)				
Sand banks and mud flats				
Bare ground / Built-up	59.30	15.00	1.50	
Watercourse / Marine waters	5.80			

	Areas (ha) affected by dust deposition $\geq 350 \text{ mg./m.}^2$ - 27.5 MT scenario			
	Effect			
	Negative - minor	Negative - moderate	Negative - major	Negative - critical
Dense forest				
Shrubland				
Mangrove				
Mangrove (degraded)				
Sand banks and mud flats				
Bare ground / Built-up	59.30	15.00	1.50	
Watercourse / Marine waters	5.80			

Table 6 Sangarédi dust deposition

	Areas (ha) affected by dust deposition $\geq 350 \text{ mg./m.}^2$ - existing scenario 2014			
	Effect			
	Negative - minor	Negative - moderate	Negative - major	Negative - critical
Dense forest				
Thicket				
Shrubland	0.47			
Woodland	24.72	0.00		
Wooded Grassland	43.53	0.83		
Grassland	195.56	4.60		
Bare ground / Built-up	451.55	49.31		
Waterbodies	4.12	0.00		

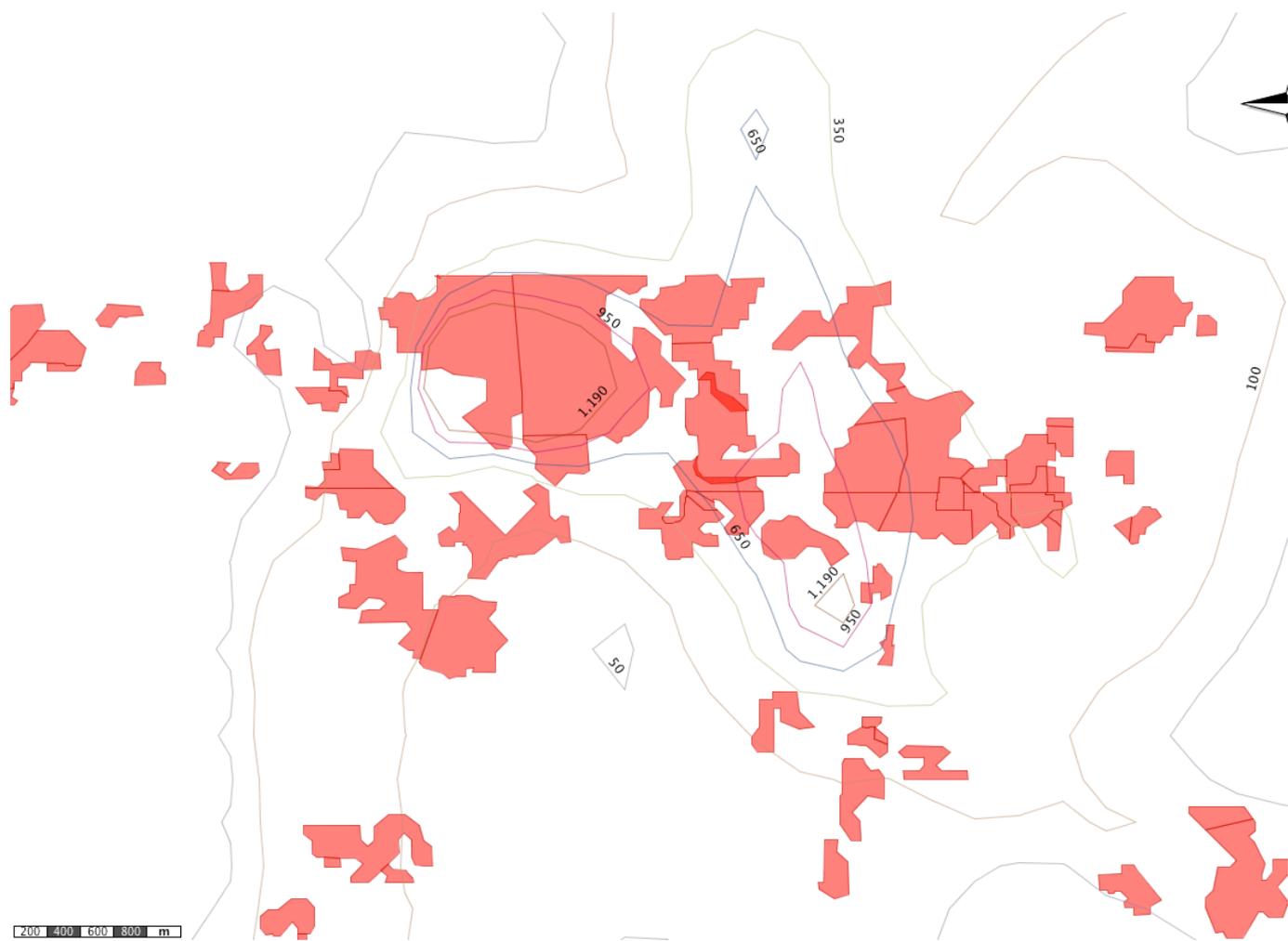
	Areas (ha) affected by dust deposition $\geq 350 \text{ mg./m.}^2$ - 18.5 MT scenario 2017			
	Effect			
	Negative - minor	Negative - moderate	Negative - major	Negative - critical
Dense forest				
Thicket	0.52			
Shrubland	4.62	0.04		
Woodland	59.27	10.81		
Wooded Grassland	68.16	14.18		
Grassland	267.15	50.91		
Bare ground / Built-up	548.38	96.88		
Waterbodies	4.12	3.32		

	Areas (ha) affected by dust deposition $\geq 350 \text{ mg./m.}^2$ - 22.5 MT scenario 2019			
	Effect			

	Negative - minor	Negative - moderate	Negative - major	Negative - critical
Dense forest	0.06			
Thicket	2.60	0.15	0.01	
Shrubland	6.24	2.31	0.14	
Woodland	61.90	13.76	2.55	0.0
Wooded Grassland	116.47	30.87	7.37	2.2
Grassland	479.61	99.96	22.30	8.4
Bare ground / Built-up	369.92	23.14	2.34	1.0
Waterbodies	4.12			

	Areas (ha) affected by dust deposition $\geq 350 \text{ mg./m.}^2$ - 27.5 MT scenario 2027			
	Effect			
	Negative - minor	Negative - moderate	Negative - major	Negative - critical
Dense forest	15.58	3.11	0.77	0.3
Thicket	23.27	6.09	2.33	1.6
Shrubland	125.67	38.58	11.15	5.1
Woodland	100.87	38.55	14.12	7.6
Wooded Grassland	164.46	77.75	32.99	19.2
Grassland	794.25	413.28	147.95	50.2
Bare ground / Built-up	27.12	11.63	4.64	1.8
Waterbodies				

Map 3 Detail of dust deposition at 27.5 MTPA (2027) in Kourawel area



APPENDICES

Appendix 9.10 Summary of commitments and mitigation

Summary of commitments and mitigation measures

1 INTRODUCTION

The purpose of this section is to summarize actions and measures contained in the ESIA, the ESMP (see SIP), and agreed upon as a result of the Paris meetings. This section thus summarizes the commitments of CBG already made, before the BAP.

The general order of presentation follows the approved order of measures to reduce biodiversity impacts: avoidance (Section 7.2 Changes to project design), minimizing (Section 7.3 specific mitigation measures), restoring (Section 7.4 Restoration) and finally compensating (Section 7.5 Compensation and action plans). Finally there is a section on additional studies to be done including preliminary monitoring plans (Section 7.6 Further studies).

2 CHANGES TO PROJECT DESIGN

2.1 Introduction

Certain avoidance measures of sensitive habitats were taken during the development of the Expansion Project (for example reduction of the dredging). Other studies depend on additional studies awaiting engineering results (choice of deposition zone for dredging, study of road network) or that should be done just before clearing (botanical and ornithological studies). The mining zones were determined by geological criteria and are relatively predetermined, save avoiding mining altogether. Most of the modifications to the infrastructure at Kamsar and Sangarédi are occurring in areas already affected by the Project or populated areas close to the railroad.

2.2 Mining area

At the start of FEL 2, the long-term mining plan from the initial FEL 1 phase was still being used. Based on various recommendations from the ESIA coordinating team and other sources, a mandate was assigned to an outside firm to further develop and improve the mining plan in collaboration with the experts at Rio Tinto Alcan.

Major changes were noted when the final document was submitted in June 2014. Although the footprint within the concession remains the same, the duration of mining in the various areas has been considerably reduced through the grouping of operations. This will minimize the impacts related to loss of land and disturbance of local populations. In some areas, for example (such as Bowal 22), mining presence went from nine years to four. The new mining plan also covers a longer period: up to 2042. Operations are to move to the North Cogon around 2027. For this phase, two options are also under study and will be discussed at greater length in upcoming studies. The first is to extend the railroad and set up new stockpiling and loading areas. The second is to haul the ore by road train. This ESIA covers only the period up to 2027, i.e., mining in the South Cogon.

As for the mining itself, various options were studied. At the beginning of FEL 2, the Project team analyzed whether the crushing operations should be located at Kamsar or at Sangarédi. A modeling of production and of the financial impacts demonstrated that it would be preferable and more economically viable, in the long term, to have the crushers at Kamsar. If they were at Sangarédi, the positive effects would be short-term. The environmental impacts, too, have been lessened, since the crushing operations will stay where they already are, in the industrial zone. Had it been decided to move them to Sangarédi, there would have been a new element to consider in terms of noise and dust emissions in an area already severely impacted by CBG's operations.

Another attractive option, still under study, is the use of surface miners to reach deposits located near villages, roads or other structures. The Project team decided to push ahead with this option and develop it further during the detailed engineering phase (FEL 3). There are several arguments in favor of using this new

technology. Environmentally, it would reduce noise, vibrations and dust emissions from blasting. It would make it possible to approach sensitive areas, i.e., less than 500 meters from structures (while maintaining the 100-meter minimum setback prescribed by the Mining Code). It has even been shown that surface miners could reduce annual fuel consumption by more than 2 million liters, with a corresponding reduction in greenhouse gas emissions.

Around 2017, operations are to be transferred to the northeast side of the national highway. The Project team therefore had to analyze options for crossing the road. The following options were discussed:

- Level crossing with a stop sign;
- An overpass; and
- An underpass.

The underpass solution was selected, because it was also necessary to ensure that the train will be able to cross the road and get to the Parawi stockpiling and loading area.

A new rail yard was also needed for the railroad. Various options were analyzed, but only one was selected, based on the criteria of safety and quantity of excavation/fill. The route was drawn so as to optimize topography while ensuring that no train sorting operations will take place under the bridge. Expansion of the N'Dangara rail yard was rejected for reasons of safety (increased traffic, and railcars moving along several parallel tracks).

Further avoidance of critical habitat and endangered species may occur following detailed studies in specific areas during the BAP production and detailed mine road alignment.

2.3 Port

During FEL 2, several options were studied for the port operations:

- Addition of a Capesize quay with all carrier loading dockside;
- Addition of a Capesize quay – Capesize carriers are partially loaded dockside, then loading is finished offshore with a Panamax (50,000 tonnes);

- Addition of a Capesize quay – Capesize carriers are partially loaded dockside, then loading is finished offshore with a Handymax (30,000 tonnes); and
- Addition of a Panamax quay – Capesize carriers are loaded offshore (in three trips).

Modeling was conducted by consulting firm Royal Haskoning to determine which type of quay would be the most economically viable in the long term. It was demonstrated that the most economical model also had the least environmental impact, since dredging is both the largest cost item in this part of the Project and the main source of environmental and social impacts.

Initially, option 3 had been recommended as being the one offering the best balance in terms of capital outlay and operating costs. It also reduced the extent of the dredging required in the estuary channel, since the Capesize carriers would be leaving the estuary with only part of their cargo (the remainder to be loaded offshore).

Following a review of the Project scope in the second phase of FEL 2, along with recommendations made by the ESIA coordinating team, the option of bringing Capesize carriers to the quay was rejected. The Project team even eliminated the option of offshore loading in favor of using only Panamax carriers, as is done at present. The location of the new quay was also reviewed. Initially, the consulting firm recommended a second quay a little further from the existing one, so that an additional jetty would have to be installed to reach it. In the scope review, the Project team requested an analysis of the possibility of simply extending the existing quay to accommodate two carriers. At the end of FEL 2, the option selected was to completely eliminate dredging in the channel while minimizing the footprint of operations in the port area.

3 SPECIFIC MITIGATION MEASURES

3.1 General habitat avoidance measures

Construction and operation activities have to be done in the context of explicit work areas and not allowing access to neighboring areas (except specific exceptions). That is to say:

- Clear delimitation (signs, barriers, fencing) of work zones for each phase (construction and operation);
- Forbidding access outside of the work area or the roads or trails leading to it, on foot or by vehicle. This with the aim of reducing disturbance to animals, destruction of vegetation (trampling or risk of fire) and compacting of soil. This applies to CBG employees and subcontractors except for special cases to be approved by the environmental inspector;
- Explanations to be given to all regarding the reasons for these measures; and
- In particularly sensitive areas, reinforce the interdiction by signs.
-

3.2 Measures during clearing (everywhere but especially Sangarédi)

Even though quasi all of the clearing will take place in fairly open environments and without any identified high status species at this date (except the vultures), the precaution principles recommends that certain measures be taken:

- Presence of an environmental inspector during clearing. The inspector will have to make sure the explicit measures are respected. In addition he or she will have to exercise a precautionary judgment in case of unexpected discoveries

(for example presence of unexpected animals or archeological specimens);

- Clear delimitation in the field of the area to be cleared and for the passage of machinery;
- Ensure respect of those limits. Work or even passage on foot forbidden outside the limits. The presence of an important number of persons outside the work area could negatively affect the fauna around the site. Hunting or harvesting of natural products outside of the work area to be absolutely forbidden;
- Avoid clearing more than absolutely necessary;
- Keep the access for heavy machinery to the minimum required. Compacting of soil outside the work area is negative for the rehabilitation of the site;
- Avoid passing too close to trees with heavy machinery;
- Take measures against setting vegetation on fire;
- If it is necessary to cut trees, the wood will have to be made available to local residents;
- Clearing will have to take place in such a manner as to aid movement of animals towards habitats that are not going to be cleared. In particular avoid temporary habitat islands;
- During clearing, if it is evident that there are animals present (mammals, birds, reptiles, amphibians), these should be encourage to leave by making noise for example. For amphibians and lizards capture them if possible to place them outside of the area to be cleared. Not to be done for snakes, given the possibility of the presence of dangerous species;
- Avoiding voluntarily killing animals during clearing;
- Take into considerations the recommendations of specialists that will visit the sites before clearing;
- As specified in the mitigation measures for the physical environment (Chapter 2 of the ESIA), the soil will have to be carefully removed and stored so as to be reused during rehabilitation. This soil is important not only as a substrate for plants but also as reservoir of seeds of local plants adapted to the environment; and
- As specified in the mitigation measures for the physical environment and the following section, take all required measures to prevent erosion and the contamination of streams.

3.3 Measures associated with work near streams and other surface water elements (Sangarédi)

General measures to reduce impacts on the surface freshwater system are given in Section 2.4 of Chapter 2 of the ESIA. Most of the work in Sangarédi will be done far from streams, however there are some specific measures that have to be considered, particularly for the development of the road network:

- Avoid all work in the water or the banks unless it is absolutely necessary;
- Avoid the destruction of vegetation on the banks
- An environmental inspector will have to be present during any work in or close to streams; and
- Any stream crossing of a stream to improve or create a new road will have to be the object of a specific environmental plan that will specify measures to take and periods to avoid (spawning periods for example).

3.4 Measures for noise (especially Sangarédi)

The general measures to reduce or control noise are given in Section 2.3 of Chapter 2 of the ESIA. However, there are certain specific measures to consider for the protection of biodiversity:

- Take into consideration the critical habitats close to the new mining areas and ensure that mining takes place in such a way as to limit noise in the critical habitats. For example by starting to dig in the part farthest away. This will allow a progressive increase in noise (perhaps allowing habituation) and will reduce the noise because much of the digging will take place below grade;
- When possible, place noise generating equipment in area far from the critical habitat; and

- Avoid making too much noise (use of explosives) during the night, early in the morning or as sunset. These are key periods for many animals and they will be more impacted.

3.5 Measures for dust and air quality (everywhere)

The general measures to reduce or control noise are given in Section 2.3 of Chapter 2 of the ESIA. However, there are certain specific measures to consider for the protection of biodiversity:

- Avoid burning vegetation (cut or in place) during clearing. It is a source of atmospheric pollution. Consider grinding and composting to improve soil quality during rehabilitation;
- Ensure that soil stockpiles are well protected from the wind by stabilizing them and letting plants grow on them; and
- Ensure the rehabilitation of areas that are no longer required as soon as possible to reduce dust and bring the area back into natural habitat.

3.6 Measures for lighting (everywhere)

The lighting of the mines and installations and by trucks along the mining roads can impact some animals:

- Reduce the use of lighting to what is absolutely required for safety;
- Consider the use of directional lighting to avoid lighting non-essential areas such as the sky or areas outside the work area;
- Consider the use of screens to limit the lighted area;
- Use timers or movement detectors where constant lighting is not required;
- Use fairly low lighting towers to reduce non-essential lighting;
- Vehicles should use low beams except if security conditions require the use of high beams;

- Ensure that interior areas are not over-illuminated. Indoor illumination can have impacts outside via windows and doors; and
- In some cases these light may have an impact on bats. These effects may be linked to the attraction of insects coming to the light or by avoidance of lit areas. In the case of attraction of insects, this can be reduced by using sodium lights.

3.7 Measures concerning dredging (Kamsar)

At the date the biology report was finished, there were no details on the type and techniques of dredging to be used during the enlargement of the turning basin by the quay. Dredging has the potential to be the cause of significant impacts on at least one *Endangered* species in the Rio Nuñez Estuary. This is biologically important and because according to Performance Standard 6 of the IFC, such impacts in a critical habitat are problematical for the Project.

- Implicate the biologists of the team in discussion on dredging;
- A critical species is the blackchin guitarfish (*Rhinobatos cemiculus* [= *Glaucostegus cemiculus*]). This benthic fish is considered *Endangered* according to the IUCN, it is present in the estuary and fairly close to the quay and is important for artisanal fishing. The reproduction period is September to October and it is likely the most important period for this species. It is therefore recommended that, if possible, dredging be avoided from August to January. The study for marine mammals and reptiles for this ESIA concluded that there was no particularly critical time for the other important species in the estuary;
- Dredging should be done using methods that minimize impacts on marine turtles, notably by avoiding the use of trailing suction dragheads that can wound turtles by the action of their sucking heads. If there is no alternative, turtle-shields or other means should be used (see Dickerson et al., 2004)

3.8 Construction of the quay extension (Kamsar)

The construction of the extension to the quay will occur in an area of critical habitat (the waters of the Rio Nuñez Estuary). The critical impact will likely be the underwater noise produced by construction activities (construction of pilings, explosives, drilling).

- Avoid noise levels above the injurious threshold proposed by Southall et al. (2007) for cetaceans. These levels are sound pressure levels of 230 dB re: 1 μ Pa and sound exposure levels of 198 dB re: 1 μ Pa²-s for single- or multi-pulse acoustic sources such as piling, and sound exposure level of 215 dB re: 1 μ Pa²-s for non-pulse sound sources such as drilling); and
- These levels can be avoided by using the measures described in the report on marine mammals and reptiles of this ESIA (Annexe 3-2 p. 63-64).

3.9 Measures to avoid collisions between animals and ships (Kamsar)

The Project Expansion assumes that the number of ore ships will double. Additionally there will be an increase in other ships (dredges, tugs and launches). The possibility of collisions between ships and large marine animals (dolphins, manatees, crocodiles and marine turtles) will thus increase considerably. The risks of collisions can be reduced through the use of the following measures:

- Impose a speed limit for ships. A maximum speed of 18.5 km/hr protects certain cetaceans (Conn and Silber, 2013) and a maximum speed of 7 to 11 km/hr protects manatees (Laist and Shaw, 2006). Therefore a general limit of 18.5 km/hr associated with a limit of 11 km/hr or less within less than 100 m of the coast should protect many species;

- Collisions between boats and animals are often the result of frequent changes in boat heading that make it difficult for animals to track and avoid the boat. Consequently, vessels should be reminded to maintain a steady heading when possible. When vessels are required to maneuver continuously, a slower vessel speed should be implemented.
- Produce and distribute a brochure that explains the importance of protecting animals in the estuary and the means of reducing the problems;
- Select construction vessels that have ducted or cowled propellers; and
- Any collision with a substantial animal (cetacean, manatee, crocodile, marine turtle) should be reported to the environmental inspector. If possible the animal should be taken and data recorded by the inspector (photos, measurements, samples, etc.).

3.10 Measures to avoid collisions between animals and vehicles (Sangarédi)

The risks of collisions are particularly real in the case of the mining road network in Sangarédi (see additional study in Section 8.6). Certain general measures can be considered and applied to other situations:

- Specify and apply severely a speed limit for all Project vehicles. To the extent that CBG allows access to its roads by others, CBG should also apply this limit to others. There are few studies that clearly determine the effects of speed reduction on accidents with animals. One of these studies (Gunther, Biel, and Robison, 1998) suggests a very significant decrease in accidents in going from 88 km/hr to 72 km/hr. One study (Hobday, 2010) shows that a car must travel at less than 60 km/hr at night to avoid collision with a dark animal (like a chimpanzee). For large trucks, the ideal speed at night would of course be less. Clearly a speed limit can only have an impact if it is enforced;

- Have drivers follow courses that will include sensitization to environmental issues in general and risks of collisions in particular; and
- Drivers will have to keep a log of observations of large animals seen (alive or dead) and of collisions with large animals. The inspector will have to be notified in case of a dead animal so as to get information (photos, measurements, samples, etc.).

3.11 Measures concerning invasive species

Clearing and changes in habitats are often favorable for certain invasive species, often not native to the area. These species can compete with local species and reduce the biodiversity value. Among the measures to take:

- *Chromolaena odorata* is an invasive species from the Neotropical zone and was seen in several places around Sangarédi. This plant is considered to be a great danger for tropical forests (Grice and Setter, 2003; Struhsaker, Struhsaker and Siex, 2004), and poses environmental problems in West Africa. It should be destroyed wherever it is found in the Project area; and
- *Anacardium occidentale* (cashew tree) is present in certain plantations and has been planted in some CBG rehabilitated mines. It is not native to Guinea (from South America) and it poses a certain invasive danger. The approach to rehabilitation should be reviewed and local species used.

4 RESTORATION

Ideally the goal of rehabilitation is to re-establish the habitats that were there before the intervention and in certain cases even to create habitats of higher value. Most of the habitats to rehabilitate will be on the exploited mines. This topic is approached in the action

plan for mine rehabilitation. However certain general measures also applicable to rehabilitation in other areas, are listed here:

- Avoid using exotic species;
- Use local species that can contribute to the ecosystemic value of the habitat;
- On the bowals, use species that are typical of bowal vegetation;
- Put back the soil that was stripped as it is a veritable seed bank of species that are locally adapted; and
- If necessary consider the possibility of nurseries of local species, some taken during clearing.

5 COMPENSATION AND ACTION PLANS

5.1 Measures required under Performance Standard 6 of the IFC

Performance Standard 6 of the IFC explains the measures to be taken if the Project impacts natural or critical habitats (as explained in Annexe 4-2, the modified habitats of the IFC are not involved and the protected areas are not directly impacted).

For natural habitats, the IFC specifies the search for an alternative, consultation with stakeholders and the use of mitigation measures. The mitigation measures strive to ensure no net loss of biodiversity. The measures can include:

- Avoiding impacts on biodiversity through the identification and protection of set asides;
- Implementing measures to minimize habitat fragmentation, such as biological corridors;
- Restoring habitats during operations and/or after operations; and
- Implementing biodiversity offsets.

For critical habitat, it must be shown that the activities of the project fulfill the required conditions of Paragraph 17 (see Annexe 4.2). Paragraph 18 says:

In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a biodiversity action Plan and will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated.

It is this clear that in the two cases (natural habitat and critical habitat), measures beyond classis mitigation measures described in the preceding sections must be applied. These protection measures, set-asides, corridor creation, et al., must be described in one more action plans.

Although the emphasis here is on the requirements of the IFC, such plans may also be required under the laws, action plans and conventions of Guinea.

All action plans must also include monitoring measures. These are described separately in Section 4.9.

The following subsections describe the plans to put into place to arrive at the request of the IFC. These plans will obviously have to be detailed with the progress of the Project (specifically with the data from the additional studies described earlier). Nevertheless the plans described here and the monitoring measures described in Section 4.9 give the essential elements of an action plan on biodiversity.

Fieldwork undertaken in 2013 demonstrated the presence of numerous species considered important from the perspective of biodiversity conservation. The additional studies and monitoring measures will reinforce these data. The presence of these species justifies putting in place a protection and management system in the Study Areas. The following action plans are [intended](#) to protect all the elements of the ecological systems of the Study Areas, even those species whose presence is not yet recognized.

5.2 Development of a mine rehabilitation plan (Sangarédi)

A good and rapid rehabilitation of the mines as soon as extraction is complete is an essential point of any biodiversity protection plan. This is particularly true when there is a series of small zones to mine, spread out in the concession. Ideally the rehabilitation should be a return of the land to its initial roles as natural habitat or agricultural land, this as quickly as possible and in a permanent way. The 2014 Mining Plan is a big step forward from the environmental point of view compared to the 2013 Mining Plan because it specifies the use of contiguous mining areas at the same time. This not only reduces the impacts linked to spread-out mines, but also allows planning rehabilitation of an area shortly after its use.

The question of the rehabilitation of the mines is complex and must consider not only biological aspects but also social and economic ones:

- The plan must be seen by CBG as one of the approaches to satisfy Performance Standard 6 of the IFC. The plan will demand efforts and costs from CBG;
- This plan must of course include besides CBG, local stakeholders, notably local residents and villages
- The rehabilitation plan must also include biologists, agricultural experts and sociologists, familiar with the local situation;
- The goals of the plan must be to: specify the rehabilitation measures, clarify the status of the rehabilitated areas (notably vis-à-vis the local populations); determine a schedule for rehabilitation; and determine monitoring measures for rehabilitation;
- It will be important to explain well the reason for the plan and how it will work to residents. Without the support of the local populations, the plan will not be effective;
- A schedule must be established at the beginning of the plan development;
- A list of people responsible and participants will be established as soon as possible;

- An annual report must be published each year that describes what was done and decided and what remains to; and
- The development of the plan will finish upon the production of the final plan that will establish more precise actions.
-

5.3 Development of a mining road management plan for bushmeat hunting

It is very probable that without mitigations measures there will be an increase in bushmeat hunting linked to the development of a road network that will allow easier and more rapid access to locations currently fairly isolated. The use of the existing mine road network by private citizens is evident. The development of the new road network may occur over existing roads and any closure of the roads would leave residents of several villages totally isolated. The need for a management plan will follow the additional study on mining roads that was recommended. If a plan is necessary it will have to include the following elements:

- This plan must of course include besides CBG, local stakeholders, notably local (residents, villages and the commune of Sangarédi) and government agencies;
- The plan must also include one or two competent biologists, familiar with the local situation;
- The goal of the plan is not to limit or forbid legal hunting acts but to target illegal acts that put animal species in peril. In fact, all commerce of bushmeat is forbidden in Guinea except with a special ministerial agreement;
- The goals of the plan must be to: ensure that the mining roads do not become an easier means of transport for bushmeat; determine a realistic schedule; and determine monitoring measures;
- It will be important to explain well the reason for the plan and how it will work to residents. Without the support of the local populations, the plan will not be effective;
- A schedule must be established at the beginning of the plan development;

- A list of people responsible and participants will be established as soon as possible;
- An annual report must be published each year that describes what was done and decided and what remains to; and
- The development of the plan will finish upon the production of the final plan that will establish more precise actions.
-

5.4 Development of a mining road management plan for woodfuel harvesting

It is very probable that without mitigations measures there will be an increase in woodfuel harvesting linked to the development of a road network that will allow easier and more rapid access to locations currently fairly isolated (as for bushmeat, described above). The need for a management plan will follow the additional study on mining roads that was recommended. If a plan is necessary it will have to include the following elements:

- This plan must of course include besides CBG, local stakeholders, notably local (residents, villages and the commune of Sangarédi) and government agencies;
- The plan must also include one or two competent biologists, familiar with the local situation;
- The goal of the plan is not to limit or forbid woodfuel harvesting but to ensure that the new means of transport do not put the resource or harvesting by residents in danger;
- The goals of the plan must be to: ensure that the mining roads do not become an easier means of transport for woodfuel by persons not living in the area; determine a realistic schedule; and determine monitoring measures;
- It will be important to explain well the reason for the plan and how it will work to residents. Without the support of the local populations, the plan will not be effective;
- A schedule must be established at the beginning of the plan development;
- A list of people responsible and participants will be established as soon as possible;

- An annual report must be published each year that describes what was done and decided and what remains to; and
- The development of the plan will finish upon the production of the final plan that will establish more precise actions.

5.5 Development of a forest protection plan (Sangarédi)

It is clear that the forests that still exist in the Sangarédi area are the most critical habitats of the area. Nearly all of the dense forests that still exist are along watercourses in the form of gallery forests. The protection of the forests also ensures the protection of the watercourses of the valleys.

- The plan must be seen by CBG as one of the approaches to satisfy Performance Standard 6 of the IFC. The plan will demand efforts and costs from CBG;
- This plan must of course include besides CBG, local stakeholders, notably local (residents, villages and the commune of Sangarédi) and government agencies;
- An effort should be made to also include other mining companies, with neighboring concessions. Their support could help build a regional approach that would extend beyond the limits of the Study Area;
- The plan must also include one or two competent biologists, familiar with the local situation;
- The goals of this plan must be to protect ecosystems and the important species that inhabit them (chimpanzee, mangabey, African golden cat, rare plants, reptiles, amphibians and fish); protect remnant habitat; promote the restoration of key habitats to ensure or bring back an effective corridor role to the gallery forests; determine a realistic schedule; and determine monitoring measures;
- The determination of a functional corridor is complex and requires knowledge about the animals that are supposed to use the corridors. Corridors that are too narrow may not fulfill their roles;
- As the plan must in part be considered a compensation measure by CBG for the destruction of natural habitats on

future mines, the surface area of the areas to protect and the corridors to create must at least be comparable to the surface area lost: 3,200 ha. This surface area is approximate and may evolve to consider losses linked to the road network (when there will be enough data on this topic) and impacts outside of the area to be cleared (impact from noises, dust, etc.). The plan may also take into account rehabilitated mine areas if these are devoted solely to the restoration of natural habitat. An important part of the to surface area (at least half) must be devoted to the creation of new forest habitat linked to the existing gallery forests to improve their role as corridors;

- It will be important to explain well the reason for the plan and how it will work to residents. Without the support of the local populations, the plan will not be effective;
- A schedule must be established at the beginning of the plan development;
- A list of people responsible and participants will be established as soon as possible;
- An annual report must be published each year that describes what was done and decided and what remains to; and
- The development of the plan will finish upon the production of the final plan that will establish more precise actions.

5.6 Development of a bowal protection plan

It may seem paradoxical to suggest a bowal vegetation protection plan when the bowals of Sangarédi do not seem to have species of high status. Nevertheless the bowals of the Sangarédi region often coincide with the bauxite areas to be mined. It is not impossible that the mining of bauxite by CBG ad other nearby mining companies could result in a marked decrease of the area of bowals and their specific vegetation. Thus it is reasonable to ensure that that vegetation of the bowals does not disappear. It is also necessary to take into account the presence of some animals specific to this type of vegetation.

- The botanists that will do the additional studies will determine for each new area to mine the percentage of the bowal vegetation that will be eliminated; and
- If the percentage is over 50% a study will have to be done to determine approaches for the protection of a minimum population.

5.7 Development of a Cogon Corridor protection plan

The valley of the Cogon in the Study Area is clearly important from the biological point of view. Even more, the valley of the Cogon viewed in a larger context deserves to be considered at the regional level, as the valley still seems to be acting as an important regional corridor. A plan such as this can only succeed with the participation of mining companies holding concessions along the Cogon.

- The plan must be seen by CBG as one of the approaches to satisfy Performance Standard 6 of the IFC. The plan will demand efforts and costs from CBG;
- This plan must of course include besides CBG, local stakeholders, notably local (residents, villages and the commune of Sangarédi) and government agencies;
- The participation of other mining companies, with neighboring concessions, is of course essential. Their support could help build a regional approach that would extend beyond the limits of the Study Area. The Government of Guinea and the IFC could encourage other companies to participate;
- The plan must also include one or two competent biologists, familiar with the local situation;
- CBG should take the role of initiator of the discussions;
- The goals of the plan must be to: protect important species present (chimpanzee, new population of red colobus, hippopotamus); protect the remaining habitat; promote the restoration of key habitats to ensure or restore the role of regional corridor; protect local resources such as artisanal fishing; determine a realistic schedule; and determine monitoring measures;

- In this case, the identification of a wide corridor going to the heights of the plateaus is needed;
- It will be important to explain well the reason for the plan and how it will work to residents. Without the support of the local populations, the plan will not be effective;
- A schedule must be established at the beginning of the plan development;
- A list of people responsible and participants will be established as soon as possible;
- An annual report must be published each year that describes what was done and decided and what remains to; and
- The development of the plan will finish upon the production of the final plan that will establish more precise actions.

5.8 Development of a Rio Nuñez Estuary protection plan

The Rio Nuñez Estuary is a critical habitat but the situation is very different from the Sangarédi area where CBG has a mining concession that covers a large surface area and where CBG can exercise a major role in its protection. For the Rio Nuñez Estuary there are several groups having rights, including local and foreign fishermen, and undoubtedly soon other mining companies. More than in Sangarédi, a protection plan here must include large number of actors, including of course the Government of Guinea. Only an integrated approach will allow the management of the estuary for the good of all and of biodiversity.

- The plan must be seen by CBG as one of the approaches to satisfy Performance Standard 6 of the IFC. The plan will demand efforts and costs from CBG;
- This plan must of course include besides CBG, local stakeholders, notably local (residents, villages and the commune of Kamsar), government agencies and mining companies that might locate here;
- CBG should take the role of initiator of the discussions;
- The plan must also include one or two competent biologists, familiar with the local situation;

- The goals of the plan must be to: protect important species (dolphin, manatee, aquatic birds, marine turtles, crocodiles, marine fish); protect key habitats (mangrove, mud flats); protect artisanal fishing; plan the port installations in a sustainable fashion; determine a realistic schedule; and determine monitoring measures;
- It will be important to explain well the reason for the plan and how it will work to residents. Without the support of the local populations, the plan will not be effective;
- A schedule must be established at the beginning of the plan development;
- A list of people responsible and participants will be established as soon as possible;
- An annual report must be published each year that describes what was done and decided and what remains to; and
- The development of the plan will finish upon the production of the final plan that will establish more precise actions.

6 FURTHER STUDIES

6.1 Additional study on dredging (Kamsar)

A benthic invertebrate survey of the dredging area and deposition area is currently being carried out in conjunction with the dredging sediment sampling program (see Section 2.1.8).

At at least 10 sampling locations at each of the two sites, three separate grab samples will be taken using the Petite Ponar grab used for the sediment sampling. Use of the Petite Ponar grab for benthic invertebrate samples is justified (see Bingham et al, 1982 for example). The samples taken with the grab will be sieved using a 1mm mesh sieve and preserved in alcohol. Each of the over 60 samples will be analyzed by a recognized laboratory familiar with identification of marine/brackish benthic species of the region.

A report on the benthic invertebrates present will be presented after completion of the laboratory analyses.

6.2 Additional study on the mining road network (Sangarédi)

At the date of finalizing the biology report, there were no details on the development of a road network associated with the mining of new areas. The network itself will have a significant impact, notably by destroying habitats, fragmenting of habitats and reducing animal movements (especially for medium and large mammals). The network would also have impacts on access to isolated areas for persons searching for bushmeat and woodfuel. It will be imperative that competent biologists participate in the development of the network: alignments, avoidance of critical habitats, reduction of fragmentation of habitats, protection of aquatic habitats, use by residents and others, status after the end of mining, etc.

6.3 Additional botanical studies (Sangarédi)

The botanical study for the ESIA recommends that additional studies be done in areas to be mined during the September to October period, the preferred period to identify bowal species. The botanical studies to date have not identified species of high conservation status on the bowals but this remains a possibility. In addition, a species considered *Vulnerable* by IUCN was found in a wooded grassland (*Khaya senegalensis*).

It is recommended to do these studies in September-October before mining in a new area. The identification of bowal plants can be difficult and requires very competent botanists (such as those of Kew Royal Botanical Gardens). During these studies, the botanists should also verify the limits of critical habitats in proximity and inform CBG if there are corrections to make to their distribution. They could also make recommendations as to the measures to be taken if necessary identification of species with high status).

Before clearing for the new mining roads, it would be judicious to check for the presence of important species by the botanists already present for the mining area studies.

6.4 Additional study for Endangered vultures (Sangarédi)

Three species of Endangered vultures are among the few Endangered species to frequent in a regular manner the sites to be mined at Sangarédi. The individuals of the three vulture species cover large territories and would likely not be very sensitive to mining activities in a specific area. The exception is in the case of nesting on tree close to or on the sites to be mined. As the Mining Plan covers a long period, it is not useful to do a survey at the beginning of the Project. However, as the time approaches for the opening of a new mining area, it would be prudent to do a verification for vultures and other birds of prey. They could make recommendation on measures to take if necessary.

In addition a survey for key Endangered species, including vultures, in the vicinity of the areas to be mined has been planned for September-November 2015 (see section 10.3)

6.5 Additional study for the Kunda half-toed lizard *Hemidactylus kundaensis*

During work close to Kourawel it will be important to verify the presence of this species by a competent herpetologist and to take measures necessary for its protection if there are impacts predicted. This species could live in houses and if there changes to the village by CBG actions, this would have to be taken into account.

In addition a survey for key Endangered species, including this lizard, in the vicinity of the areas to be mined has been planned for September-November 2015 (see Section 10.3)

6.6 Additional studies on bats

A bat survey was recommended in the ESIA and was also recommended during the Paris meetings. The survey will be undertaken as soon as possible.

6.7 Additional studies on underwater noise

At the Paris meetings, the need for a study on underwater noise was discussed and recommended. This is an important aspect in terms of use of the port area by marine mammals. A modeling assessment of the noise from the development of the new quay and dredging operations will be done during the BAP production (see Section 10.3).

7 MONITORING

7.1 Introduction

A monitoring program is a requirement for verifying impact predictions and the efficiency of mitigation measures. Some of the mitigation measures already include monitoring measures and the protection plans will undoubtedly establish other specific monitoring measures. Certain aspects are already recommended by other disciplines (for example water quality monitoring). Monitoring measures described here are those not already included in the preceding section and that merit consideration.

A good monitoring program must be doable. For example it would be theoretically desirable to verify the continued presence of certain rare species such as the endemic frog (*Phrynobatrachus pintoii*) or certain reptiles (*Philothamnus cf semivariatus*, *Cynisca cf oligopholis*, and *Hemidactylus kundaensis*). Unfortunately it is not

clear that it would be possible to verify fluctuations in numbers of these species, not very visible and present in very low numbers. An approach by habitat would also be useful but very complex.

7.2 Reports

Each year the persons responsible for the monitoring will have to submit a report detailing the fieldwork, the results, the conclusions and the recommendations. This report will have to be transmitted to all of the applicable stakeholders and, if possible, put on an Internet site for public download.

7.3 Primates at Sangarédi

Monitoring of chimpanzees is very desirable. It is an *Endangered* species, present in critical habitats in the Sangarédi area. Chimpanzee monitoring will also allow verification of measures to preserve these critical habitats. Chimpanzees are relatively numerous and fairly easy to see (individuals and nests in trees). During the monitoring for chimpanzees, it will be important to follow the evolution of other threatened primates in the area (red colobus, sooty mangabey and others whose presence are not yet confirmed).

The choice of consultant for this monitoring program will have to be based mainly on competence doing this type of work.

The details of the monitoring protocol will have to be established by the consultant in charge of the monitoring program and approved by government agencies but should:

- Have the clearly stated goal of following the fluctuations of primate populations, particularly primates;
- Cover the environmental Study Area for Sangarédi for the ESIA of the Expansion Project but potentially targeting preferentially areas close to the new mining areas;
- Allow for sufficiently frequent field studies (probably annually) to be able to detect changes quickly;

- Follow recommendations from the most recent studies on inventory methods for primates (for example H. Kuhl, F. Maisels, M. Ancrenaz and E.A. Williamson (2008). *Best Practice Guidelines for Surveys and Monitoring of Great Ape Populations*. Gland, Switzerland: IUCN SSC Primate Specialist Group);
- Include recommendations in case of substantial population decreases; and
- Provide competent field biologists

7.4 Hippopotamus at Sangarédi

Hippopotamus are one of the species using the Cogon Corridor. The IUCN status of this species is being revised and could change. In addition they are fairly easy to see and therefore easy to monitor. The monitoring could also be helped by information from residents. Monitoring of hippopotamus could also be the opportunity to monitor other species along the river.

The choice of consultant for this monitoring program will have to be based mainly on competence doing this type of work.

The details of the monitoring protocol will have to be established by the consultant in charge of the monitoring program and approved by government agencies but should:

- Have the clearly stated goal of following the fluctuations of hippopotamus populations along the Cogon;
- Cover the environmental Study Area for Sangarédi for the ESIA of the Expansion Project but preferentially targeting the Cogon Corridor;
- Allow for sufficiently frequent field studies (probably annually) to be able to detect changes quickly;
- Include recommendations in case of substantial population decreases; and
- Provide competent field biologists

7.5 Atlantic humpback dolphin at Kamsar

The Atlantic humpback dolphin is an IUCN Vulnerable species and there is a good population in the Rio Nuñez Estuary. The species is fairly easy to see and individuals can be recognized by differences in their fins. It is a type of species likely to be sensitive to disturbance.

The choice of consultant for this monitoring program will have to be based mainly on competence doing this type of work.

The details of the monitoring protocol will have to be established by the consultant in charge of the monitoring program and approved by government agencies but should:

- Have the clearly stated goal of following the fluctuations of dolphin populations in the Rio Nuñez Estuary;
- Cover the environmental Study Area for Kamsar for the ESIA of the Expansion Project;
- Allow for sufficiently frequent field studies (probably annually) to be able to detect changes quickly;
- Follow recommendations from the most recent studies on inventory methods for dolphins, particularly methods using the identification of individuals (for example Parsons, K. M. 2010. *Procedural Guideline No. 4–5 Using photographic identification techniques for assessing bottlenose dolphin (*Tursiops truncatus*) abundance and behaviour in Marine Monitoring Handbook March 2001*. Joint Nature Conservation Committee);
- Include recommendations in case of substantial population decreases; and
- Provide competent field biologists.

7.6 Revisions

A good monitoring program is not static but is continually modified in view of the monitoring results. It is highly probable that following the initial results, modifications in methodology or target species may be recommended. These modifications should be considered and implemented.

7.7 Collection of ancillary observations on biodiversity

CBG employees and subcontractors can help to understand the biodiversity in the Study Area by keeping logs of observations or in advising the environmental inspector. Among the specific actions:

- Keeping of logs by certain key people: for example environmental inspectors, site supervisors, drivers, ship captains);
- The logs should contain all observations of large fauna or unusual environmental aspects (death of vegetation, fish kill in a stream, etc.); and
- In particular, finds of all vertebrate carcasses should be notified to the environmental inspector who will be able to identify the carcass (or preserve it or photograph it for identification by a specialist) and determine if tissue samples should be taken (for DNA analysis for certain species or determination of cause of death is poisoning is suspected).

APPENDICES

Appendix 9.11 Critical Habitat Assessment (CHA)

CBG mine expansion project: Critical and Natural Habitat Assessment

September 2015

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1 Executive summary

This report assesses the presence of Critical Habitat and Natural Habitat for both the terrestrial and marine areas of the CBG expansion project - mine, rail and port - in the Boké prefecture in northwest Republic of Guinea. This report determines for what biodiversity the area qualifies as Critical Habitat, with the aim of allowing CBG to assess impacts and prioritise mitigation measures for these priority biodiversity features in alignment with the International Finance Corporation's Performance Standard 6 (IFC PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources. This report is based on existing data and also provides a high-level assessment of further data requirements that may be necessary to clarify Critical Habitat status for some taxa.

Is this project in Critical Habitat?

The assessment finds that **the CBG Project expansion is situated in Critical Habitat:**

- The presence of 16 highly threatened and/or restricted-range terrestrial species and subspecies **qualify the terrestrial area as Critical Habitat** (Table 1). These include West African Chimpanzee (*Pan troglodytes verus*), West African Red Colobus (*Procolobus badius temminckii*) and the Critically Endangered reptiles *Cynisca cf oligopholis* and *Hemidactylus kundaensis*. Five species qualify for **Tier 1 Critical Habitat** and a further 11 species/subspecies for **Tier 2 Critical Habitat**;
- Eight marine species and the presence of highly threatened mangrove ecosystems **qualify the marine area as Tier 2 Critical Habitat** (Table 2);
- Four internationally recognised areas of high biodiversity **also qualify the area as Critical Habitat**. Two Ramsar sites and Important Bird Areas: **Iles Tristao** and **Rio Kapatchez**, and two Key Biodiversity Areas: **Kamsar** and **Boulléré**.

This study also confirms the presence of **six types of Natural Habitat**: gallery forest; wooded grassland and woodland; bowal grassland; non-bowal grassland; beaches, sand banks and mud flats; and freshwater aquatic habitats.

This assessment is based on available data; further Critical Habitat-qualifying biodiversity may be present in the area of assessment. Global range maps for 12 Critically Endangered and Endangered species (1 crocodile and 11 marine fish) overlap the area of assessment and would qualify as Critical Habitat if confirmed to be present. Baseline surveys of plants and amphibians are incomplete and supplementary surveys in the wet season may well reveal the presence of other Critical Habitat-qualifying species.

Based on the data available, it was not possible to provide a detailed spatial map showing the location of areas supporting Critical Habitat qualifying biodiversity within the DMU; such mapping is an important process for identifying opportunities for avoidance and should be a priority for downstream biodiversity action planning. In the meantime **it would be good practice to consider all areas whose status is potentially Critical Habitat as Critical Habitat until surveys demonstrate it is not.**

Further charismatic and threatened species occur in the area of assessment, including Western Black-and-white Colobus (*Colobus polykomos*), Hippopotamus (*Hippopotamus amphibius*) and West African Manatee (*Trichechus senegalensis*) (Table 7). While not qualifying for Critical Habitat status, these may attract high levels of stakeholder concern and therefore present a risk to the project. Good international practice would

be to review the level of stakeholder concern for these species in the Project area and, where concern is confirmed to be high, to treat such biodiversity in the same way as Critical Habitat-qualifying biodiversity.

What does this mean?

The Project expansion area (mine and port) is situated in Critical Habitat. This means that to align with PS6 the Project will need **to demonstrate that all feasible avoidance of impacts on the biodiversity values for which the Critical Habitat was designated have been implemented** and – through its Biodiversity Action Plan – how the mitigation hierarchy will be implemented to ensure **no measureable adverse impact** and to achieve an overall **net gain** of these values. In areas of Natural Habitat, the Project will need to demonstrate that no feasible alternatives that are not in Natural Habitat exist and that mitigation measures will achieve **no net loss of Natural Habitat where feasible**.

PS6 requires a considerable burden of proof that all feasible avoidance and minimisation of impacts on Critical Habitat qualifying features have been implemented. This requires a robust understanding of impacts. The Project could consider **whether further studies would be appropriate to improve understanding of key impacts on Critical Habitat-qualifying features**, especially cumulative impacts, hydrological impacts, fragmentation and connectivity impacts and indirect impacts (especially increased hunting and wildlife trade). Such studies could enable a **quantitative residual impact assessment using loss/gain accounting for Critical Habitat-qualifying features** to help demonstrate that all feasible avoidance and minimisation has been implemented and to evaluate potential offset requirements.

Based on current knowledge, the distribution/numbers of West African Chimpanzee, West African Red Colobus and endemic species restricted to the Sangarédi subprefecture (e.g. *Cynisca cf oligopholis* and *Hemidactylus kundaensis*) are so limited that any significant Project impacts could jeopardise their continued existence within the Project area. These species are likely to pose the highest risks to the Project in aligning with PS6 requirements. For these species, a **heightened focus on avoiding and minimising impacts** would improve options for aligning with PS6 requirements (notably the 'no measureable adverse impact' requirement) as well as minimising stakeholder risks. For West African Chimpanzee and West African Red Colobus, **an improved understanding of the geographical affinity and significance of their populations in the DMU** – though targeted surveys and expert stakeholder review – **would help the Project assess the extent of avoidance that would be appropriate**. Where residual impacts are likely, **an offset feasibility study would help determine whether it is possible to generate sufficient gains off-site** to meet the PS6 'net gain' requirements for these species.

Some species for which Critical Habitat has been designated are relatively poorly known and may be more widespread than currently (eg Purple Marsh Crab *Afrithelphusa monodosa*, the freshwater fish *Epiplatys njalaensis* and *Nimbapanchax jeanpoli* and the plant *Ledermanniella abbayesii*). **The Project has the option to conduct further studies** of such species both within and outside the Project area to clarify the importance of the Project DMU for them, potentially leading to a revision of their Critical Habitat status. Nevertheless, unless a robust re-assessment clarifies their status, **Biodiversity Action Planning should proceed on the assumption that they are Critical Habitat qualifying species**.

Table 1: Priority biodiversity for the CBG Project - Critical Habitat-qualifying species in the terrestrial DMU (red bars indicate definite risks, grey bars indicate no risks identified). * Qualify for both Criteria 1 and 2.

Criteria	Biodiversity features	
1: Critically Endangered or Endangered species	2 Mammals: West African Chimpanzee (Tier 2)	
	West African Red Colobus (Tier 2)	
	3 Birds: Hooded Vulture (Tier 2)	
	White-backed Vulture (Tier 2)	
	Rueppell's Griffon Vulture (Tier 2)	
	3 Reptiles: <i>Cynisca cf oligopholis</i> (Tier 1)*	
	<i>Hemidactylus kundaensis</i> (Tier 1)*	
	1 Amphibian: <i>Phrynobatrachus pintoii</i> (Tier 1)*	
	2 Fish: <i>Nimbapanchax jeanpoli</i> (Tier 2)*	
	<i>Epiplatys njalaensis</i> (Tier 1)*	
1 Invertebrate: <i>Afrithelphusa monodosa</i> (Tier 1)*		
2: Restricted-range species	3 Reptiles: <i>Cynisca cf oligopholis</i> (Tier 1)*	
	<i>Cynisca leonina</i> (Tier 2)	
	<i>Hemidactylus kundaensis</i> (Tier 2)*	
	1 Amphibian: <i>Phrynobatrachus pintoii</i> (Tier 1)*	
	5 Fish: <i>Malapterurus teugelsi</i> (Tier 2)	
	<i>Epiplatys njalaensis</i> (Tier 2)*	
	<i>Nimbapanchax jeanpoli</i> (Tier 2)	
	<i>Epiplatys hildegardae</i> (Tier 2)	
	1 Invertebrate: <i>Afrithelphusa monodosa</i> (Tier 2)*	
	2 Plants: <i>Fleurydora felicis</i> (Tier 2)	
<i>Ledermanniella abbayesii</i> (Tier 2)		
3: Migratory/congregatory species	None identified	
4: Highly threatened & unique ecosystems	None identified	
5: Key evolutionary processes	None identified	
Legally Protected Areas & Internationally Recognised Areas	2 Key Biodiversity Areas: Kamsar	
	Boulléré	

Table 2: Priority biodiversity for the CBG Project - Critical Habitat-qualifying species in the marine DMU (red bars indicate definite risks, grey bars indicate no risks identified).

Criteria	Biodiversity features	
1: Critically Endangered or Endangered species	1 Mammal: Atlantic Humpback Dolphin (Tier 2)	Red
	2 Reptiles: Hawksbill Turtle (Tier 2) Green Turtle (Tier 2)	
	Blackchin Guitarfish (Tier 2)	
	Daisy Stingray (Tier 2)	
	Dusky Grouper (Tier 2)	
2: Restricted-range species	None identified	Grey
3: Migratory/congregatory species	1 Bird: Sanderling (Tier 2)	Red
4: Highly threatened & unique ecosystems	1 Habitat: Mangrove	Red
5: Key evolutionary processes	None identified	Grey
Legally Protected Areas & Internationally Recognised Areas	2 Ramsar sites and Important Bird Areas¹: Rio Kapatchez	Red
	Îles Tristao	

¹ The candidate [Île Alcatraz et Île du Naufrage](#) marine IBA would also qualify if its status is confirmed.

Technical Report

2 Introduction

2.1 Purpose of this report

The Compagnie des Bauxites de Guinée (CBG) Project is a bauxite mining project in the Boké prefecture in north western Republic of Guinea. CBG is a mining company belonging jointly to the Government of Guinea and Halco Mining (Alcoa, Rio Tinto Alcan and Dadco). CBG is currently considering increasing its bauxite production by 14 million tonnes per annum (MTPA) to a production capacity of 27.5 MTPA by around 2022. The CBG Expansion Project (**the Project**) involves increasing the rate of bauxite extraction, transport and processing. The project will significantly expand its operations by mining additional plateaus within the Sangarédi mining concession area, extending the ship loading quay at Kamsar (including dredging of the turning basins) and upgrading the railway (new sidings) between the two to increase transport and shipping capacity.

CBG is seeking funding from the International Finance Corporation (IFC) and therefore aims to align with IFC's Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC 2012a). This report aims to:

1. Undertake a Critical Habitat Assessment to determine whether the Project area is within Critical Habitat (IFC PS6) and, if so, for what biodiversity features.
2. Undertake a rapid assessment of any significant gaps in the Biology Baseline Study and Biological Impact Assessment of the Project Environmental and Social Impact Assessment (ESIA; EEM 2014).
3. Develop recommendations for a high-level strategy ("roadmap") to mitigate impacts on biodiversity and align with the Project with IFC PS6 requirements.

2.2 Scope, exclusions and limitations

The scope of this report is to undertake a Critical Habitat (CH) Assessment for the biodiversity present in the area of the mining expansion (mine, rail and port). This assessment therefore does not assess current or future impacts from *existing* infrastructure and mining operations.

The focus of this assessment is assessing the presence of biodiversity features (species and habitats) that would qualify the area as Critical Habitat, as well as any identifying major gaps in the current biodiversity baseline and impact assessment. Potential impacts to *ecosystem services* are not considered here.

Findings are based on existing data, with limited consultation from expert stakeholders to validate findings. Gaps in available data mean that there may be other species which qualify the area as Critical Habitat but which have not yet been surveyed. Data resolution and time constraints meant it was not possible to map the location of Critical Habitat in detail; this should be a priority task for mitigation planning ([Section 5.3.1](#)).

2.3 What are Critical and Natural Habitat?

PS6 identifies three classes of area based on (i) habitat condition (or 'quality' or 'state') and (ii) significance for biodiversity. PS6 uses the term 'habitat' to refer to these areas, rather than the actual vegetation within them.

Habitat condition is classified as either **Natural** or **Modified** based on the extent of human modification of the ecosystem (Table 3). The threshold for classifying a habitat as Modified rather than Natural is high: only the most heavily disturbed habitats would be classified as Modified. Monoculture forestry plantations, arable fields and urban areas show "substantial modification" and would be classed as Modified; selectively logged gallery forests for example, usually retain most of the original species and ecological processes and so would in most cases still be considered Natural Habitat.

Areas of "**high biodiversity value**" are termed **Critical Habitat** by the IFC. Such a designation is based on the presence and/or quantity of significant types of biodiversity (e.g. rare species, rare habitats). There are five main criteria by which IFC PS6 Critical Habitat is defined:

- Critically Endangered and/or Endangered species;
- Endemic and/or restricted-range species;
- Globally significant concentrations of migratory species and/or congregatory species;
- Highly threatened and/or unique ecosystems;
- Areas associated with key evolutionary processes.

TBC (2012) explains these criteria and their implications. An associated Guidance Note to PS6 (IFC 2012b) defines quantitative thresholds for the first three types of biodiversity (species). If these thresholds are exceeded for any criterion, an area qualifies as Critical Habitat status. In addition to these five main criteria, Protected Areas and Internationally Recognised Areas will also often qualify for Critical Habitat designation. Critical Habitat may also qualify on a case-by-case basis (as determined by specialists and the IFC) if other significant biodiversity features are present, such as areas required for the reintroduction of threatened species. Criteria 4 and 5 are assessed qualitatively based on expert opinion, though emerging quantitative criteria for ecosystems (Keith *et al.* 2013) can be used as a guide for Criterion 4.

Designation of an area as Critical Habitat is independent of the state of the habitat: Critical Habitat-qualifying biodiversity may be present even in heavily degraded Modified Habitat, for example vultures may use heavily modified landscapes, including urban areas but may still qualify for Critical Habitat.

Table 3: Summary of the PS6 scheme for classifying areas.

		Condition of the area	
		Natural	Modified
Significant types or quantities of biodiversity ("Critical Habitat-qualifying features")	Present	Critical Habitat	Critical Habitat
	Absent	Natural Habitat	Modified Habitat

2.4 Implications of Critical Habitat designation

Critical Habitat designation is purely an assessment of biodiversity importance of an area, based on the biodiversity values and not the potential Project impacts. If there are no Project impacts, the fact that a species or habitat qualifies the area for Critical Habitat does not necessarily mean that it will require any specific mitigation. However, where impacts do occur, PS6 requires Project proponents to 'fully exercise the mitigation hierarchy', with an emphasis on measures aimed at avoiding and minimising impacts. In Critical Habitat, this means that overall net gains of Critical Habitat-qualifying biodiversity are required. A high threshold of proof will be required to demonstrate that it is feasible to deliver such gains. Further information is available in TBC (2012).

For Natural Habitat, mitigation measures will need to be designed to achieve a "no net loss" of biodiversity where feasible (IFC 2012a Paragraph 15). Measures to achieve this can include measures to avoid impacts through the identification and protection of set-asides (i.e. project areas that are excluded from development and are targeted for the implementation of conservation enhancement measures), implementing measures to minimize habitat fragmentation, such as through the establishment of biological corridors, habitat restoration and through implementation of biodiversity offsets.

2.5 What are Tier 1 and Tier 2?

PS6 defines two 'tiers' of Critical Habitat, with quantitative thresholds for criteria 1-3 (IFC 2012b). Tier 1 is the higher tier and is defined because of the presence of greater quantities of CH-qualifying biodiversity.

IFC and other stakeholders often demand a considerably greater burden of proof that the mitigation hierarchy is being followed carefully (and especially that all feasible avoidance has been implemented) for Projects in Tier 1 Critical Habitat, but otherwise Project requirements are the same as for Tier 2 Critical Habitat.

3 Methods

3.1 Key steps and data inputs

Collect and verify available information on biodiversity using the Project Biodiversity Baseline, literature review, expert consultation and analysis.

A candidate list of potential Critical Habitat-qualifying species, subspecies and subpopulations of species known to occur within the Project area was compiled from a spatial analysis of the [IUCN Red List](#)², baseline field survey reports and additional literature.

Baseline surveys of biodiversity carried out for both the mine and port expansion areas as part of the Project's Environmental and Social Impact Assessment (ESIA) have made a significant contribution to

² IUCN (2015). It should be noted that IUCN range maps are not available for all species, subspecies and populations on the Red List, and also that the IUCN Red List is not an exhaustive list; many species, subspecies and populations have not been assessed under IUCN Red List criteria and therefore do not have an extinction risk status assigned to them. There are very few global distribution maps available for plants which are assessed on the Red List.

biodiversity knowledge for the Boké prefecture and were a key input to this study. Studies were conducted on large mammals, birds, fish (marine and freshwater), reptiles, amphibians and plants, and aquatic ecology. A detailed habitat map has also been created of the Project study area.

Key reports consulted were:

1. EEM Environmental and Social Impact Assessment of the CBG Mine Expansion Project (2014). Of particular relevance were Chapters 3 (Biological Baseline), 4 (Environmental and Social Impact Assessment), 9 (Cumulative Impact Assessment), 10 (Environmental and Social Management Plan) and the relevant annexes on species surveys;
2. Critical Habitat Assessment Report for the Guinea Alumina Corporation (ecology and environment Inc & Kormos 2008);
3. Rapid Biological Assessment of Boké Préfecture, Northwestern Guinea (Wright et al. 2006);
4. Complementary Primate Study CBG Extension Project Part 1 - Summary Report (Wild Chimpanzee Foundation 2015).

For plants, data was also obtained by consulting the Rainbio database, GBIF and the Paris herbarium database (see MBG report in [Appendix 5](#)).

1. Identify appropriate area of analysis (Discrete Management Unit)

Evaluation of the presence of Critical Habitat is undertaken at the scale of a "Discrete Management Unit" (DMU) as per IFC PS6 (IFC 2012b). DMUs are defined as *'areas with a definable boundary within which the character of biological communities and/or management issues have more in common with each other than they do with those in adjacent areas'*. DMUs contain an area of potentially affected landscape. They are designated based on sensible ecological or political boundaries to encompass the region in which the Project and its impacts are located.

Consideration of a broader landscape than just the Project site demonstrates that the Project is taking a precautionary approach to biodiversity, ensuring all Project risks are taken into consideration, and demonstrates transparency to relevant stakeholders. The **choice of DMU places no management obligations on the Project**.

In principle, different DMUs may be appropriate for each biodiversity feature (species, habitats, ecological processes, etc.) However, in practice DMUs will be similar for many biodiversity features and as small a number of DMUs as possible should be used to simplify the analysis, especially in the early stages of mitigation planning where the priority is to ensure that Critical Habitat-qualifying features are identified. Identifying taxon-specific DMUS may be appropriate for downstream mitigation planning as part of Biodiversity Action Plan development.

The CBG DMU

A separate terrestrial and marine DMU were chosen for the CBG Project to account for potential impacts to both distinct environments (Figure 1). The terrestrial DMU covers both the area designated for mine expansion (Zone 1) as well as the railway line from the mine to the port at Kamsar. A 20km buffer was placed around the Zone 1 similar to the buffer used in the ESIA Chapter 9: Cumulative Impact Assessment. This allows consideration of the direct impacts, as well as broader indirect and cumulative impacts (see [Appendix 1](#) for a map of other mining concessions in the Boké prefecture). A 10km buffer was included to

either side of the railway as was suggested for the RUSAL railway (ESIA Chapter 9: Cumulative Impact Assessment). The total area of the terrestrial DMU was 6,990 km².

The marine DMU was chosen to cover any potential impacts from the port expansion and covers the Rio Nunez estuary and adjacent Ramsar sites, extending both inlands to include the main rivers and backwaters, and approximately 20km outwards to sea. The Ramsar sites were included in the DMU as they lie within 30-40 km of the port development which reflects distances travelled by artisanal fishing boats from communities providing fish to Kamsar. They include similar habitat and biodiversity and would potentially be impacted by the development, including cumulative developments with other projects. The total area of the marine DMU was 2,697 km².

These DMUs are considered to be a sensible unit of analysis for the Project, because impacts on any part of this area might negatively affect Project priority biodiversity, and thus present risks to the Project. The area was considered large enough to include the foraging ranges for species of high stakeholder concern as well as accounting for potential cumulative impacts resulting from other mining projects surrounding the CBG Project. It is therefore precautionary in covering all areas of biodiversity risk to the Project.

The DMU also encompasses a number of areas designated for their high biodiversity importance, comprised of: two Key Biodiversity Areas (Boulléré and Kamsar - the latter is divided into three sections) and two Ramsar sites of importance for wetlands which also overly two Important Bird Areas (Iles Tristao and Rio Kapatchez).

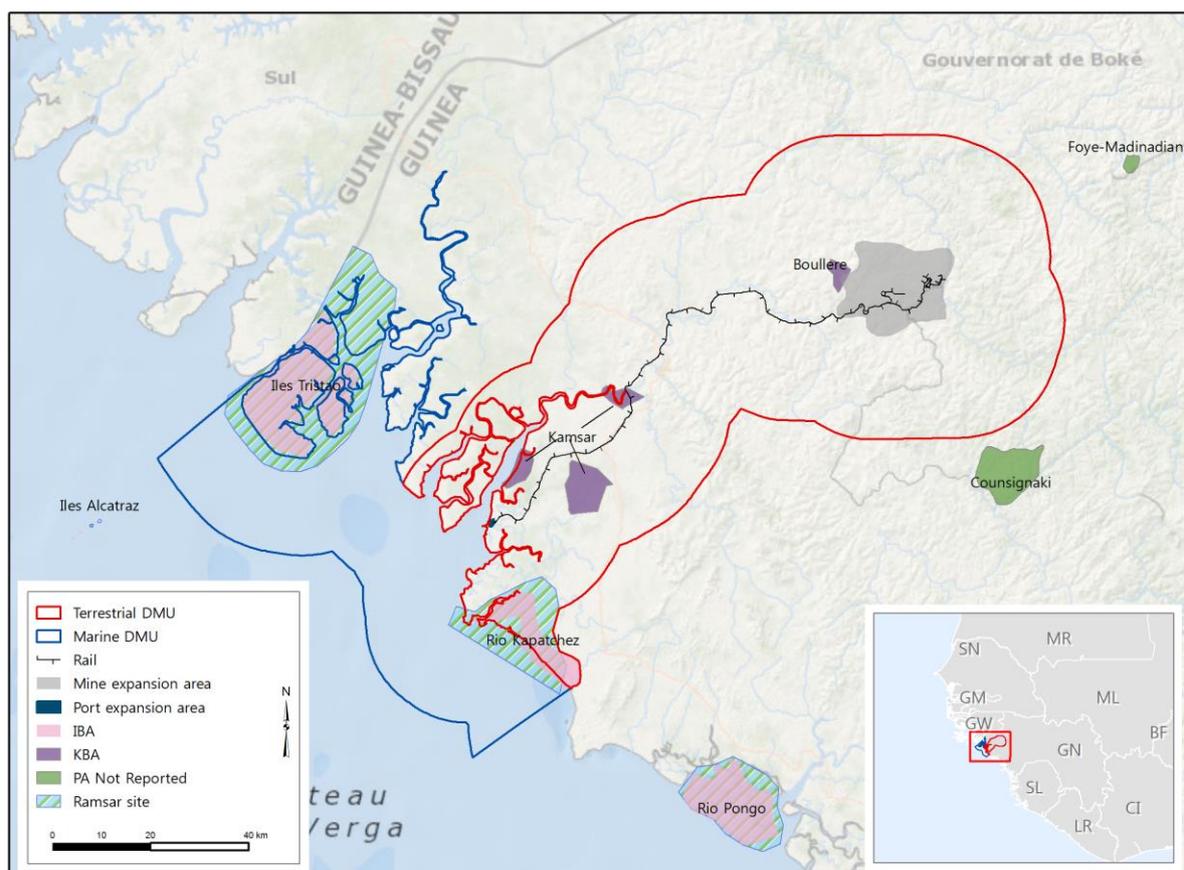


Figure 1: Terrestrial and marine DMUs. Map includes key infrastructure (mine and port expansion areas and railway line) as well as International Bird Areas (IBA), Key Biodiversity Areas (KBAs) and Ramsar sites.

2. Conduct assessments against IFC criteria for species and habitats to identify which biodiversity features qualify as Critical Habitat

A list of candidate species potentially qualifying as Critical Habitat, subspecies and subpopulations was derived from databases, baseline surveys and literature (Appendix 2 shows the candidate list for criteria 1 and 2). Candidates were then screened against IFC PS6 Critical Habitat quantitative thresholds in criteria 1-3 (IFC PS6 criteria 1-3) (IFC 2012b).

3. Assess of data gaps impacts and mitigation measures proposed in Biodiversity Baseline

A rapid review was undertaken of the existing Biodiversity Baseline and the Environmental and Social Impact Assessment (Chapters 3 and 4 resp. of the project ESIA; EEM 2014). The review aimed to highlight any significant information gaps in the current Project ESIA, and provide high-level comments for addressing these.

3.2 Assessment methods

3.2.1 Criteria 1, 2 and 3: threatened, restricted-range and migratory/congregatory species

To determine whether the Project area qualified as Critical Habitat, steps taken were to:

- Obtain the highest quality data available for species, subspecies and subpopulations in the DMU (e.g. IUCN Red List, findings from the Project's Biodiversity Baseline, other databases);
- Calculate the % of the global population or range within the DMU for each species, subspecies and subpopulation;
- Screen these results against the PS6 quantitative thresholds (see [Appendix 2](#) for thresholds);
- Use expert ecological value judgement and professional knowledge to interpret the results.

Quantitative thresholds:

Criteria 1, 2 and 3 determine whether DMUs represent Critical Habitat for particular species, subspecies and populations, based on the proportion of their population or range found within the DMU. Reliable data on population or Area of Occupancy were not available for most species, subspecies and populations. In those cases, Extent of Occurrence³ (EOO) was used as a proxy. EOO data were obtained from IUCN (2015), and a calculation made for each candidate species, subspecies or subpopulation under criterion 1 or 2 of the percentage of the global and national range within the area of analysis. These percentages were then screened against thresholds within PS6. Thresholds for Critical Habitat qualification under IFC PS6 criteria 1-3 are provided in [Appendix 2](#).

Species of national importance:

Although Critical Habitat is largely based on global conservation priorities, sub-criterion 1e also refers to nationally-important populations of Critically Endangered and Endangered species. Analysis was therefore

³ The Extent of Occurrence (EOO) for a species, subspecies or subpopulation is essentially the total area which covers all the known, inferred or projected sites of present occurrence, excluding cases of vagrancy, i.e. its distribution.

carried out on the percentage of the known national range⁴ of each of the threatened species found within the DMU. A Critically Endangered and Endangered species was considered as qualifying for Critical Habitat if $\geq 10\%$ of the national range of the species is within the DMU.

Subspecies, stocks, varieties and populations:

Where subspecies and populations have been assessed individually on the Red List, they were considered individually in this assessment. This means that, for example, where a species and subspecies are both classed as Endangered or Critically Endangered, both the species and subspecies would be separately assessed for Critical Habitat qualification.

Plants:

Very few West African plant species have been assessed under IUCN Red List criteria and few range maps are available. In order to assess for the presence of plants considered to be either highly threatened or restricted-range, the Missouri Botanical Gardens (MBG) undertook a screening of the terrestrial DMU against plant specimens found in the Rainbio plant database⁵ and the Global Biodiversity Information Facility (GBIF). This information was combined with plant specimens collected previously by Kew and the National Herbarium of Guinea as part of the Project's Biodiversity Baseline. SONNERAT, the online database of the Paris herbarium was also consulted (see [Appendix 5](#) for the full report).

Definitions of "restricted-range" and "endemic" (Criterion 2):

Thresholds for definitions of "restricted-range" were taken from IFC PS6 Guidance Note 80 (IFC 2012b):

- 50,000 km² or less for terrestrial vertebrates;
- 100,000 km² for marine vertebrates;
- 20,000 km² for freshwater crabs, fish, and molluscs;
- 50,000 km² for dragonflies and damselflies.

For plants, IFC guidance does not provide a quantitative threshold for restricted-range, recognising as more practical the concept of endemism, defined as species that have ' ≥ 95 percent of its global range inside the country or region of analysis' (Guidance Note 79; IFC 2012b). This definition was used for assessing plants under criterion 2, with EOO used as a measure of range. While practical, however, it should be noted that the proportion of a species range that is within ecologically arbitrary country boundaries is often a poor guide for assessing biodiversity risk. For example, some species may have a very restricted range but span two or more countries. Plants identified as priorities here thus likely represent only the very highest priorities among plants.

Migratory or congregatory species (Criterion 3):

For criterion 3, species were screened for evidence of there being significant concentrations of migratory or congregatory species, using literature, databases (especially the BirdLife International Important Bird Area dataset) and findings from the Project's Biodiversity Baseline. TBC's scientists are able to rapidly assess this criterion for birds and marine species, the main groups qualifying under this criterion.

⁴ Taken from IUCN (2015). It should be noted that in some cases the IUCN Red List maps for some species are crude representations of actual range, and do not represent population sizes, or relative concentrations of species.

⁵ It should be noted that most of the herbarium specimens are historical and there are very few recent specimens to base these assessments on. Therefore, these may not give a completely accurate picture of the current status of the species.

3.2.2 Criterion 4 - Highly threatened and/or unique ecosystems

GN6 defines ecosystems considered to be “highly threatened” or “unique” as ‘those (i) that are at risk of significantly decreasing in area or quality; (ii) with a small spatial extent; and/or (iii) containing unique assemblages of species including assemblages or concentrations of biome-restricted species.’

All ecosystems known from the DMU were screened against this criterion, with advice sought from experts (see [Section 3.2.5](#)). Particular attention was paid to the possibility of the presence of ecosystems that were at risk of significantly decreasing in area or quality, ecosystems with a small spatial extent, and ecosystems containing particularly unusual assemblages of species.

IFC do not provide quantitative significance thresholds for this criterion. The emerging IUCN Red List of Ecosystems criteria (Keith *et al.* 2013) were therefore used as a guide along with a set of global maps of terrestrial unique or highly-threatened ecosystems that TBC has developed for this purpose. For the purposes of this assessment, by analogy with Critical Habitat Criterion 1, ‘highly threatened’ in the sense of IFC PS6 has been interpreted as Critically Endangered or Endangered, and ‘threatened’ as Vulnerable. Ecosystems were screened against these criteria based on published data on their extent and historical or future rate of loss.

Without objective quantitative thresholds, expert opinion and qualitative value judgement remain important for assessment under this criterion.

3.2.3 Criterion 5 - Areas associated with key evolutionary processes

According to the Guidance Note for PS6 (IFC 2012b), the two key factors defining this criterion are ‘*the physical features of a landscape*’ and ‘*subpopulations of species that are phylogenetically or morphogenetically distinct*’. Although key evolutionary processes may operate at various spatial scales, in the sense of PS6 these are usually considered at a relatively fine scale rather than broad biogeographic regions (e.g. an individual mountain that may have acted as a glacial refugium and thus hosted the evolution of a suite of endemic species). No quantitative significance thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement. Areas associated with key evolutionary processes were screened using expert advice.

3.2.4 Internationally and/or nationally recognized areas of high biodiversity value

The Guidance Note for PS 6 (IFC 2012b) states that an area is likely to qualify as Critical Habitat where it contains “*internationally and/or nationally recognized areas of high biodiversity value*”. In addition to protected areas, other sites include UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (‘the Ramsar Convention’).

3.2.5 Expert stakeholder consultation

IFC PS6 strongly recommends that an on-going process of stakeholder consultation be integrated into a projects Environment and Social Management System, including for the determination of Critical Habitat. Although stakeholder consultation was limited due to time constraints, the following expert stakeholders were consulted to support the assessment:

- Tariq Stévant at the Missouri Botanical Gardens for a rapid assessment of botanical species;
- Virginie Vergnes and Christophe Boesch of the Wild Chimpanzee Foundation for input on the status of Chimpanzee in the DMU and the regional conservation significance of the DMU for Chimpanzee conservation;
- Matt Shirley for expert guidance on the status of crocodile species in the area;
- Abdulai Barrie, University of Maine and regional large mammal expert for input on the status of West African Red Colobus;
- Hugo Rainey of the Wildlife Conservation Society for expert input on the presence and status of bird species in the area.

3.2.6 Limits and robustness of this assessment

This assessment was conducted using the best available information, complemented by expert consultations. The time available to undertake this assessment was extremely short, and further research may change the assessment. In particular, several of the restricted-range species (including reptile, freshwater fish and plant species) qualifying the area as Critical Habitat under criterion 2 are poorly known. Further research may extend their known range, such that the area no longer holds sufficient significance to meet Critical Habitat thresholds.

While further research may change the list of Critical Habitat qualifying biodiversity, the overall designation of Critical Habitat status would not change. This is because Critical Habitat is defined on a weakest link approach: if any criterion is met for any biodiversity, then the area is Critical Habitat. Evaluations under criterion 1 are particularly robust and unlikely to change based on further work.

4 Results

Overall 24 species, mangroves habitat and the presence of two Internationally Recognised Areas qualify the DMU as Critical Habitat. A breakdown of the biodiversity features qualifying under each criterion is presented below.

4.1 Criterion 1: Critically Endangered and/or Endangered species – qualified

Eighteen species qualify the DMU for Critical Habitat under criterion 1: three species of mammal; three bird species, four reptile species, one amphibian species, six fish species and one invertebrate species (Table 4 and Table 5 below). The Endangered Purple Marsh Crab (*Afrithelphusa monodosus*), Endangered puddle frog (*Phrynobatrachus pinto*), Critically Endangered Half-toed Gecko (*Hemidactylus kundaensis*), Endangered amphisbaenian (*Cynisca cf oligopholis*) and Endangered Njala Panchax (*Epiplatys njalaensis*) qualify the DMU as Tier 1 Critical Habitat (IFC 2012b). Further information on these species is given in [Section 4.4](#).

4.2 Criterion 2: Endemic and/or restricted-range species – qualified

Eleven species qualify the DMU for Critical Habitat under criterion 2: three reptile species, one amphibian species, four fish species, one invertebrate species and two plant species (Table 4 and Table 5 below). Of these, six species qualify for Critical Habitat under both criteria 1 and 2. The Endangered puddle frog *Phrynobatrachus pintoii* and Endangered amphisbaenian (*Cynisca cf. oligopholis*) qualify the DMU as Tier 1 Critical Habitat (IFC 2012b). Further information on these species is given in [Section 4.4](#).

4.3 Criterion 3: Globally significant concentrations of migratory species and/or congregatory species – qualified

One species qualifies the DMU for Critical Habitat under Criterion 3: one bird species, the Sanderling (*Calidris alba*) qualifies the DMU as Tier 2 Critical Habitat (Table 5).

Table 4: Priority biodiversity for the CBG project – Critical Habitat qualifying species confirmed present in the terrestrial DMU and qualifying criteria.

Group	Scientific name	English name	IUCN status ⁶	Restricted range?	IFC PS6 Tier 1 or 2	Critical Habitat criteria
Mammal	<i>Pan troglodytes</i>	Chimpanzee	EN		2	1 (IFC GN6) ⁷
Mammal	<i>Pan troglodytes verus</i>	West African Chimpanzee (subspecies)	EN		2	1 (IFC GN6) ⁸
Mammal	<i>Procolobus badius</i>	West African Red Colobus	EN		2	1e
Mammal	<i>Procolobus badius temminckii</i>	West African Red Colobus (subspecies)	EN		2	1e
Invertebrate	<i>Afrithelphusa monodosa</i>	Purple Marsh Crab	EN	Yes	1	1a,1b,2b
Amphibian	<i>Phrynobatrachus pintoii</i>	Pinto's Puddle Frog	EN	Yes	1	1a,1b,2a
Reptile	<i>Hemidactylus kundaensis</i>	Kunda Half-toed Gecko	CR	Yes	1	1a,1b,2b
Reptile	<i>Cynisca cf oligopholis</i>	Amphisbaenian sp.	EN	Yes	1	1a,1b,2a
Reptile	<i>Cynisca leonina</i>	Los Archipelago Worm Lizard	VU	Yes	2	2b
Bird	<i>Necrosyrtes monachus</i>	Hooded Vulture	EN (CR)		2	1c
Bird	<i>Gyps africanus</i>	White-backed Vulture	EN (CR)		2	1c
Bird	<i>Gyps rueppellii</i>	Rueppell's Griffon Vulture	EN (CR)		2	1c
Fish	<i>Epiplatys njalaensis</i>	Njala Panchax	EN	Yes	1	1b,2b
Fish	<i>Nimbapanchax jeanpoli</i>	Jeanpol's Killi	EN	Yes	2	1c,2b
Fish	<i>Epiplatys hildegardae</i>	Hildegard's Panchax	VU	Yes	2	2b
Fish	<i>Malapterurus teugelsi</i>	Teugels's Electric Catfish	NT	Yes	2	2b
Plant	<i>Fleurydora felicis</i>		VU	Yes	2	2b
Plant	<i>Ledermanniella abbayesii</i>		DD	Yes	2	2b

⁶ CR = Critically Endangered, EN = Endangered, NT = Near Threatened, VU = Vulnerable, LC = Least Concern, DD = Data Deficient, NE = Not Evaluated

^{7,7} Under IFC 2012b footnote GN20: "For example, special consideration should be given to great apes (i.e., family Hominidae) given their anthropological and evolutionary significance in addition to ethical considerations." See [Section 4.4](#) for further discussion.

Table 5: Priority biodiversity for the CBG project – Critical Habitat qualifying species confirmed present in the marine DMU and qualifying criteria.

Group	Scientific name	English name	IUCN status	Restricted range?	IFC PS6 Tier 1 or 2	Critical Habitat criteria
Mammal	<i>Sousa teuszii</i>	Atlantic Humpback Dolphin	VU (EN) ⁹		2	1d,1e
Reptile	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	CR		2	1c,1d
Reptile	<i>Chelonia mydas</i>	Green Turtle	EN		2	1d
Fish	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN		2	1d
Fish	<i>Glaucostegus cemiculus</i> syn. <i>Rhinobatos cemiculus</i>	Blackchin Guitarfish	EN		2	1d
Fish	<i>Dasyatis margarita</i>	Daisy Stingray	EN		2	1d
Fish	<i>Epinephelus marginatus</i> syn. <i>E. guaza</i>	Dusky Grouper	EN		2	1d
Bird	<i>Calidris alba</i>	Sanderling	LC		2	3b

4.4 Species accounts for PS6 criteria 1-3

4.4.1 Terrestrial species

<p>Species: Chimpanzee (<i>Pan troglodytes</i>)</p> <p>Subspecies: West African Chimpanzee (<i>Pan troglodytes verus</i>)</p> <p>Type: Mammal</p> <p>Species status (IUCN): Endangered</p> <p>Subspecies status (IUCN): Endangered</p> <p>Presence in DMU: Confirmed</p> <p>Species Critical Habitat status:</p> <ul style="list-style-type: none"> • Criterion 1: Yes (Tier 2) • Criterion 2: No • Criterion 3: No <p>Subspecies Critical Habitat status:</p> <ul style="list-style-type: none"> ○ Criterion 1: Yes (Tier 2) ○ Criterion 2: No ○ Criterion 3: No <p>Justification: The presence of Chimpanzee precautionarily qualifies the DMU for Tier 2 Critical Habitat under Criterion 1. Although only 0.28% of the global range of this species falls within the DMU, IFC guidance</p>	 <p><i>Pan troglodytes verus</i></p> <p>Terrestrial DMU</p> <p>Subspecies range</p> <p>1:21,137,591 IUCN 2015</p>
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⁹ Likely to be uplisted to Endangered or even Critically Endangered this year (T. Collins in litt. 2015) and therefore precautionarily considered as Endangered in this report.

(footnote GN20 of IFC 2012b) provides for special attention to such species: “For example, special consideration should be given to great apes (i.e., family Hominidae) given their anthropological and evolutionary significance in addition to ethical considerations”. Chimpanzees are therefore precautionarily considered to qualify this DMU for Critical Habitat status.

The West African Chimpanzee subspecies *Pan troglodytes verus* is Endangered and is precautionarily considered to qualify the DMU as Critical Habitat under Criterion 1 as for the species above. West African Chimpanzee is also close to qualifying under Criterion 1 as the DMU covers >8% of the national range; given the uncertainty over the size of the Chimpanzee population present in the DMU and of the national population it is possible that a more detailed assessment would find that the area does qualify under this criterion.

The DMU is in proximity to (and may lie within) the Guinea-Guinea Bissau Border Area Important Priority Area for Chimpanzees according to the regional action plan (Kormos & Boesch 2003) but is separated from the Fouta Djallon Exceptional Priority Area by many hundreds of kilometres (C. Boesch in litt. 2015) and so the Project DMU is provisionally considered Tier 2 Critical Habitat¹⁰. However, the regional action plan is currently being revised and the boundaries and status of priority areas for West African Chimpanzees are likely to change. Data collected from within the Boké prefecture indicates that the area contains regionally important populations of West African Chimpanzee’s (WCF 2015). We strongly recommend that this evaluation should be reviewed by expert stakeholders. A re-evaluation of regional priority areas for West African Chimpanzee under the regional action plan is scheduled for 2016 so this assessment could be revisited in the light of that update. It is possible that based on these further data, the Project DMU would qualify as Tier 1 Critical Habitat status for West African Chimpanzee.

Summary of state of knowledge from the DMU

Most of the chimpanzee nest groups were found around Boulléré (EEM 2014, WCF 2015). Chimpanzees are known to use a mosaic of different habitats for foraging, from gallery forest and along the forest edge between fallow and woody and bushy savannah and bowal habitat (V. Vergnes, pers. comm. Sept. 2015). Although nesting happens mainly in the gallery forests, fallow and woody savannah habitats are used for nesting as well, particularly when favoured tree species have been logged (Pruetz & Bertolani 2009, WCF 2015). Chimpanzees were heard on three out of five days of surveying in 2005, but during the ESIA study only one direct observation of a group of about six individuals was made (EEM 2014). Although the number of chimpanzees within the mining zones in the east of the Sangarédi subprefecture is probably not high, chimpanzees are known to be present in the western part of the CBG mine concession around Boulléré and are estimated to be between 18-30 individuals (WCF 2015). Indications are that this population is currently stable, albeit vulnerable to disturbance and further habitat fragmentation (WCF 2015). Old traditional beliefs of refraining from eating and killing certain animal species in Sangarédi and Kamsar subprefectures offers limited and marginal protection for the primate species. Such protection is further threatened by the influx of (non-Muslim) migrants into the area who do not hold such beliefs and hunt chimpanzees for bushmeat (V. Vergnes, pers. comm. Sept. 2015).

¹⁰ A precedent for using regional action plans to determine Tier 1 or Tier 2 status for great apes can be found in TBC (2014).

Species: West African Red Colobus (*Procolobus badius*)

Subspecies: West African Red Colobus (*Procolobus badius temminckii*)

Type: Mammal

Species status (IUCN): Endangered

Subspecies status (IUCN): Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Subspecies Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No



Procolobus badius temminckii

Terrestrial DMU
 Subspecies range

1:6,985,380

IUCN 2015

Justification: The West African Red Colobus (*Procolobus badius temminckii*) is currently listed as Endangered on the IUCN Red List (IUCN 2015). The species qualifies the area as Tier 2 Critical Habitat under Criterion 1 as the DMU contains >20% of its national range. Likewise, the subspecies also qualifies the DMU as Tier 2 Critical Habitat under Criterion 1. It is estimated that >20% of the subspecies' national range is within the DMU.

Summary of state of knowledge from the DMU

The Endangered West African Red Colobus (*Procolobus badius temminckii*) was encountered along the Kogon river about 10 kilometres from the expansion area to the north (Baarman *et al.* 2014). Surveys undertaken in the adjacent GAC concession also confirmed the presence of *Procolobus badius temminckii* although these are based on a mating call and a camera trap image and can therefore not confirm the subspecies as being *P.b. temminckii* with 100% certainty (WCF, unpublished data). This study did not find this species in Boulléré even though it was recorded in 2005 (Eriksson & Kpoghomou, 2006). Local people claimed it still occurred in gallery forest near Boulléré (Wright *et al.*, 2006). Although its main habitat consist of dense forests, groups have been observed in more open habitats like wooded savannah and mangrove swamps where their native habitat has been lost (Galat-Luong & Galat 2005).

Species: *Afrithelphusa monodosa*

Type: Invertebrate (freshwater)

Species status (IUCN): Endangered

Presence in DMU: Confirmed

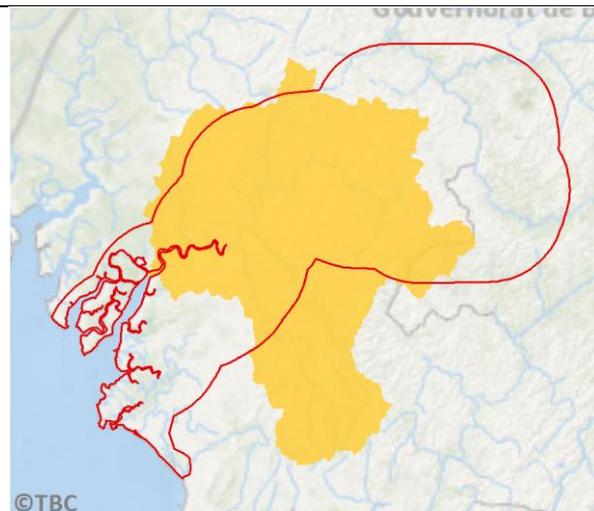
Species Critical Habitat status:

- Criterion 1: Yes (Tier 1)
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: The Purple Marsh Crab *Afrithelphusa monodosa* qualifies the DMU as Tier 1 Critical Habitat under Criterion 1 as it is Endangered and 69% of its global range is found within the DMU which includes the only known population. Additionally, it qualifies the DMU as Tier 2 Critical Habitat under Criterion 2 as its known range is restricted to Boké region and 69% of its global range is in the DMU. The global population is likely to be fewer than 2,500 individuals.

Summary of state of knowledge from the DMU

A small number of individuals were found during surveys in 2006 in freshwater near Sarabaya south-west of Boké (EEM 2014). These are the first observations since it was described in 1947. The original vegetation cover found at the collection locality was agricultural land in southern Guinea savannah which was presumably originally a freshwater marsh (IUCN 2015); habitat requirements are unclear.



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Afrithelphusa monodosa
▭ Terrestrial DMU
▭ Species range

1:2,022,960

IUCN 2014

Species: *Phrynobatrachus pintoii*

Type: Amphibian (frog)

Species status (IUCN): Endangered

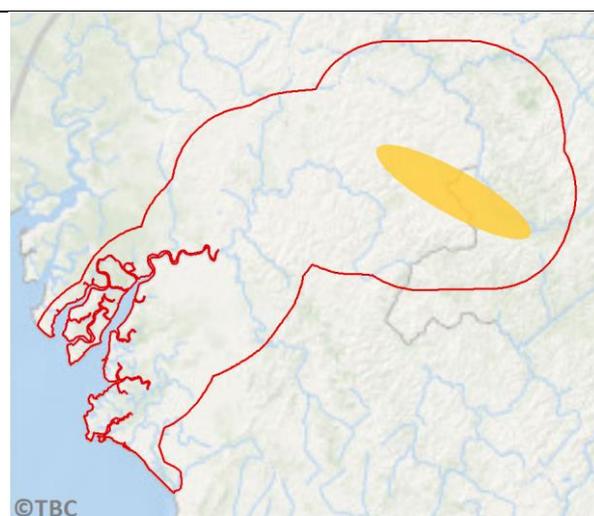
Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 1)
- Criterion 2: Yes (Tier 1)
- Criterion 3: No

Justification: The puddle frog *Phrynobatrachus pintoii* qualifies the DMU as Tier 1 Critical Habitat under Criterion 1 as it is Endangered and all of its range is within the DMU (IUCN 2015). It also qualifies as Tier 1 under Criterion 2 as it is restricted range and is thought to be found only in the Sangarédi subprefecture (IUCN 2015).

Summary of state of knowledge from the DMU



©TBC

Phrynobatrachus pintoii
▭ Terrestrial DMU
▭ Species range

1:1,947,892

IUCN 2015

Eight individuals of this species were found in Kouarewel and N'Dounssy in gallery forest during the ESIA studies (EEM 2014).

Species: *Hemidactylus kundaensis*¹¹

Type: Reptile

Species status (IUCN): Critically Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 1)
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: The gecko *Hemidactylus kundaensis* qualifies the DMU as Tier 1 Critical Habitat under Criterion 1 as it is Critically Endangered and 62% of its global range is found within the DMU with fewer than 10 sites globally (IUCN 2015). Additionally, it also qualifies the DMU as Tier 2 under Criterion 2 as it is a restricted range species with 62% of its global range restricted to Sangarédi subprefecture (IUCN 2015) and 99% of its national range is in the DMU (IUCN 2015).

Summary of state of knowledge from the DMU

This species was found in Kourawel in 2013 in dry forest on slopes or plateaux and may be tolerant of some habitat degradation (EEM 2014); habitat preference and distribution are unclear.

Species: *Cynisca cf oligopholis*

Type: Reptile

Species status (IUCN): Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 1)
- Criterion 2: Yes (Tier 1)
- Criterion 3: No

Justification: The amphisbaenian *Cynisca cf oligopholis* qualifies the DMU as Tier 1 Critical Habitat under Criterion 1 as it is Endangered (IUCN 2015) and all of its known population is found in the DMU and restricted to the Sangarédi subprefecture (EEM 2014, IUCN 2015). Additionally, it also qualifies the DMU as Tier 1 under Criterion 2 as its whole range is restricted to the Sangarédi subprefecture (EEM 2014). It is most closely related to *Cynisca oligopholis* which is restricted to one locality in Guinea-Bissau (IUCN 2015). Note that a range map is not available for *Cynisca cf oligopholis*.

Summary of state of knowledge from the DMU

¹¹ The IUCN range map for this species appears to be inaccurate and so is not included.

In 2012 29 individuals were found near Kogon Lenguéré and in 2013 near Kalinka Roundé. It is found in gallery forest (EEM 2014).

Species: *Cynisca leonina*

Type: Reptile

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

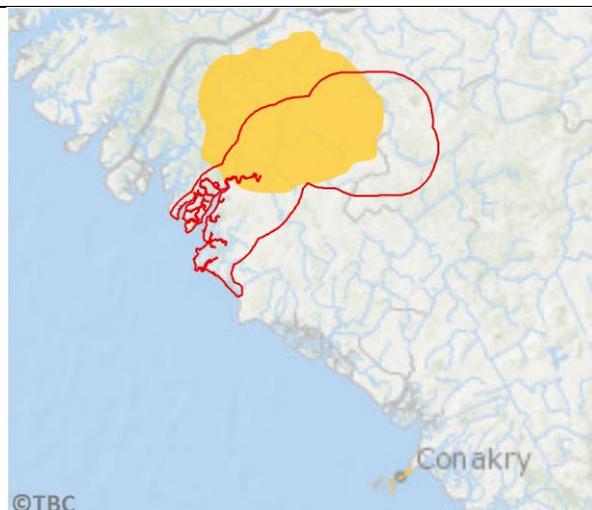
Species Critical Habitat status:

- Criterion 1: No
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: The amphisbaenian *Cynisca leonina* qualifies the DMU as Tier 2 Critical Habitat under Criterion 2 as it is restricted range and 58% of its range is found within the DMU.

Summary of state of knowledge from the DMU

Recorded in dry gallery forest in 2012 to the north-west of Sangarédi (Chirio 2012).



Cynisca leonina
 Terrestrial DMU
 Species range

1:3,900,401
IUCN 2014

Species: Hooded Vulture (*Necrosyrtes monachus*)

Type: Bird

Species status (IUCN): Endangered (about to be uplisted to Critically Endangered)

Presence in DMU: Confirmed

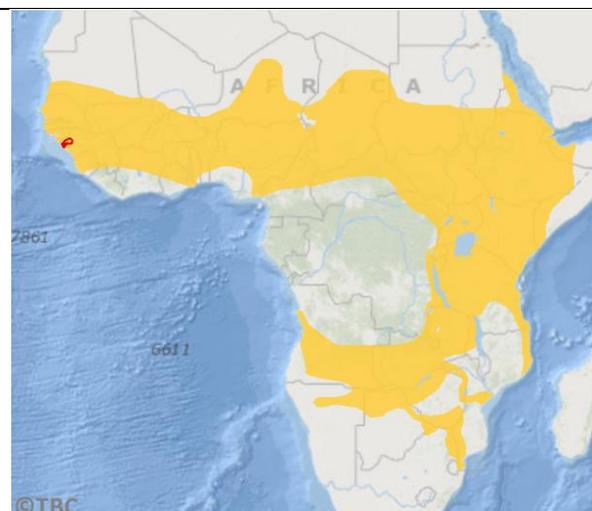
Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: Hooded Vulture precautionarily qualifies the DMU as Tier 2 Critical Habitat under Criterion 1 as this species will be uplisted to Critically Endangered in 2015¹².

Summary of state of knowledge from the DMU

During the ESIA survey, over 30 individuals could be seen in Sangarédi town each day and almost all villages seemed to have a pair of these birds near the mine



Necrosyrtes monachus
 Terrestrial DMU
 Species range

1:100,109,598
IUCN 2015

¹² The uplisting is scheduled for November 2015, see <http://www.birdlife.org/globally-threatened-bird-forums/2015/07/proposed-status-changes-for-six-species-of-african-vulture/>

(EEM 2014). It was observed at four locations near Kamsar (EEM 2014). Overall, it was less commonly seen away from human habitation.

Species: White-backed Vulture (*Gyps africanus*)

Type: Bird

Species status (IUCN): Endangered (about to be uplisted to Critically Endangered)

Presence in DMU: Confirmed

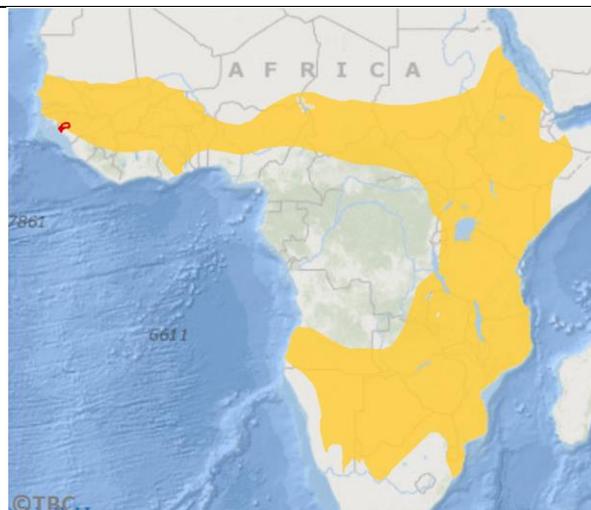
Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: White-backed Vulture precautionarily qualifies the DMU as Tier 2 under Criterion 1 as this species will be uplisted to Critically Endangered in 2015¹³.

Summary of state of knowledge from the DMU

Twenty-six individuals were seen in a flock with Hooded and Rueppell's Griffon Vultures *Gyps rueppellii* near a village within the licence area at Sangarédi (EEM 2014). This species was also observed at Taigbé in the Kamsar study area (EEM 2014). A local herder indicated that people lived alongside vultures without conflict. However, there is increasing demand for vulture parts for so-called 'traditional' medicine in West Africa and this could cause a rapid decline of small populations of vultures.



Gyps africanus

- Terrestrial DMU
- Species range

1:99,462,845
IUCN 2015

¹³ The uplisting is scheduled for November 2015, see <http://www.birdlife.org/globally-threatened-bird-forums/2015/07/proposed-status-changes-for-six-species-of-african-vulture/>

Species: Rueppell's Griffon Vulture (*Gyps rueppellii*)

Type: Bird

Species status (IUCN): Endangered (about to be uplisted to Critically Endangered)

Presence in DMU: Confirmed

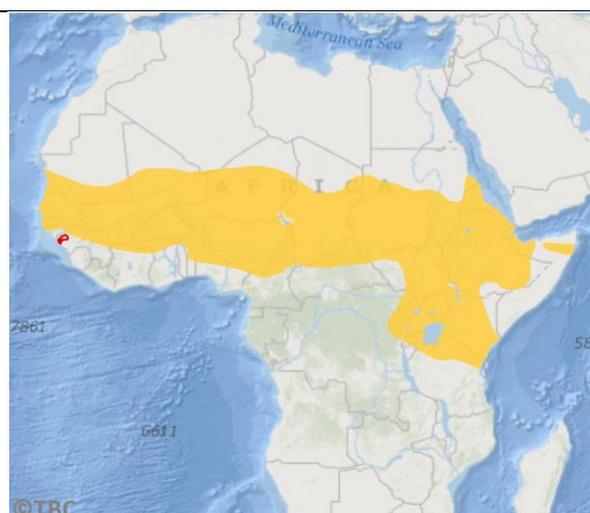
Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: Rueppell's Vulture precautionarily qualifies the DMU as Tier 2 under Criterion 1 as this species will be uplisted to Critically Endangered in 2015¹⁴.

Summary of state of knowledge from the DMU

Three individuals were seen in the same flock as the White-backed Vultures close to a village. Previously it was not known from this part of Guinea (EEM 2014, IUCN 2015).



Gyps rueppellii

- Terrestrial DMU
- Species range

1:107,739,124

IUCN 2015

Species: *Fleurydora felicis*

Type: Plant

Species status (IUCN): Data Deficient

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: No
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: The plant *Fleurydora felicis* qualifies the DMU as Tier 2 Critical Habitat as it is restricted range and endemic to Guinea, being known from only four locations in the country (T. Stévant, Missouri Botanical Garden, in litt. 2015). It may additionally be uplisted to Endangered on the IUCN Red List as its distribution and population is so limited (T. Stévant, Missouri Botanical Garden, in litt. 2015). If so, then it would qualify the DMU as Tier 1 Critical Habitat as there are only four locations known in its range.

Summary of state of knowledge from the DMU

This species was identified in the DMU in 2012; it is found in gallery forests and river banks ([Appendix 5](#))

¹⁴ The uplisting is scheduled for November 2015, see <http://www.birdlife.org/globally-threatened-bird-forums/2015/07/proposed-status-changes-for-six-species-of-african-vulture/>

Species: *Ledermanniella abbayesii*

Type: Plant

Species status (IUCN): Data Deficient

Presence in DMU: Confirmed

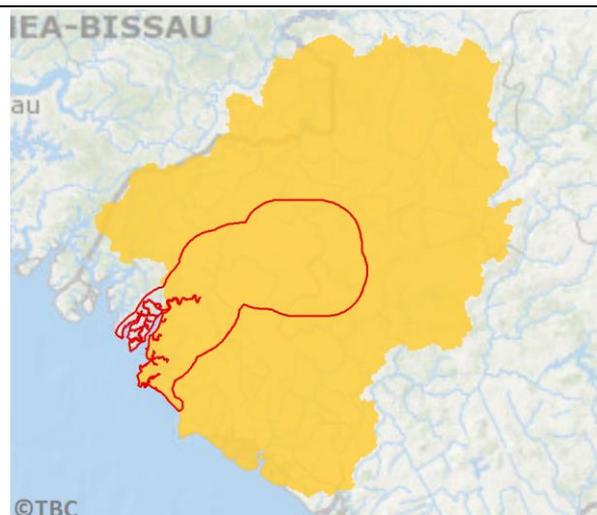
Species Critical Habitat status:

- Criterion 1: No
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: The plant *Ledermanniella abbayesii* qualifies the DMU as Tier 2 Critical Habitat as it is restricted range, being known from only two locations globally (T. Stévant, Missouri Botanical Garden, in litt. 2015). It may additionally be uplisted to Endangered on the IUCN Red List as its distribution and population is so limited (T. Stévant, Missouri Botanical Garden, in litt. 2015). If so, then it would qualify the DMU as Tier 1 Critical Habitat as there are only two locations known in its range. 19.1% of its range is found within the DMU (IUCN 2015).

Summary of state of knowledge from the DMU

Found in rocky rivers and streams in forest. Specimens have been collected from the DMU ([Appendix 5](#)).



Ledermanniella abbayesii

□ Terrestrial DMU
■ Species range

1:4,180,952

IUCN 2015

4.4.2 Freshwater species

Species: *Epiplatys njalaensis*

Type: Fish (freshwater)

Species status (IUCN): Endangered

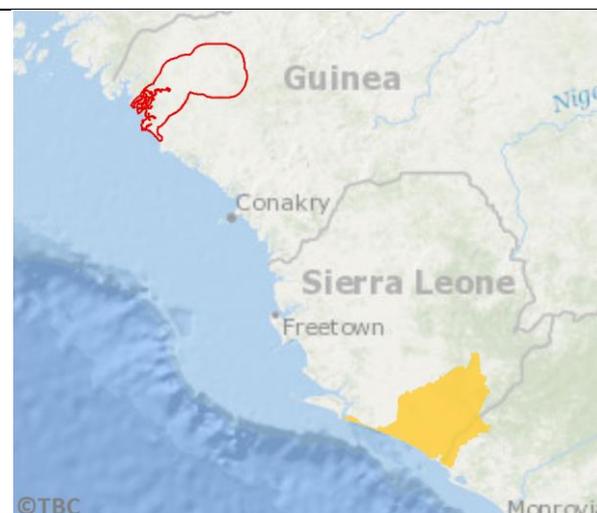
Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 1)
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: The fish *Epiplatys njalaensis* qualifies the DMU as Tier 1 Critical Habitat under Criterion 1 as it is Endangered and exists in fewer than 10 discrete management units. Until this study was known only from Sierra Leone (IUCN 2015). It also qualifies the DMU as Tier 2 Critical Habitat under Criterion 2 as it is also restricted range and this is a range extension which includes >1% of its habitat inside the DMU (EEM 2014).

Summary of state of knowledge from the DMU



Epiplatys njalaensis

□ Terrestrial DMU
■ Species range

1:9,018,568

IUCN 2015

It is present in small rivers under forest cover. In the study area, it was captured in both the watersheds (Kogon 3 sites and Tinguilinta 1 site) (EEM 2014). On the Kougnoubhè, a tributary of the Thiapikouré in the Kogon watershed, 80 individuals were captured (EEM 2014).

Species: *Nimbapanchax jeanpoli*

Type: Fish (freshwater)

Species status (IUCN): Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: The fish *Nimbapanchax jeanpoli* qualifies the DMU as Tier 2 Critical Habitat under Criterion 1c as it is Endangered and has fewer than 10 discrete management sites globally. It also qualifies as Tier 2 under Criterion 2 as it has a globally restricted range of less than 10,000 km² of which >1% is in the DMU (EEM 2014, IUCN 2015). Until this study, it was known only from an area bordering Guinea, Sierra Leone and Liberia (IUCN 2015).

Summary of state of knowledge from the DMU

This species is found in small streams in the study area (EEM 2014). It is non-migratory. It was one of the more abundant freshwater fish species found during the ESIA studies.



Nimbapanchax jeanpoli

- Terrestrial DMU
- Species range

1:8,735,632
IUCN 2015

Species: *Epiplatys hildegardae*

Type: Fish (freshwater)

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: No
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: *Epiplatys hildegardae* qualifies the DMU as Tier 2 Critical Habitat under Criterion 2 as it has a globally restricted range of 16,500 km² with fewer than five known locations, and the range extension in the DMU contains >4% of the global population (EEM 2014, IUCN 2015). It is endemic to Guinea and until this study was known only from the region of N'Zérékoré in Guinée Forestière.

Summary of state of knowledge from the DMU

Epiplatys hildegardae was found in the two watersheds: Kogon, six sites and Tinguilinta, three sites (EEM 2014), a range extension for the species. It occurs in quiet parts of small watercourses.



Epiplatys hildegardae

- Terrestrial DMU
- Species range

1:13,000,000
IUCN 2015

Species: *Malapterurus teugelsi*

Type: Fish (freshwater)

Species status (IUCN): Near-threatened

Presence in DMU: Confirmed

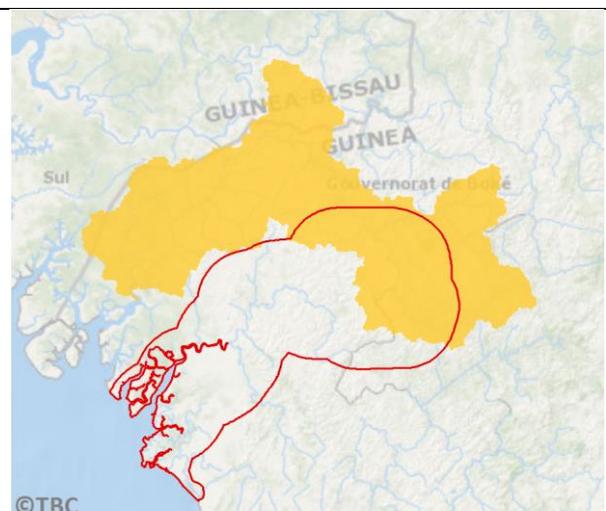
Species Critical Habitat status:

- Criterion 1: No
- Criterion 2: Yes (Tier 2)
- Criterion 3: No

Justification: *Malapterurus teugelsi* qualifies the DMU as Tier 2 Critical Habitat under Criterion 2 as it has a restricted range and the DMU overlaps with 25% of its global range (IUCN 2015). The DMU contains a nationally important component (28%) of the species' range (EEM 2014). It is endemic to Guinea and known only from the Kogon River watershed (IUCN 2015).

Summary of state of knowledge from the DMU

A single individual was captured in the Kogon watershed during the ESIA study (EEM 2014).



Malapterurus teugelsi

- Terrestrial DMU
- Species range

1:3,000,000
IUCN 2015

4.4.3 Marine species¹⁵

Species: Atlantic Humpback Dolphin (*Sousa teuszii*)

Type: Mammal

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: The Atlantic Humpback Dolphin (*Sousa teuszii*) precautionarily qualifies the DMU as Tier 2 Critical Habitat under Criterion 1 as its IUCN Red List status is likely to be uplisted to Endangered or Critically Endangered soon (T. Collins in litt. 2015) and as the DMU forms part of a globally significant habitat for this species' population. As a high profile marine mammal species it is clearly a Project priority and potential

Project impacts to this species should be given careful consideration. At least 47 individuals were recorded in the Study Area from a population which may lie in the tens or low hundreds (EEM 2014, Weir 2015, T. Collins in litt. 2015). It is a highly threatened species whose range is restricted to the western coast of Africa, ranging from Western Sahara to Angola. Injuries from fishing nets were observed during the study (Weir 2015) and therefore an increase in fishing intensity is likely to have an impact on the population in the DMU.

Summary of state of knowledge from the DMU

A minimum of 47 individuals were recorded in the ESIA study area in the coastal waters around Kamsar. However, the population is likely to be greater as the individual discovery curve has not reached its asymptote (EEM 2014, Weir 2015).



Sousa teuszii

□ Terrestrial DMU
■ Species range

1:74,518,513
IUCN 2015

Species: Hawksbill Turtle (*Eretmochelys imbricata*)

Type: Reptile

Species status (IUCN): Critically Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: The Hawksbill Turtle *Eretmochelys imbricata* qualifies the DMU as Tier 2 Critical Habitat under Criterion 1 as it is Critically Endangered and the DMU is likely to support the regular occurrence of this species

¹⁵ Note that range maps were not included for wide ranging marine species.

(IUCN 2015). The Hawksbill Turtle is threatened globally by unsustainable use (of eggs and turtles), loss of nesting beaches to development, pollution and accidental bycatch (IUCN 2015).

Summary of state of knowledge from the DMU

One individual was observed off the south-west tip of Binari Island within the Study Area (EEM 2014). Nesting sites are suspected to be present in the study area (EEM 2014) but have not yet been confirmed.

Species: Green Turtle (*Chelonia mydas*)

Type: Reptile

Species status (IUCN): Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: The Green Turtle *Chelonia mydas* qualifies the DMU as Tier 2 Critical Habitat under Criterion 1 as it is Endangered and wide-ranging and whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species (IUCN 2015). The Green Turtle is threatened globally from direct persecution (for example egg collection), loss of nesting beaches to development, pollution and accidental bycatch in fisheries (IUCN 2015).

Summary of state of knowledge from the DMU

One carapace was found in a fishing camp in the north-west of Binari Island (EEM 2014) while not certain, the likelihood is that it was captured within the DMU as it was captured by artisanal fishers who do not travel long distances. This species also feeds in shallow waters such as those found in the DMU.

Species: Scalloped Hammerhead (*Sphyrna lewini*)

Type: Fish (marine)

Species status (IUCN): Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: The Scalloped Hammerhead *Sphyrna lewini* qualifies the DMU as Tier 2 Critical Habitat under Criterion 1 as it is Endangered and wide-ranging and whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species (IUCN 2015). Although it is wide ranging, there is genetic evidence for multiple subpopulations (IUCN 2015). All life-stages are vulnerable to capture as both target and bycatch in fisheries: large numbers of juveniles are captured in a variety of fishing gears in near shore coastal waters, and adults are taken in gillnets and longlines along the shelf and offshore in oceanic waters. Population segregation and the species' aggregating habit make large

schools highly vulnerable to fisheries and means that high CPUEs can be recorded, even when stocks are severely depleted (IUCN 2015). Hammerhead shark fins are more highly valued than other species because of their high fin ray count, leading to increased targeting of this species in some areas.

Summary of state of knowledge from the DMU

One individual was observed in the fish market at Port Nene near Kamsar but it is not known where it was captured. However, the likelihood is that it was captured within the DMU as it was captured by artisanal fishers who do not travel long distances (EEM 2014).

Species: Blackchin Guitarfish (*Glaucostegus cemiculus* syn. *Rhinobatos cemiculus*)

Type: Fish (marine)

Species status (IUCN): Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: The Blackchin Guitarfish *Glaucostegus cemiculus* syn. *Rhinobatos cemiculus* qualifies the DMU as Tier 2 Critical Habitat under Criterion 1 as it is Endangered and wide-ranging and whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species (IUCN 2015). It is targeted throughout its range in West Africa. The high price that fins can fetch (100 to 150 Euro/kg) presents a lucrative incentive for fishermen and as a result targeted artisanal fisheries have developed in the region to supply the Asian shark fin trade. Pregnant females and reproductively active males move inshore for parturition, as mating immediately follows birth. Gravid females are targeted specifically for their large fins, this alongside the aggregation of spawning individuals around the coast render this species susceptible to fishing exploitation. This species is large and has a low level of fecundity, it is likely to have a relatively unproductive and vulnerable life history.

Summary of state of knowledge from the DMU

Eight individuals were caught by tracked artisanal fishing boats in coastal waters in the DMU (EEM 2014).

Species: Daisy Stingray (*Dasyatis margarita*)

Type: Fish (marine)

Species status (IUCN): Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: The Daisy Stingray *Dasyatis margarita* qualifies the DMU as Tier 2 Critical Habitat under Criterion 1 as it is Endangered and wide-ranging and whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species (IUCN 2015).

One individual was observed in the fish market at Yongosal near Kamsar but it is not known where it was captured. However, the likelihood is that it was captured within the DMU as it was captured by artisanal fishers who do not travel long distances (EEM 2014).

Species: Dusky Grouper (*Epinephelus marginatus* syn. *E. guaza*)

Type: Fish (marine)

Species status (IUCN): Endangered

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: Yes (Tier 2)
- Criterion 2: No
- Criterion 3: No

Justification: The Dusky Grouper *Epinephelus marginatus* syn. *E. guaza* qualifies the DMU as Tier 2 Critical Habitat Criteria 1 as it is Endangered and wide-ranging and whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species (IUCN 2015). It is widely targeted across its global range as adults for food, and is extremely slow to reach sexual maturity. It also forms spawning aggregations which are particularly vulnerable to overfishing, and as such, shows low resilience to fishing.

Summary of state of knowledge from the DMU

Two individuals were caught in boats tracked by GPS inside the Study Area so there is some knowledge of its habitat preference in coastal waters (EEM 2014).

Species: Sanderling (*Calidris alba*)

Type: Bird

Species status (IUCN): Least Concern

Presence in DMU: Confirmed

Species Critical Habitat status:

- Criterion 1: No
- Criterion 2: No
- Criterion 3: Yes (Tier 2)

Justification: The Sanderling *Calidris alba* qualifies the DMU as Tier 2 Critical Habitat Criterion 3 because it is a congregatory species and the DMU supports at least 1.35% of the biogeographical population (BirdLife International 2015).

Summary of state of knowledge from the DMU

Counts during the 2013 surveys in the Study Area found 1,630 individuals (compared to the 1% biogeographic population of 1,200) (EEM 2014). It prefers estuarine habitat including sandy shores.

4.5 Additional species of concern

A number of species are not Critical Habitat qualifying biodiversity at this time. However, they have a relatively high profile and are of stakeholder concern. Potential impacts to these species should therefore be assessed and mitigated. Here, we present data on Critically Endangered and Endangered species (mostly marine fish) which are believed to occur in the DMU but which are not yet confirmed (Table 6). These species would qualify the DMU as Critical Habitat if they were found to be present. We also present information on Vulnerable and Near Threatened species which are present in the DMU but are not CH-qualifying, although they are likely to be uplisted in the future and are of high stakeholder concern (Table 7). [Appendix 3](#) provides detailed species accounts for species that would qualify the DMU as Critical Habitat if found to be present. [Appendix 4](#) provides detailed species accounts for priority species of stakeholder concern.

Table 6: Critically Endangered and Endangered species whose range maps overlap the DMU and that would qualify the DMU as Critical Habitat if found to be present.

Biodiversity features	Species/subpopulation	IUCN status
1 Reptile	Slender-snouted Crocodile	CR
11 Fish	Smalltooth Sawfish	CR
	Large-tooth Sawfish	CR
	Smalltooth Sawfish (subpop)	CR
	Large-tooth Sawfish (subpop)	CR
	Sawback Angelshark	CR
	Smoothback Angel Shark	CR
	Atlantic Goliath Grouper	CR
	Great Hammerhead	EN
	Common Guitarfish	EN
	African Wedgefish	EN
	White Skate	EN

Table 7: Priority species likely to be of high stakeholder concern for the CBG project.

Biodiversity features	Species	IUCN status	Restricted range?
Terrestrial DMU			
6 Mammals:	Hippopotamus	VU	
	African Golden Cat	VU	
	African Clawless Otter	NT	
	Sooty Mangabey	VU	

	Western Black-and-white Colobus	VU	
	Guinea Baboon	NT	
1 Bird:	Beudoin's Snake Eagle	VU	
1 Reptile:	West African Dwarf Crocodile	VU ¹⁶	
1 Fish:	<i>Synodontis kogonensis</i>	DD	Yes
1 Plant:	<i>Pseudoprosopis bampsiana</i>	NE	
Marine DMU			
1 Mammals:	West African Manatee	VU	
2 Reptiles:	Olive Ridley Turtle	VU	
	Nile Softshell Turtle	NE	

4.6 Criterion 4: Highly threatened and/or unique ecosystems – qualified

Mangroves qualify as unique and highly threatened, and thus qualify as Critical Habitat under Criterion 4.

The DMU supports >10% of Guinea's mangroves. These highly diverse and complex habitats are used for foraging, resting, nursery and refuge areas by invertebrates, juvenile fish, a wide variety of migratory and endemic birds and some larger animals such as the West African manatee (*Trichechus senegalensis*). Mangroves not only help to sustain Guinea's fisheries but are a major source of nutrients to coastal habitats. Mangroves also provide critical spawning and nursery areas for a variety of coastal and offshore species as well as helping to stabilise bottom sediments and protect shorelines from erosion. Guinea's mangrove population comprises a quarter of West Africa's total mangrove wetland, giving it the third highest coverage of mangrove in the region, after Nigeria and Guinea-Bissau (Corcoran *et al.* 2007). This represents an estimated seven per cent of the total mangrove cover in Africa. Mangroves are therefore an important regional resource. The most serious threats to mangroves are uncontrolled exploitation as a result of rapid human population growth. Other activities that threaten mangroves in the area are harvesting of trees for firewood, charcoal and building materials, shrimp farming and exploitation of crabs and oysters.

Two other habitats in the area were considered under criterion 4. West African bowal habitat is a sub-type of open grassland in rocky lateritic areas, characterised by a particular composition of plants, some of which are rare and have restricted ranges. Bowal is locally common in parts of Guinea, but it is thought to have a limited global distribution and be threatened by habitat loss. This habitat type has not, however, yet been mapped on a global scale. A recent Critical Habitat Assessment for the Simandou Project in Guinea (TBC 2014) consulted expert opinion and the consensus was reached that this habitat does not qualify as Critical Habitat under criterion 4.

Gallery forest, occurring in "ribbons" along watercourses, was defined as a broad vegetation type by Kew in the baseline study. Although it contains some rare species and has clearly been reduced in extent, including through habitat clearance for agriculture, this broad vegetation type is widespread in Guinea and there is

¹⁶ This species is undergoing taxonomic revision (Eaton *et al.* 2009). The West African form present in Guinea is likely to be re-evaluated as Endangered or Critically Endangered (Environnement Illimité 2013).

insufficient evidence for it to be considered distinct from wider forest and woodland vegetation types present in the area. It is therefore not considered to qualify for Critical Habitat under criterion 4 on its own merits. A finer-grained habitat classification and assessment of loss rates could change this evaluation. Although gallery forest is not currently considered to qualify as Critical Habitat on its own under criterion 4, this habitat is considered to be of high conservation value for the local area as it has a limited extent, and is of significant importance to a number of priority species of fauna such as Chimpanzee and West African Red Colobus.

There is the potential for cumulative impacts to affect all these habitats to a much greater extent than Project direct and indirect impacts alone. This should be assessed carefully given the importance of these habitats for a large number of Critical Habitat qualifying species.

4.7 Criterion 5: Areas associated with key evolutionary processes – not qualified

Criterion 5 does not qualify the DMU as Critical Habitat. In Africa, areas of relative climatic stability may have played an important role as biodiversity refuges during past periods of climate change, e.g. during the Pleistocene ice ages. Such “refuge” areas are generally characterized by a comparatively larger number of locally endemic species. For example, mountain tops (e.g. sub-montane grassland and forest) and inselbergs. They may be important for ensuring maintenance of evolutionary processes and hence of biodiversity.

In West Africa, the presence of evolutionarily important forest refuges has primarily been postulated in humid mountainous zones. However, in the drier areas of this region, where the Project is located, this is unlikely to have been the case. This area of West African savannah habitat is not an area known for particularly high endemism or key evolutionary processes.

4.8 Protected areas and internationally recognised areas – qualified

In addition the five main criteria for Critical Habitat, Protected Areas and internationally recognised areas¹⁷ are often considered Critical Habitat. **Iles Tristan, Rio Kapatchez** – both **Ramsar sites** and **Important Bird Areas (IBAs)** - qualify the DMU as Critical Habitat. **Kamsar** and **Boulléré Key Biodiversity Areas (KBAs)** also qualify the DMU as Critical Habitat. The candidate Île Alcatraz et Île du Naufrage marine IBA would also qualify if its status is confirmed.

Ramsar sites are wetlands of international importance for biodiversity that have been recognised under the framework of the Ramsar Convention on Wetlands (www.ramsar.org). KBAs are sites identified as global priorities for conservation using simple, standard criteria, based on their importance in maintaining species populations (Langhammer *et al.* 2007). IBAs are essentially a subset of KBAs (i.e. IBAs are KBAs for birds). Although the mine and port developments are not within the boundaries of the Ramsar sites, the port

¹⁷ Exclusively defined as UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention).

development lies in proximity to the Ramsar sites on the coast and therefore they may be subject to indirect Project impacts. They are therefore included within the DMU.

Iles Tristan International Bird Area and Ramsar site covers 85,000 ha to the north-west of Kamsar and was designated because of its importance for migratory birds. It also fulfils criteria for an Important Bird Area (Robertson 2001). Much of the area is covered in mangroves as well as fresh and brackish water marshes, rice-fields and extensive intertidal mudflats (2,300 ha). Secondary forest and wooded savanna occurs on the highest points (5 m) of the islands. Counts of between 5,000–10,000 Near-threatened *Phoeniconias minor* have been made. The breeding colonies of *Platalea alba* and *Sterna caspia*, as well as of *Threskiornis aethiopica* (75 pairs) and *Larus cirrocephalus* are located on Pani Bankhi. In addition, *Ardea goliath*, *Ciconia episcopus*, *Scopus umbretta*, *Haliaetus vocifer* and Vulnerable *Balearica pavonina* are suspected to breed. The mudflats surrounding the islands, particularly those adjacent to the village of Katchek on Ile Katarak, hold more than 20,000 wintering waders and it is likely that further counts would reveal that more species exceed 1% biogeographic thresholds. The site is known to be under threat from disturbance and hunting. New surveys are required to update knowledge on the site.

Rio Kapatchez International Bird Area and Ramsar site lies to the south of Kamsar over 20,000 ha and was designated because of its importance for migratory birds. It also fulfils criteria for an Important Bird Area (Robertson 2001). The site includes a large expanse of mudflats as well as mangroves, sand-dunes, freshwater marsh and rice-fields. The mudflats are used by both Near-threatened *Phoenicopterus minor* (counts of 5,000–10,000) and *P. ruber*. Several waterbird species nest in the mangroves including *Scopus umbretta*, *Ciconia episcopus* and, perhaps, *Mycteria ibis*. In addition, large numbers of wintering waders use the mudflats, including several hundred *Recurvirostra avosetta*. Khôni Benki is an important high-tide roost for waders. The freshwater marshes and rice-fields are used by numerous nesting *Phalacrocorax africanus*, *Anhinga rufa*, *Casmerodius albus*, *Dendrocygna viduata* and, probably, *Ardeola ralloides*. Although there have been no complete counts, available data suggest that the site is regularly used by more than 20,000 waterbirds and it is likely that further counts would reveal that some species exceed 1% biogeographic thresholds.

Kamsar Key Biodiversity Area has been designated for the West African Chimpanzees identified at the site (Eriksson & Kpoghomou 2006)¹⁸ Since Chimpanzees are likely extirpated from this site, its value and classification as a KBA may be reviewed.

Boulléré Key Biodiversity Area has been designated for the West African Chimpanzee identified at the site (Eriksson & Kpoghomou 2006).

¹⁸ IBAT also cites the Purple Marsh Crab as a reason for designation of this site, but we have unable to find supporting evidence to justify this.

4.9 Summary of Critical and Natural Habitats

IFC PS6's concept of Critical Habitat refers to the entire Discrete Management Unit. Within the DMU particular ecological habitats may be Critical Habitat, either because they qualify in their own right (for example in this case mangroves qualify under criterion 4) or because they support Critical Habitat-qualifying biodiversity. All ecological habitats of importance to Critical Habitat-qualifying biodiversity are Critical Habitat, whether they are Natural or Modified, and whether they are occupied permanently or transiently (e.g. for foraging or dispersal). Some ecological habitats may support Critical Habitat-qualifying species in only part of the DMU (for example woodland may be Critical Habitat where Chimpanzees are present and use it for foraging, but Natural Habitat where no Chimpanzees or other Critical Habitat-qualifying biodiversity is present). This distinction and the implications for the Project is presented in Table 8 below and ecological habitats are categorised according to this classification in Table 9.

Table 8 Habitat types - as per IFC PS6 designations – including implications and further actions required.

Habitat status (as per IFC PS6)	Description	Action required under PS6
Critical Habitat	Habitat is Critical Habitat, either on its own, or due to the presence of CH-qualifying features.	Implement IFC PS6 Paragraph 17 on Critical Habitat to achieve a <i>net gain</i> for the CH-qualifying biodiversity.
Natural Habitat that <i>potentially</i> qualifies as Critical Habitat	Habitat is potentially Critical Habitat due to the presence of CH-qualifying features within some or all of the Natural Habitat.	Undertake surveys to confirm whether the habitat is important for supporting CH-qualifying species. Where present , implement IFC PS6 Paragraph 17 on Critical Habitat to achieve a <i>net gain</i> for the CH-qualifying biodiversity. Where absent , implement IFC Paragraph 15 on Natural Habitat to achieve a <i>no net loss</i> for the habitat.
Modified habitat that <i>potentially</i> qualifies as Critical Habitat	Habitat is potentially Critical Habitat due to the presence of CH-qualifying features within some or all of the Modified Habitat.	Undertake surveys to confirm whether the habitat is important for supporting CH-qualifying species. Where present , implement IFC PS6 Paragraph 17 to achieve a net gain for the CH-qualifying biodiversity. Where absent , treat as Modified Habitat and implement IFC Paragraph 12 on Modified habitat to <i>minimize impacts and implement mitigation measures as appropriate</i> .

Based on the data available, it is was not possible to provide a detailed spatial map showing the location of areas supporting Critical Habitat qualifying biodiversity within the DMU; such mapping is an important process for identifying opportunities for avoidance and should be a priority for downstream biodiversity action planning. In the meantime **it would be good practice to consider all areas whose status is potentially Critical Habitat as Critical Habitat until surveys demonstrate it is not.**

The DMU contains several ecological habitats classed as Natural Habitats (as opposed to Critical or Modified) on the basis that they contain viable assemblages of plant and/or animal species of largely native origin (IFC PS6 2012a, Paragraph 13). Although most of these habitats are (at least in part) a product of human-ecosystem interactions over the long term (e.g., Fairhead & Leach 1996) and they have undergone some level of degradation and/or modification due to human activity in recent years (EEM 2014), the area's primary ecological functions and species composition remain intact.

Table 9 lists the different habitat types found within the DMU, including the CH-qualifying species that the habitat is known to support.

Table 9: Key habitat types within the terrestrial and marine DMUs, including associated CH-habitat species. Colour codes: Red = Critical Habitat, Orange = Natural Habitat that may be Critical Habitat in at least some locations, Yellow = Modified Habitat that may be Critical Habitat in some locations, see (Table 8) above. Habitat types based on the Project ESIA (EEM 2014).

Habitat type	What CH-qualifying species does this habitat support?
Mangroves	Mangroves are all Critical Habitat under Criterion 4.
Freshwater aquatic habitats	<i>Epiplatys njalaensis</i> , <i>Nimbapanchax jeanpoli</i> , <i>Malapterurus teugelsi</i> , <i>Epiplatys guineensis</i> , <i>Epiplatys hildegardae</i> , <i>Afrithelphusa monodosa</i> , <i>Ledermanniella abbayesii</i>
Núñez Estuary	<i>Atlantic Humpback Dolphin</i> , <i>Scalloped Hammerhead</i> , <i>Blackfin Guitarfish</i> , <i>Daisy Stingray</i> , <i>Dusky Grouper</i> , <i>Green and Hawksbill Turtle</i>
Gallery forest	Chimpanzee, West African Red Colobus, <i>Phrynobatrachus pintoii</i> , <i>Cynisca cf oligopholis</i> , <i>Cynisca leonina</i>
Wooded grassland and woodland	Chimpanzee, <i>Hemidactylus kundaensis</i>
Bowal grassland	Chimpanzee, <i>Afrithelphusa monodosa</i>
Non-bowal grassland	Chimpanzee, <i>Afrithelphusa monodosa</i>
Beaches, sand banks and mud flats	Green and Hawksbill turtles
Shrubland and thicket (farm fallow)	Chimpanzee (in rare cases)
Anthropic formation (inc. farmland)	Hooded, White-backed and Rueppell's Griffon vultures, <i>Afrithelphusa monodosa</i>

4.10 Robustness of this analysis and key data gaps

This assessment has confirmed the Project to be in Critical Habitat, based on the presence of twenty-five species/subspecies and one ecosystem. Despite imperfect data, the overall assessment is robust.

Additional surveys may confirm the presence of additional CH-qualifying species whose range overlaps with the DMU, but which have not been identified through existing field surveys. Further surveys may also de-qualify particular species as CH where they are found to be absent or where they no longer meet CH-thresholds (for example, where further studies determine a species to no longer qualify as restricted-range). CH designation may also change where project impacts are assessed as being insignificant for that species. However, for two taxonomic groups significant gaps in survey coverage were identified:

1. **Plants:** Botanical surveys undertaken during dry season (November) were unsuitable for confirming presence/absence of some plant species. Without reliable information from the wet season, there is a significant risk that many potentially threatened plant species occurring within the DMU will remain undocumented, particularly for bowal habitat.
4. **Amphibians:** The amphibian surveys undertaken during dry season (November) were unsuitable to confirm presence/absence of some amphibian species. Without reliable information from the wet season, there is a significant risk that potentially threatened amphibian species occurring within the DMU will remain undocumented.

These data gaps deal only with the presence of Critical Habitat qualifying biodiversity features. Further data needs for mitigation planning are discussed in [Section 5](#) and [Section 6](#).

5 Implications of Critical and Natural Habitat status for the Project

5.1 PS6 requirements

The determination of Critical Habitat status under PS6 means that the Project will need to meet the requirements of IFC PS6 paragraph 17:

- *'No other viable alternatives within the region exist for development of the Project on modified or natural habitats that are not critical';*
- *'The Project does not lead to measurable adverse impacts on those biodiversity values for which the Critical Habitat was designated, and on the ecological processes supporting those biodiversity values';*
- *'The Project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time'; and*
- *'A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program'.*

The Project's mitigation strategy for aligning with paragraph 17 should be described in a Biodiversity Action Plan that should demonstrate how **net gains** of those biodiversity values for which the Critical habitat was designated will be generated.

For Natural Habitats the Project will need to demonstrate **no net loss**.

Where impacts are likely, the mitigation hierarchy will need to be applied to ensure steps are taken for appropriate avoidance, minimisation, and restoration, and if required, offsets. For species that are known to be present at the Project site, conservation activities and monitoring and evaluation will need to be outlined and implemented through the Biodiversity Action Plan (BAP).

In the case of several subspecies (e.g. the West African Chimpanzee and West African Red Colobus) and endemic species restricted to the Sangarédi subprefecture (e.g. *Cynisca cf oligopholis* and *Hemidactylus kundaensis*), these species/subspecies numbers in the DMU are so low that any impact could jeopardise their continued existence. Therefore the focus for these should be on earlier steps in the mitigation hierarchy (avoidance and minimisation) to demonstrate no residual impact if possible. Where residual impacts are likely, an offset feasibility plan, supported by further assessment would need to help determine whether the 'no measurable adverse impact' requirement of PS6 paragraph 17 would be met.

Additional Conservation Actions for these species, such as awareness-raising among staff and the local population to reduce indirect impacts and support further research (e.g. through the Wild Chimpanzee Foundation) and regional conservation planning are recommended, in part, as a way to manage stakeholder reputational risk.

5.2 Overview of information needs for mitigation planning

In order to determine how and whether the project can meet the requirements of PS6 paragraph 17 further research will be required to ascertain if they are significantly impacted by the Project. Figure 2 below presents a matrix of the CH-qualifying species, according the anticipated level of significance of impacts (rows) and the level of understanding of the effectiveness of mitigation actions (columns). The degree of confidence in the anticipated level of impacts is shown by colour.

		Understanding of actions required to mitigate impacts:	
		Clear: <i>Undertake appropriate mitigation actions</i>	Unclear: <i>Undertake additional studies</i>
Significance of impacts to CH-qualifying feature: <i>Level of confidence in impact significance: High Low</i>	CRITICAL		<ul style="list-style-type: none"> Chimpanzee (species/subspecies) <i>Cynisca cf oligopholis and Cynisca leoninus</i>
	MAJOR	<ul style="list-style-type: none"> Atlantic Humpback Dolphin Freshwater fish (five species) Two plant species (<i>Ledermanniella abbayesii</i> and <i>Fleurydora felicis</i>) 	<ul style="list-style-type: none"> West African Red Colobus (species/subspecies) Pinto's Puddle Frog Purple Marsh Crab
	MODERATE	<ul style="list-style-type: none"> Vultures (three species) Hawksbill and Green Turtle Marine fish (13 species/subpopulations) 	<ul style="list-style-type: none"> Kunda Half-toed Gecko
	MINOR	<ul style="list-style-type: none"> Sanderling 	

Figure 2: Prioritisation of priority biodiversity species¹⁹ based on the estimated pre-mitigation impact significance (rows) and level of understanding of mitigation actions (columns). The level of confidence in the impact significance is provided by green (high) and orange (low) confidence levels.

The above figure assists in prioritising potential further investigation. The bottom row are of lower priority for further study due to likely low significance of impacts. The upper left cells are areas where there is reasonable understanding of what additional measures would help improve the management of biodiversity risks. For the upper right hand cells further study will help elucidate either the potential impacts, or the possible mitigation measures required. Details of data gaps and potential measures to address them are given in [Section 5.3.1](#) and [5.3.2](#) below.

¹⁹ Includes species that would qualify the DMU as Critical Habitat if they were found to be present.

5.3 Data needs for downstream planning

5.3.1 Biological baseline

The Project Baseline (EEM 2014) presents accounts for habitats and species whose presence has been confirmed, or which are likely to occur within the study areas (Sangarédi mine area and Kamsar plant). The ESIA also presents a detailed characterization of the habitats in the study area (mainly for Sangarédi). However, further information on the status of biodiversity that qualifies the area as Critical Habitat would enable improved understanding of potential impacts and development of appropriate mitigation actions. The key data needs for allowing planning for alignment with IFC PS6 requirements are presented below in Table 10.

Table 10: Key remaining gaps in current Biodiversity Baseline, including proposed measures to address these and align with IFC PS6 requirements (red bars indicate priority gaps, orange bars indicate medium gaps and grey bars indicate lowest priority gaps).

Gap	Critical Habitat qualifying feature(s)	What is the gap and why is it important?	Possible measures to address gap	Priority
Status of Endangered primates	<ul style="list-style-type: none"> West African Chimpanzee (<i>Pan troglodytes verus</i>) West African Red Colobus (<i>Procolobus badius temminckii</i>) 	Current surveys indicate potentially regionally significant populations of Chimpanzees to the west of the direct mine site that would be vulnerable to indirect impacts from the Project. External, expert-based review of the methods and results is recommended to confirm and validate these findings. Further surveys to determine distribution, population numbers and habitat use of these species would allow identification of the appropriate scale of mitigation actions and an estimate of potential residual impacts.	CBG could work with chimp experts to confirm significance of findings from the Wild Chimpanzee Foundation and to undertake further surveys. Data from these surveys could be pooled together with regional data in support of the updated West African Regional Chimpanzee Action Plan (due to be updated in 2016/17) to help clarify significance of the DMU for chimpanzee's.	High
Presence and status of Endangered Purple Marsh Crab	<ul style="list-style-type: none"> Purple Marsh Crab 	This species is known from only two localities, each of limited geographic extent. Any project impacts on this species could therefore be significant. The baseline survey did not focus on preferred habitats of this EN species; it is therefore not possible to evaluate potential impacts. This species is known from modified habitats and further surveys might help clarify its conservation status.	Further surveys to confirm presence/absence in appropriate habitat and clarify conservation status.	High
Presence of CH-qualifying plant species	<ul style="list-style-type: none"> <i>Fleurydora felicis</i> <i>Ledermanniella abbayesii</i> Potentially other species 	Current botanical surveys were undertaken during the dry season and are likely to have missed out on these species.	Undertake additional botanical surveys in relevant habitats during wet season (Sept. – Oct.). Survey also for other species which are potentially CH-qualifying.	High

Gap	Critical Habitat qualifying feature(s)	What is the gap and why is it important?	Possible measures to address gap	Priority
Status of Critically Endangered and endemic lizard species	<ul style="list-style-type: none"> Kunda Half-toed Gecko 	Project impacts could be significant but remain unclear due to limited surveys.	Current surveys confirmed presence of a single specimen to the north-west of Sangarédi. Further targeted surveys needed to confirm status.	High
Presence of Endangered amphibian species	<ul style="list-style-type: none"> Pinto's Puddle Frog 	The amphibian surveys undertaken during dry season (November) were unsuitable to confirm presence/absence of some amphibian species.	Undertake additional amphibian surveys during wet season.	High
Status of CH-qualifying marine species	<ul style="list-style-type: none"> Atlantic Humpback Dolphin Hawksbill Turtle Green Turtle 	Current surveys indicate a significant population of Humpback Dolphins (at least 47 individuals) may be present within the study area, with a potential resident population on the west side of Taïdi Island. Presence and status of Hawksbill and Green sea turtles unclear. Earlier surveys were restricted due to extreme tidal conditions and waves.	Further surveys are needed during the dry season when conditions are better to assess the status of these species.	Med
Presence and status of marine turtle nesting sites	<ul style="list-style-type: none"> Hawksbill Turtle Green Turtle 	Baseline surveys indicated potentially suitable nesting habitat on the west shore of Binari Island but no turtle nesting surveys were undertaken there. Potential indirect impacts are not yet understood.	Undertake beach surveys in DMU to confirm presence/absence of nesting turtles during nesting season (Sept – Nov), particularly for the southern part of the west shore of Binari Island.	Med
Status of CH-qualifying mangroves	<ul style="list-style-type: none"> Mangroves 	Botanical surveys for mangroves ("shore sites") currently limited to only three sampling sites to understand indirect impacts.	Undertake further baseline surveys of the intertidal habitats in Kamsar and the DMU to identify mangrove species, current status and fauna associated with mangroves.	Med

Gap	Critical Habitat qualifying feature(s)	What is the gap and why is it important?	Possible measures to address gap	Priority
Status of benthic flora and fauna within the estuary	<ul style="list-style-type: none"> Seagrasses Other fauna to be confirmed 	No benthic surveys have been undertaken for the main shipping channel. These surveys may confirm the presence of threatened seagrass meadows within the Nunez Estuary. Global data indicates presence of seagrass beds within the DMU (Short & UNEP-WCMC 2005) ²⁰	Benthic surveys (e.g. grab sampling) along and downstream from the quay expansion area and dredge deposition area.	Med
Presence of Endangered vulture colonies	<ul style="list-style-type: none"> White-backed Vulture Rueppell's Griffon Vulture Hooded Vulture 	Surveys confirmed presence of a number of individuals but it remains unclear whether there are breeding populations or colonies present, and if these populations are potentially threatened by local communities (e.g. through poisoning).	Surveys to detect breeding colonies of vultures in the DMU as they nest in restricted colonies which could potentially be affected by the Project	Med
Presence and status of bats in mangroves and other habitats	<ul style="list-style-type: none"> To be confirmed 	Small mammal surveys have not been undertaken to determine presence of bats in DMU where there are potential direct and indirect impacts.	Undertake surveys using mist nets and camera traps to determine presence of bats in mangroves and other habitats in the DMU	Med

²⁰ See <http://data.unep-wcmc.org/datasets/7>

Gap	Critical Habitat qualifying feature(s)	What is the gap and why is it important?	Possible measures to address gap	Priority
Status of and impacts on CH-qualifying and potentially qualifying groupers and elasmobranchs (sharks and rays)	<ul style="list-style-type: none"> • Scalloped Hammerhead • Great Hammerhead • Great Hammerhead (subpopulation) • Blackchin Guitarfish • Common Guitarfish • Smalltooth Sawfish • Smalltooth Sawfish (subpopulation) • Largetooth Sawfish • Largetooth Sawfish (subpopulation) • African Wedgefish • White Skate • Sawback Angelshark • Smoothback Angel Shark • Atlantic Goliath Grouper 	These species are thought to be present but existing surveys have been limited and do not confirm presence and/or status.	Planned mitigation actions for existing CH-qualifying marine species targeted by local fisheries (e.g. through a fisheries management plan) are likely to provide similar benefits to these species. Therefore, ongoing monitoring for presence and status of these species is recommended through fisheries surveys.	Med

5.3.2 Biological impact assessment

The Project ESIA includes a Biological Impact Assessment (chapter 4) that identifies Project impacts to biodiversity. Priority gaps that were identified through a high-level assessment of these documents is presented below in Table 11.

Table 11: Key priority gaps in current understanding of impacts, divided by the Sangerédi mine and Kamsar port expansions.

Category	Gap	Possible measures to address gap
Cumulative impacts	Impacts resulting from the interaction of new project (i.e. mining projects neighbouring this project but also further afield) activities and infrastructure with new and/or existing infrastructure.	Facilitate a regional land use planning effort with key government, industry and civil society stakeholders, including the development of nationally or regionally aggregated offsets. Similar industrial projects are also active in Guinea-Bissau, so there may be regional interest in impact mitigation, particularly as some impacts are likely to be transboundary, e.g. hunting and fishing. Pooling of biodiversity data gathered from different projects (e.g. for Chimpanzee) would help understand impacts and appropriate mitigation strategies.
Sangerédi mine expansion		
Direct habitat loss and degradation	Impacts from roads on sensitive habitats including bowal and gallery forest.	Road plan currently being developed will need to consider impacts to sensitive habitats and take avoidance measures to reduce potential impacts where possible. Work with engineers to develop a road plan that avoids loss, degradation and fragmentation of sensitive habitats
Barrier effect and connectivity impacts	Fragmentation impacts to gallery forests, stream and bowel habitats resulting in further range restrictions of Chimpanzees, West African Red Colobus and restricted range species that are unable to cross barrier.	Assess direct and indirect impacts of habitat fragmentation to priority species. Impacts are likely to include increased isolation and extirpation from study area.
Hydrological impacts	Potential impacts from changes to hydrological flow regimes and a reduction in the water table to CH-qualifying species reliant on freshwater including restricted range fish, <i>Phrynobatrachus pintoii</i> , <i>Cynisca cf oligopholis</i> and <i>Afrithelphusa monodosus</i> and the plant <i>Ledermannia abbayesii</i>	Undertake further hydrological surveys of streams and develop a hydrological flow model to assess potential impacts. Monitor for any changes, particularly during the dry season when water level is at its lowest.

Category	Gap	Possible measures to address gap
Induced access and in-migration	Indirect impacts resulting from induced access and in-migration into Sangarédi are currently not considered in the ESIA. Indirect impacts are likely to be significant due to increased accessibility and increased purchasing power and include increased deforestation and habitat clearance for agriculture, charcoal and fuelwood, bushmeat hunting and fishing.	Undertake an assessment of indirect impacts to priority biodiversity from induced migration into Sangarédi. This assessment will need to quantitatively model for the number of migrants and their natural resource needs (i.e. hunting and harvesting) and account for impacts to biodiversity surrounding the study area due to increased accessibility. Such as study should assess impacts on local communities from loss of resources as well as on biodiversity.
Hunting, bushmeat and wildlife trade	Impacts to CH-qualifying species vulnerable to hunting including Chimpanzees and West African Red Colobus.	Assess impacts from improved access to previously remote areas, transport network facilitating trade, increased demand and access to markets stimulating demand.
Kamsar port expansion		
Altered water quality	Dredging techniques and magnitude currently unclear. Impacts to CH-qualifying marine species (turtles, fish, dolphins and manatees) and mangroves are likely due from decreased water quality and sedimentation as a result of construction and dredging in the Rio Nuñez Estuary.	Develop sedimentation and flow models to establish whether impacts are likely (and where) and implement further avoidance and minimisation measures to mitigate impacts.
	Plan for dredge sludge deposition currently under development. This plan will need to consider impacts to sensitive marine habitats (i.e. mangroves) and take avoidance measures to reduce potential impacts.	Undertake an assessment of dredging impacts and ensure dumping of dredging sludge will not negatively impact the sensitive marine environments.
Induced access and in-migration	Indirect impacts to CH-qualifying marine species and mangroves within the Rio Nuñez Estuary resulting from induced migration into the Kamsar area are currently not considered in the ESIA. Indirect impacts are likely to be significant due to increased accessibility and include increased fishing and mangrove loss due to conversion for agriculture and harvesting for charcoal and fuelwood.	Undertake an assessment of indirect impacts to priority biodiversity from induced migration into Kamsar. This assessment will need to quantitatively model for the number of migrants and their natural resource needs (i.e. fishing and harvesting of mangrove resources) and account for impacts to marine and coastal biodiversity surrounding the study area.

6 Next steps: roadmap for developing a biodiversity action plan

This section provides guidance on the next steps needed to meet IFC PS6 requirements for biodiversity risk management. The approach recommended here is based on a rapid assessment of gaps within the current Project ESIA (EEM 2014), and TBC's experience in meeting international best practice for biodiversity risk management.

In order to address uncertainty for the priority biodiversity that qualify the area as Critical Habitat, supplementary studies may be required that can feed into the overall biodiversity strategy for the Project and define specific mitigation actions through the Biodiversity Action Plan (BAP). [Figure 3](#) provides a schematic framework for managing biodiversity risk from the Project, including key outputs for each of the management phases: (1) baseline data gathering, (2) assessment & analysis, (3) strategy & planning and (4) implementation and adaptive management.

Based on the high-level gap analysis of the Project ESIA, a number of actions are recommended for the Project to manage biodiversity risk and align with IFC PS6 requirements:

1. Undertake additional **targeted species surveys** for CH-qualifying species, as outlined in [Section 5.3](#).
2. Map **the location of Critical Habitat features** within the DMU and ensure that areas supporting Critical Habitat qualifying features are clearly marked on all Project maps and design diagrams to.
3. Establish a **biodiversity and ecosystem service working group** to ensuring stakeholder input to development of the Environmental and Social Management System. Proactive and early engagement with key stakeholders will help manage risks and generate support for the Project. This group would bring together relevant expertise to support the development and implementation of the Biodiversity Action Plan, including community engagement, monitoring and evaluation.²¹
4. Undertake a **Cumulative Impact Assessment (CIA)** in order to consider for past and future impacts resulting from the interaction of new and/or existing projects (i.e. mining projects neighbouring the Project). Cumulative impacts are likely to present the greatest risk to biodiversity and greatest challenge to address. An assessment of cumulative impacts will require a coordinated effort between the different stakeholders (including government and industry) through a regional planning process. Although Government and regional planners have the ultimate responsibility for the CIA, the Project can be proactive in managing reputational and financial risk by facilitating the CIA process. One such action would be to facilitate a regional planning exercise by bringing stakeholders to the table.
5. Develop a CBG **Biodiversity Strategy** to guide the management of biodiversity by the Project, outlining the rationale for managing risks associated with biodiversity. It is recommended that the strategy focuses on the Critical Habitat-qualifying features and stakeholder priorities, and outlines measures for mitigating impacts and additional measures which can compensate for likely impacts.

²¹ Local NGOs who could be involved include: Guinée Ecologie - who are able to work with local communities to support habitat protection; the Wild Chimpanzee Foundation - who are already undertaking Chimpanzee surveys for the GAC project. They could be supported by reputable international partners such as Wildlife Conservation Society, RSPB, Flora and Fauna International, African Parks etc.

The Strategy can be seen as an iterative process that evolves from project planning through to execution.

6. Develop a **Residual Impact Assessment** to quantitatively assess predicted residual losses (e.g. quality hectares, population numbers) on priority biodiversity owing to the Project (allowing an understanding of necessary gains through the mitigation hierarchy) – i.e. no net loss accounting.
7. Develop a **Biodiversity Offset Strategy** including an assessment of potential offset sites within the landscape. The strategy would need to document the development and implementation of a biodiversity offsets programme that adequately compensates for significant residual impacts and achieves a no net loss to biodiversity. The offset strategy would need account for cumulative impacts and so could explore options for regional aggregated offsets.
8. Develop and implement a **Biodiversity Action Plan (BAP)** that outlines and tracks implementation of planned mitigation measures and
 - a. Focuses on Critical Habitat-qualifying biodiversity (alongside Natural Habitat, stakeholder and other priority biodiversity of concern).
 - b. Presents a clear application of mitigation hierarchy detailing measures to avoid, reduce, restore and offset impacts to CH-qualifying biodiversity, demonstrating that there will be no 'measurable adverse impacts' on the long-term viability of the CH-qualifying species or the habitats and ecological processes supporting them.
 - c. Strongly focuses on avoidance and minimisation through early project development planning and stakeholder engagement.
 - d. Develop additional species-specific conservation measures²² for priority species of high stakeholder concern such as Chimpanzees and Atlantic Humpback Dolphins.
9. Ensure that the **Project BAP** includes detailed plans for:
 - a. **Bushmeat and Wildlife Trade Management** that provide clear measures for controlling the hunting and trading of bushmeat products for Project workers²³ and along key access points transport routes (roads and railways). This plan should be developed with key stakeholders (government, other concession holders, communities).
 - b. **Community Engagement** including awareness raising campaigns to generate support and understanding for conservation activities and helps minimise human-wildlife conflict.
 - c. **Fisheries Management** to supports sustainable fisheries and limit bycatch and control illegal fishing activities by supporting policy interventions such as increased patrols.
 - d. **Induced Access Management** to control access along CBG managed roads to restrict hunting, harvesting of forest products and prevent poaching and other illegal activities.
 - e. **Infrastructure closure and decommissioning** (including roads) that take into account a landscape-level perspective and consideration of how best to maintain and re-establish connectivity following project closure.

²² For example, through maintaining natural corridors and designation of conservation zones "set-asides" and supporting community education and awareness raising activities.

²³ Including placing restrictions in worker contracts to buy, sell, consume or trade bushmeat and the use of firearms. Sourcing food from elsewhere can further help discourage exploitation.

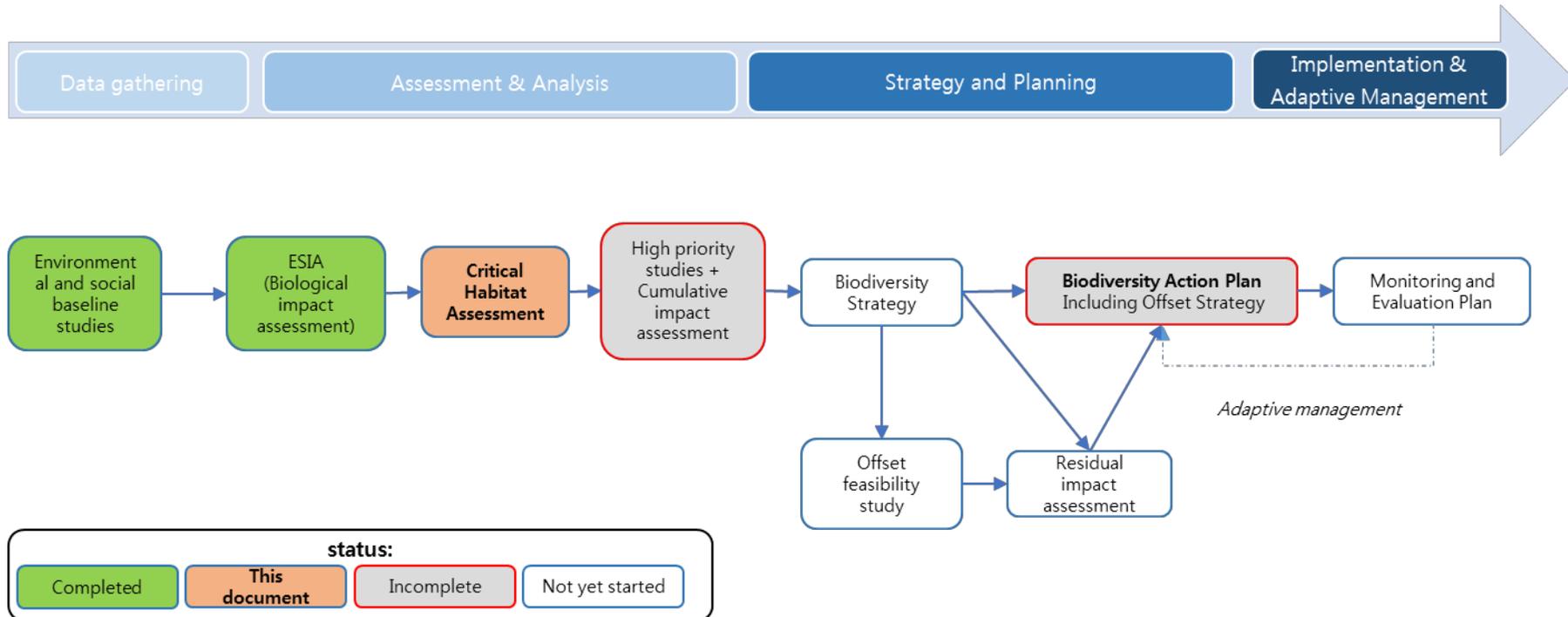


Figure 3: Potential outline of a CBG Biodiversity Management framework

7 References

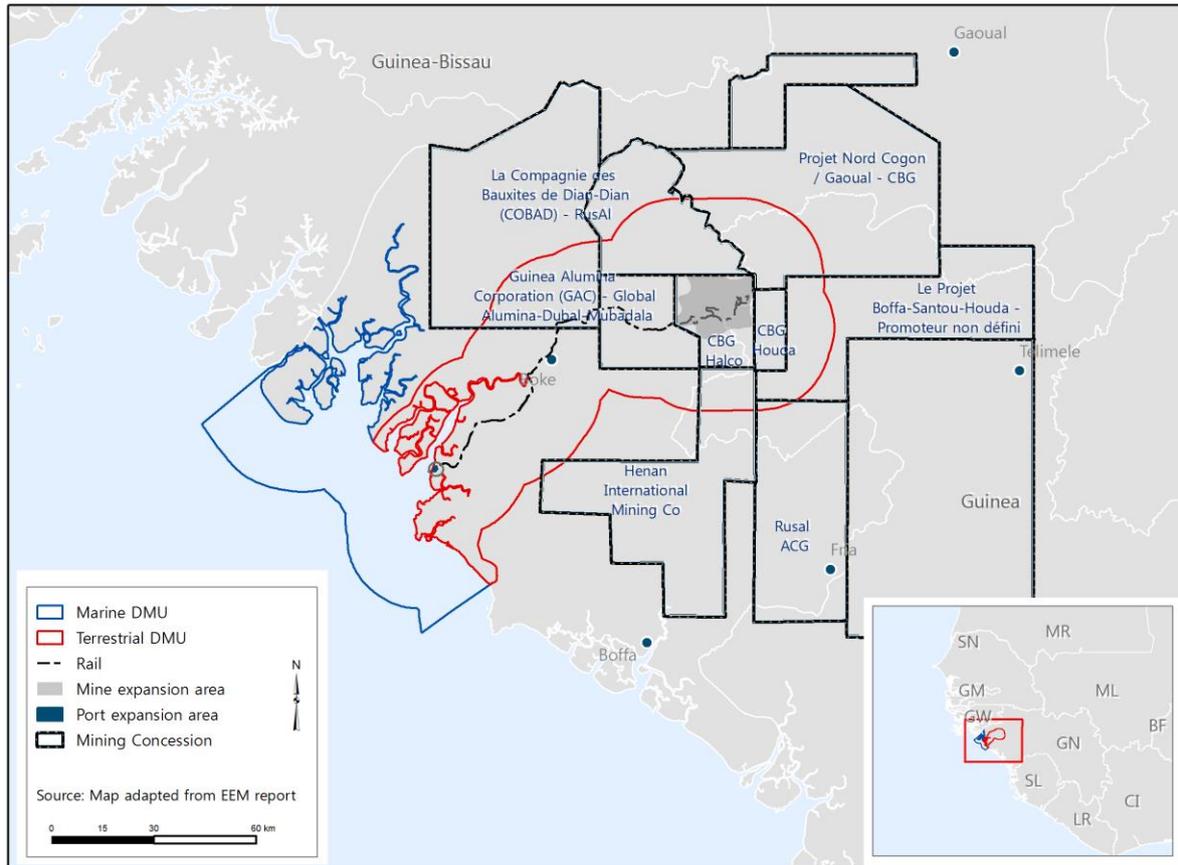
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Appendix 1 – Map of the Discrete Management Unit (DMU) overlapping with other mining development concessions.



Appendix 2 – IFC PS6 Critical Habitat Thresholds

Criteria	Threshold
1. Critically Endangered (CR)/ Endangered (EN) Species	<p>Habitat that supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally-important concentrations of a Red-listed EN species where that habitat could be considered a discrete management unit for that species/subspecies.</p> <p>Habitat of significant importance to CR or EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species.</p> <p>As appropriate, habitat containing nationally/regionally important concentrations of an EN, CR or equivalent national/regional listing.</p>
2. Endemic/ Restricted Range Species	<p>Habitat known to sustain ≥ 1 percent but < 95 percent of the global population of an endemic or restricted-range species/subspecies where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgement.</p>
3. Migratory/ Congregatory Species	<p>Habitat known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent but < 95 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgement.</p> <p>For birds, habitat that meets BirdLife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or 6 for Identifying Wetlands of International Importance.</p> <p>For species with large but clumped distributions, a provisional threshold is set at ≥ 5 percent of the global population for both terrestrial and marine species.</p> <p>Source sites that contribute ≥ 1 percent of the global population of recruits.</p>

Appendix 3 – Priority species that would qualify the DMU as Critical Habitat if found to be present

Terrestrial species

Species: Slender-snouted Crocodile (*Mecistops cataphractus*)

Type: Reptile

Species status (IUCN): Critically Endangered

Presence in DMU: Unconfirmed

Justification: The Slender-snouted Crocodile *Mecistops cataphractus* is a Critically Endangered species whose range overlaps with the DMU. Therefore, it would qualify the DMU as Critical Habitat if it was found to be present. This species is highly threatened globally and it and its habitats (forested rivers and mangroves) are likely to be of high stakeholder concern.

Marine species

Species: Smalltooth Sawfish (*Pristis pectinata*)

Type: Fish (marine)

Species status (IUCN): Critically Endangered

Presence in DMU: Unconfirmed

Justification: The Smalltooth Sawfish *Pristis pectinata* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Critically Endangered and the DMU is likely to be of national importance for this species and the Eastern Atlantic subpopulation (Harrison & Dulvy 2014, IUCN 2015). This species was once a common component of the marine fauna of the Eastern Atlantic but now have been nearly eliminated primarily by fishing (trawl and inshore netting). It is likely that the region from Guinea-Bissau to Sierra Leone represents the last area where sawfishes can be found in western Africa (Harrison & Dulvy 2014). Threats are ongoing from inshore netting and habitat modification (mangrove removal). It is found in coastal waters in the Atlantic and there are few recent records (Harrison & Dulvy 2014).

Species: Largetooth Sawfish (*Pristis pristis*)

Type: Fish (marine)

Species status (IUCN): Critically Endangered

Presence in DMU: Unconfirmed

Justification: The Largetooth Sawfish *Pristis pristis* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Critically Endangered and the DMU is likely to be of national importance for this species and the Eastern Atlantic subpopulation (Harrison & Dulvy 2014, IUCN 2015). In the eastern Atlantic this species was once commonly found from Angola to Mauritania but now have

been nearly eliminated primarily by fishing (trawl and inshore netting). Recent records are only confirmed from the area from Mauritania to Sierra Leone (Harrison & Dulvy 2014). The region has been subject to intense trawl fisheries in offshore waters from international fleets since at least the 1950s, combined with intense fishing pressure due to rapid coastal population growth and the rise in artisanal fisheries throughout the region. Declines and continuing threats result in a Critically Endangered assessment for this subpopulation. It was originally found in coastal tropical waters. There have been few recent records from the eastern Atlantic (Harrison & Dulvy 2014).

Species: Sawback Angelshark (*Squatina aculeata*)

Type: Fish (marine)

Species status (IUCN): Critically Endangered

Presence in DMU: Unconfirmed

Justification: The Sawback Angelshark *Squatina aculeata* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Critically Endangered and the DMU is likely to be of national importance for this species (IUCN 2015). This large stocky angel shark was formerly a common and important demersal predator over large areas of its coastal and outer continental shelf sediment habitat in the Mediterranean sea and eastern Atlantic. Most of this region is now subject to intense demersal fisheries, and the species is highly vulnerable from birth onwards to bycatch in the benthic trawls, set nets and bottom longlines operating through most of its range and habitat. As a result of its limiting life history characteristics and bycatch in fisheries with steadily increasing effort and capacity, its abundance has declined dramatically during the past 50 years to the point where it has been apparently been extirpated from large areas of the northern Mediterranean and parts of the West African coasts. It is now extremely uncommon throughout most of the remainder of its range. Along the West African coasts this species is taken as bycatch of industrial trawl and artisanal gillnet fisheries. It was originally found in the Eastern Atlantic and Mediterranean tropical waters. It is now rare in West African waters.

Species: Smoothback Angelshark (*Squatina oculata*)

Type: Fish (marine)

Species status (IUCN): Critically Endangered

Presence in DMU: Unconfirmed

Justification: The Smoothback Angelshark *Squatina oculata* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Critically Endangered and the DMU is likely to be of national importance for this species (IUCN 2015). Over most of its range this species is subject to intense demersal fisheries, and the species is highly vulnerable to bycatch in the benthic trawls, set nets and bottom longlines operating through most of its range and habitat. As a result of its limiting life history characteristics and bycatch in fisheries it has been apparently been extirpated from large areas of the northern Mediterranean and parts of the West African coasts. It is now extremely uncommon throughout most of the remainder of its range. Along the West African coasts this species is taken as bycatch of industrial trawl and artisanal gillnet fisheries. It was originally found in the Eastern Atlantic and Mediterranean tropical waters. It is now rare in West African waters.

Species: Atlantic Goliath Grouper (*Epinephelus itajara*)

Type: Fish (marine)

Species status (IUCN): Critically Endangered

Presence in DMU: Unconfirmed

Justification: The Atlantic Goliath Grouper *Epinephelus itajara* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Critically Endangered and the DMU is likely to be of national importance for this species (IUCN 2015). Abundance is now rare where formerly it was abundant. It is a slow growing, and aggregating species that has undergone significant population reduction over the past 40 years estimated to be at least 80% based on landings data and underwater visual censuses. It is found in tropical coastal waters in the Atlantic. Juveniles live in shallow sheltered mangrove creeks and tend to move offshore as adults.

Species: Great Hammerhead (*Sphyrna mokarran*)

Type: Fish (marine)

Species status (IUCN): Endangered

Presence in DMU: Unconfirmed

Justification: The Great Hammerhead *Sphyrna mokarran* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Endangered and the DMU is likely to be of national importance for this species and the Eastern Atlantic subpopulation which is Critically Endangered (IUCN 2015). This species is highly valued for its fins (in target and incidental fisheries), suffers very high bycatch mortality and only reproduces once every two years, making it vulnerable to over-exploitation and population depletion. Generally regarded as solitary, and is therefore unlikely to be abundant wherever it occurs. Previously observed from Mauritania to Angola, reportedly abundant from November to January in Senegal, and in October in Mauritania, stocks have since collapsed and it is recognized as one of the four most threatened species by member states of the Sub Regional Fishing Commission. Although there is very little species specific data available, the absence of recent records give cause to suspect a decline of at least 80% in the past 25 years. Fishing proceeds unmanaged and unmonitored, resulting in an assessment of Critically Endangered in the Eastern Atlantic. This species is largely restricted to continental shelves throughout tropical and sub-tropical waters.

Species: Common Guitarfish (*Rhinobatos rhinobatos*)

Type: Fish (marine)

Species status (IUCN): Endangered

Presence in DMU: Unconfirmed

Justification: The Common Guitarfish *Rhinobatos rhinobatos* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Endangered and the DMU is likely to be of national importance for this species (IUCN 2015). Although the distribution is fairly wide, it is subjected to fishing pressures throughout most of its range. Its existence along coastal inshore areas makes this species an

easy target for subsistence fisheries. Limited data are available on the biology, but it is large and is likely to have a relatively unproductive and vulnerable life history. Off the west African coasts, this species is taken as bycatch of international shrimp trawl fleets, bottom trawl cephalopod fisheries and in artisanal gill net fisheries. It is found in coastal waters in the Mediterranean and eastern Atlantic and its status is poorly known.

Species: African Wedgefish (*Rhynchobatus luebberti*)

Type: Fish (marine)

Species status (IUCN): Endangered

Presence in DMU: Unconfirmed

Justification: The African Wedgefish *Rhynchobatus luebberti* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Endangered and the DMU is likely to be of national importance for this species (IUCN 2015). Regional declines have resulted from often intensive direct and indirect fishing pressure, from coastal commercial and artisanal fisheries including benthic trawling, trammel netting, gill netting, longlining, and hook and line fishing. It is found in coastal waters on the west coast of Africa.

Species: White Skate (*Rostroraja alba*)

Type: Fish (marine)

Species status (IUCN): Endangered

Presence in DMU: Unconfirmed

Justification: The White Skate *Rostroraja alba* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. If identified here, as it is Endangered and the DMU is likely to be of national importance for this species (IUCN 2015). It is particularly susceptible to capture by fishing gears, which in combination with its life history parameters and population demography allow little capacity for it to withstand exploitation by fisheries. This species is likely to be caught as bycatch to multispecies trawl fisheries which operate on much of the continental shelf and slope, coinciding with this species habitat. It is found in coastal waters in the Eastern Atlantic.

Appendix 4 – Species potentially of high stakeholder concern

Terrestrial species

Mammals

Species: Hippopotamus (*Hippopotamus amphibius*)

Type: Mammal

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Justification: The Hippopotamus *Hippopotamus amphibius* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Vulnerable. However, this species is highly threatened in West Africa, with a highly fragmented population of about 7,000. In Guinea, there are an estimated 1,000-2,000 individuals with a decreasing population, though there has been no recent detailed assessment (IUCN 2015).

Hippopotamus were recorded in baseline surveys along the Kogon River near Sangarédi (EEM 2014). In light of this, it is recommended that this species be recognised as an important biodiversity value for the Project.

Species: African Golden Cat (*Caracal aurata*)

Type: Mammal

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Justification: The African Golden Cat *Caracal aurata* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Vulnerable. This species is under threat across its range from hunting, loss of prey base and loss of habitat, all of which are potential indirect impacts of this Project. This species is therefore of stakeholder concern.

It was recorded on a camera trap in gallery forest near Sangarédi, the first time the species had been recorded in Boké prefecture (EEM 2014).

Species: African Clawless Otter (*Aonyx capensis*)

Type: Mammal

Species status (IUCN): Near-threatened

Presence in DMU: Confirmed

Justification: The African Clawless Otter *Aonyx capensis* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Near-threatened. Throughout their range, African Clawless Otters are faced with habitat loss or degradation, polluted waters, and/or degraded water ecosystems due to the introduction of invasive alien species and marginal agricultural practices. This habitat disturbance is exacerbated by poor sanitation

infrastructure and growing industrial waste pollution. Loss of prey base is also a growing concern. This species is likely to be considered a stakeholder priority and mitigation should be considered of any potential impacts.

This species was recorded on camera trap in mangrove. Mitigation of any impacts on this habitat will reduce impacts on otters.

This species was recorded on a camera trap and tracks were observed on the beach and in mangrove in Kamsar (EEM 2014).

Species: Sooty Mangabey (*Cercocebus atys*)

Type: Mammal

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Justification: The Sooty Mangabey *Cercocebus atys* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Vulnerable. This species is under threat across its range from hunting and loss of habitat, all of which are potential indirect impacts of this Project. This species is therefore of stakeholder concern.

It was observed in gallery forest near Boulléré (EEM 2014).

Species: Western Black-and-white Colobus (*Colobus polykomos*)

Type: Mammal

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Justification: The King Colobus *Colobus polykomos* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Vulnerable. This species is under threat across its range from hunting and loss of habitat, all of which are potential indirect impacts of this Project. This species is therefore of stakeholder concern.

A skin of this species was found in the market in Sangarédi (EEM 2014).

Species: Guinea Baboon (*Papio papio*)

Type: Mammal

Species status (IUCN): Near-threatened

Presence in DMU: Confirmed

Justification: The Guinea Baboon *Papio papio* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Near-threatened. This species is under threat across its range from agricultural expansion, persecution and hunting, all of which are potential indirect impacts of this Project. This species is therefore of stakeholder concern. The species is also associated with crop-raiding.

It was observed in forest near Kamsar in 2005 (EEM 2014).

Birds

Species: Beaudoin's Snake Eagle (*Circaetus beaudoini*)

Type: Bird

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Justification: The Beaudoin's Snake Eagle *Circaetus beudoini* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Vulnerable. This species is under threat across its range from habitat loss following agricultural intensification, overgrazing and woodcutting, all of which are potential indirect impacts of this Project. This species is therefore of stakeholder concern.

It was observed in savanna near Sangaredi (EEM 2014).

Reptiles

Species: West African Dwarf Crocodile (*Osteolaemus cf tetraspis*)

Type: Reptile

Species status (IUCN): Vulnerable (see Justification)

Presence in DMU: Confirmed

Justification: The West African Dwarf Crocodile *Osteolaemus cf tetraspis* does not qualify the DMU as Critical Habitat. Its IUCN Red List status is likely to be uplisted to Endangered or Critically Endangered soon (M. Shirley in litt.) as it is believed to be a distinct species from the Dwarf Crocodile taxon found in Central Africa (Eaton *et al.* 2009). Therefore the risk of any Project impacts on this species need to be considered.

Many adults and juveniles were found at Sintiourou to the north-west of Sangarédi (EEM 2014). One sub-adult was found inside the mine licence. It prefers small wetlands such as marshes, swamp forest and ponds.

Fish

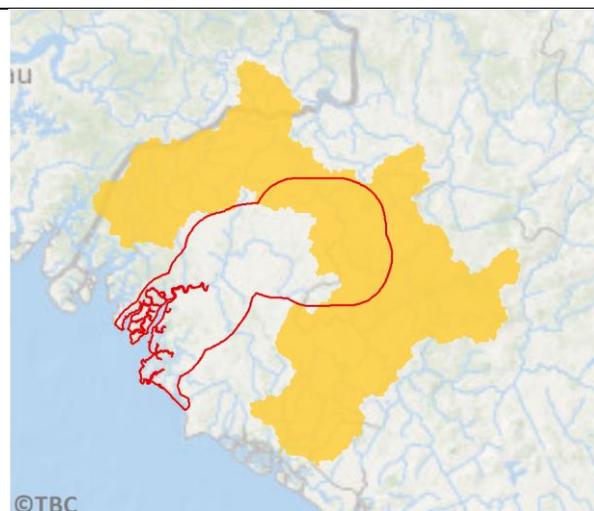
Species: *Synodontis kogonensis*

Type: Fish (freshwater)

Species status (IUCN): Data deficient

Presence in DMU: Unconfirmed

Justification: The freshwater fish *Synodontis kogonensis* does not qualify the DMU as Critical Habitat as it has not been confirmed within the DMU. It is likely to do so if identified here in the future as it is restricted range and the DMU overlaps with 16% of its global range. It is endemic to Guinea and known only from the Kogon River watershed (IUCN 2015).



Plants

Species: *Eriocaulon plumale subsp. kindiae*

Type: Plant

Species status (IUCN): Not assessed

Presence in DMU: Confirmed

Justification: The plant *Eriocaulon plumale subsp. kindiae* does not qualify the DMU as Critical Habitat as it is a subspecies which has not yet been assessed under IUCN Red List criteria (T. Stévant, Missouri Botanical Garden, in litt. 2015). However, as it is known from only three locations and from six specimens (T. Stévant, Missouri Botanical Garden, in litt. 2015), if it was found to be distinctive compared to its parent taxon it could be listed Endangered and could therefore qualify the DMU as Critical Habitat.

Specimens have been recorded from the DMU (T. Stévant, Missouri Botanical Garden, in litt. 2015).

Species: *Pseudoprosopis bampsiana*

Type: Plant

Species status (IUCN): Not assessed

Presence in DMU: Confirmed

Justification: The plant *Pseudoprosopis bampsiana* does not qualify the DMU as Critical Habitat has not yet been assessed under IUCN Red List criteria (T. Stévant, Missouri Botanical Garden, in litt. 2015). However, as it is known from only four locations and from six specimens (T. Stévant, Missouri Botanical Garden, in litt. 2015), it could be listed Endangered and could therefore qualify the DMU as Critical Habitat.

Specimens have been recorded from the DMU (T. Stévant, Missouri Botanical Garden, in litt. 2015).

Marine species

Mammals

Species: West African Manatee (*Trichechus senegalensis*)

Type: Mammal

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Justification: The West African Manatee *Trichechus senegalensis* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Vulnerable. However, this species is highly threatened in West Africa and fewer than 10,000 individuals are thought to remain globally (IUCN 2015).

A single adult West African manatee was observed in the waters between Binari Island and the Banc de Dapiar during baseline surveys (EEM 2014). Many fishermen interviewed confirmed the presence of manatees within the study area (EEM 2014), indicating that the DMU still contains significant populations of this species vulnerable to disturbance. In light of this, it is recommended that this species be recognised as an important biodiversity value for the Project.

Reptiles

Species: Olive Ridley Turtle (*Lepidochelys olivacea*)

Type: Reptile

Species status (IUCN): Vulnerable

Presence in DMU: Confirmed

Justification: The Olive Ridley Turtle *Lepidochelys olivacea* does not qualify the DMU as Critical Habitat as its IUCN Red List status is Vulnerable. It is believed to nest in Îles Tristao (EEM 2014). All marine turtles are high profile and particularly if it is found to be nesting in the DMU then this species may attract additional stakeholder attention.

The carapace of an adult of this species was observed on Taïgbé Island.

Species: Nile Softshell Turtle (*Trionyx triunguis*)

Type: Reptile

Species status (IUCN): Not Evaluated

Presence in DMU: Confirmed

Justification: The Nile Softshell Turtle *Trionyx triunguis* does not qualify the DMU as Critical Habitat as its IUCN Red List status is currently being re-evaluated. It was previously listed as Critically Endangered but further information is being collated before its status will be re-evaluated. This is likely to be Endangered (T. Digne in litt.) and it may therefore be of concern for stakeholders.

One individual was observed in the estuary close to the existing port at Kamsar.

Appendix 5 – MBG botanical report



MISSOURI
BOTANICAL
GARDEN

**An MBG study conducted for The Biodiversity Consultancy
(TBC)**

Botanical risk assessment for Compagnie des Bauxites de Guinée (CBG) concession in Guinea

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Department

In collaboration with Gilles Dauby (IRD)

1. Summary

A two day desktop study was conducted to identify potentially threatened species present within the DMU of the Compagnie des Bauxites de Guinée (CBG) concession in Guinea. The site had previously been surveyed by a team from the Royal Botanic Gardens, Kew, which identified four species that were regarded as potentially threatened. Using the Kew report and information from three databases, we conducted a rapid assessment of the conservation status of the flora present (or potentially present) in the DMU. Our method identified 195 taxa to be added to the 295 previously identified by Kew, for a total of 490 taxa recorded for the DMU. Among these 195 newly identified taxa, four may be regarded as potentially threatened (*Fleurydora felicis*, *Ledermanniella abbayesii*, *Pseudoprosopis bampsiana*, and *Eriocaulon plumale* subsp. *kindiae*), the first three of which were not previously mentioned by the Kew report, and the one was mentioned but not as threatened. Among the four species cited in the Kew report as potentially threatened, three of them might in fact not be, and one (*Terminalia scutifera*) should be considered as Range Restricted. Finally, one additional species is highlighted: *Cathormion rhombifolium* is preliminarily assessed as VU, but further, more detailed studies could prove it to be threatened. Detailed information is provided on each of the potentially threatened species, along with an explanation of why species previously considered to be threatened appear not to be. General recommendations are also given, the most important being that survey work should be conducted at the project site during Oct and Nov, focusing in particular on the bowal, which is particularly likely to possess rare and/or threatened flora elements.

2. Aim of the study

- To document potential threatened and range restricted (RR) species within the DMU
- To provide comments on the Kew report and make suggestions for further studies that may be needed

3. Methods

We compiled information from the following sources:

- 1) The Kew report;
- 2) The Rainbio database (IRD database that comprises information from most of the herbarium specimens from tropical Africa);
- 3) An extract of all data for Guinea contained in the GBIF;
- 4) SONNERAT, the online database of the Paris herbarium was also consulted.

We established a list of species potentially present in the DMU by extracting data on specimens collected within the DMU zone.

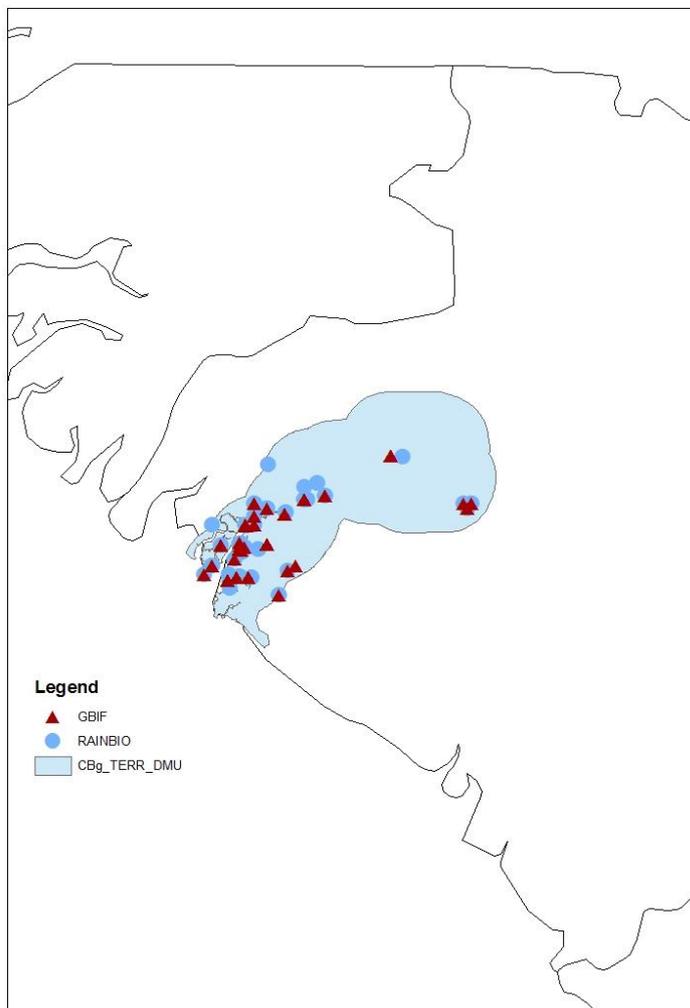
No verification of specimen identification was done, and by using data from GBIF we therefore established a list of species that are potentially present in the DMU (rather than a list of species whose presence is documented).

Calculations of EOO and AOO, and an estimation of the number of locations were done using the Rainbio method (analyses performed by Gilles Dauby). Each species was classified according to the following categories:

- Potentially threatened (PT) species (known from five or fewer locations)
- Range Restricted (RR) species (species with an EOO of less than 50,000 km²)
- Not threatened (NonT) species (those not corresponding to either of the other categories)

Locations were calculated using a grid cell of 10 × 10 km.

Relevant information for each PT and RR species was then compiled from databases after verification of specimens.



GBIF and Rainbio occurrences within the CBG DMU

4. Results

Species diversity

The Kew report listed 295 taxa. Extraction of the specimen recorded for collections made within the DMU added 73 further species from Rainbio and 122 species from GBIF. In total, 490 species (or intraspecific taxa) were recorded in the DMU. However, the GBIF data were not verified and should be considered with caution as they may contain duplicate records, misidentifications and other types of errors.

Note that according to IUCN Red List Criterion B, as applied by the Missouri Botanical Garden, a species may be CR if it is known from only one location, EN if from no more than 5 locations, VU+ if only 6 locations are known (if one or more of those locations falls within the zone of potential impact, and whose loss would render the species EN), and VU if known from 7 to 10 locations.

Potentially threatened species

The rapid Red List approach used here reveals four threatened species that were not previously mentioned as such in the Kew report. These species must be regarded as of conservation interest:

- *Fleurydora felicis* A.Chev. (Ochnaceae)

Description. Erect shrub or tree up to 15 m tall, with spreading branches. Leaves obovate. Long, branched inflorescences, bearing numerous yellow flowers.

Distribution. GUINEA (endemic). This species is known from 20 specimens, most of them from decades ago collected near Kindia. *Fleurydora felicis* appears to be very rare. The known collections represent only four locations. Within the DMU, this species is represented by one specimen in the Rainbio database (Lisowski, S. 51371), identified by P. Bissiengou in 2012.

Habitat. *Fleurydora felicis* occurs in gallery forest, along streams and rivers.

Conservation status. This species was assessed in 1998 as Vulnerable and appears on the IUCN Red List. No new locations has been found since, and on the basis of there being only four known locations, an assessment of **EN** might be justified. This species faces continuous loss of its habitat due to agriculture and drought.

Note. Even though *Fleurydora felicis* was not mentioned in the Kew report, it is very likely to occur in the DMU as our analysis showed that specimens have been collected there in the past. It should be searched for in habitats similar to those where it was previously collected: gallery forests and river banks.

- *Eriocaulon plumale* subsp. *kindiae* (Lecomte) Meikle (Eriocaulaceae)

Description. Small erect herb up to 30cm. Leaves up to 10 cm long, in basal rosette. Stem yellowish. Flower bracts dark brown, pistil white, anthers black. The subspecies was listed in Kew report.

Distribution. GUINEA (endemic). This subspecies is recorded in our database from six specimens that represent at least three locations. As most of the specimens are old, it is difficult to determine the

precise locality where they were collected. The two other subspecies that comprise *Eriocaulon plumale* are more widely distributed, and many specimens remain unidentified at the subspecies level.

Habitat. The habitat of *Eriocaulon plumale* is unclear. Specimens of this species have been collected in many different habitats: from damp areas in Bowal to granitic inselbergs with *Afrotrilepis*, rocky outcrop on slopes, or concretised iron soil with non-permanent areas of standing water. In general, most *Eriocaulon* species grow where there is seasonal water.

Conservation status. This species has not been assessed using the IUCN Red List criteria, nor have any of its subspecies. Nevertheless, with the current state of knowledge, *Eriocaulon plumale* subsp. *kindiae* might be classified as **EN** on the basis of it being known from just three locations. It is threatened by ongoing loss of the quality of its habitat, and is potentially impacted by agricultural development, mining and drought.

Note. *Eriocaulon plumale* subsp. *kindiae* is known from the DMU by several older specimens as well as material collected recently during surveys conducted by Kew. As part of a group of plants that has been understudied and overlooked in the field, it is probable that it is under-collected. Plants belonging to *E. plumale* subsp. *kindiae* should be searched for in all areas that present non-perennial standing water on rocks. While many specimens of *Eriocaulon plumale* have been collected in the past, the majority are not identified to the subspecies level. They should be reviewed as some of them may correspond to *E. plumale* subsp. *kindiae*.

- ***Pseudoprosopis bampsiana*** Lisowski (Fabaceae)

Description. Liana, sometimes shrub or tree, with longitudinally striated twigs. Compound leaves with many small leaflets. Flowers yellow, on elongated inflorescences.

Distribution. GABON – GUINEA – SIERRA LEONE. This rare species is only known from six specimens, representing the same number of locations: four in Guinea, one in Sierra Leone, and one in Gabon. It has not been collected in West Africa since 1979. The specimen from Gabon was collected in 1993, but its identification must be verified as it is the only collection that was not identified by the specialist on this group (van der Masen). In the DMU, the species was represented by one specimen in the Rainbio database.

Habitat. Remnants of gallery forest in wooded savanna, along rivers.

Conservation status. This species has not been assessed using the IUCN Red List criteria. Nevertheless, with only six known locations, it could qualify as **VU+**. *Pseudoprosopis bampsiana* is threatened by ongoing reduction in the quality of its habitat, and is potentially impacted by agricultural development, mining activities and drought.

Note. Even though *Pseudoprosopis bampsiana* was not mentioned in the Kew report, it is very likely to occur within the DMU as our analysis showed that specimens have been collected there in the past. It should be searched for in habitats similar to those as where it has been previously collected: gallery forests and river banks. Note that it is critical to confirm the identification of the specimen from Gabon because if it has been misidentified, the number of known locations would decrease 5, suggesting a possible assessment as **EN** rather than **VU+**.

- ***Ledermanniella abbayesii*** (G.Taylor) C.Cusset (Podostemaceae)

Description. Branched herb up to 30 cm; scale-like leaves 0.5-1 mm long, branched capillary leaves up to 3.5 cm long; spathellae up to 3 mm long; pedicel in spathella 2.75 (up to 7.5 mm) long; tepals 0.8 mm long; filaments when single 1.5 mm long at time of flowering, when two, filaments 1.25 mm and then andropodium 0.75 mm long; anthers 1.5 mm long; ovary 1.5 mm long; stigmas 0.75 mm; capsule cylindrical, about 3.5 mm long.

Distribution. GUINEA – LIBERIA. This species is only known from three specimens: the type collection (des *Abbayes* 898, made in 1948), another specimen collected at the same time (*Bourdu, s.n.*), both coming from Kinkon waterfall, near Pita; and a recent specimen (*C.C.H. Jongkind* 9459, made in 2010) collected in Liberia (Jèbèh River, near Zigida).

Habitat. This aquatic freshwater plant occurs on rocks in rivers, within forest.

Conservation status. *Ledermanniella abbayesii* is listed as Data Deficient according to the IUCN Red List, based on an assessment made in 2010. Nevertheless, with only two locations known, it could qualify as **EN**. This species is threatened by ongoing reduction in the quality of its habitat, and is potentially impacted by agricultural development, mining and drought.

Note. Even though *Ledermanniella abbayesii* was not mentioned in the Kew report, it is very likely to occur in the DMU as our analysis showed that specimens have been collected there in the past. Also, as part of a group of plants that has been understudied and overlooked in the field, it is probable that it is under-collected. It should be searched for in habitats similar as where it has been previously collected: rocky rivers and streams in forest.

5. Threatened species according to Kew report

The Kew report mentions **four** species of potential conservation interest. Detailed information on each of these is provided below.

- ***Rungia eriostachya*** Hua (Acanthaceae)

Description. Branched herb up to 30 cm; ovate-lanceolate leaves, decurrent petiole, strobiloid inflorescence, up to 15 cm long, with floral bracts covered with long white pubescence. Flowers white.

Distribution. GUINEA – GUINEA-BISSAU. This species is only known from eight specimens: two from Guinea-Bissau, and six from Guinea.

Habitat. *Rungia eriostachya* is usually found along streams in the Guinean savannah, or in Bowal, which is thus an important habitat for conservation. According to the Kew report, it is reported to have been found at the edge of a gallery forest.

Conservation status. This species has not been assessed using the IUCN Red List criteria. Nevertheless, with only eight locations known, it might qualify as **VU**. *Rungia eriostachya* is

threatened by ongoing reduction in the quality of its habitat, and is potentially impacted by agricultural development, mining and drought.

Note. It is unclear whether this species is rare, undercollected, or both. Nevertheless, in the current state of knowledge, it is clearly Range Restricted (EOO inferior to 50 000 km²) and therefore of conservation interest, so it should be searched for in the field, in suitable habitats.

- ***Milicia regia*** (A. Chev.) C.C. Berg (Moraceae)

This species has been assessed by the IUCN Red List Authority **VU** on the basis of demographic information (under Criterion A). This assessment was, however, made in 1998, and since then numerous specimens of *Milicia* have been re-identified, and this species now appears to be widespread in the Upper Guinea Region, from Senegal to Ghana. As a consequence, the **VU** assessment should be called into question and the species should be re-assessed.

- ***Terminalia scutifera*** Planch. ex M. A. Lawson (Combretaceae)

This species was mentioned as a Range Restricted species in the Kew report. It appears to be known from Senegal to Ghana, but seems to be rare. More than ten locations are known, but it is restricted to littoral woodland, a habitat that is facing intense threats. As a consequence, a proper assessment should be made that takes into consideration the threats on its habitat.

- ***Khaya senegalensis*** (Desr.) A. Juss. (Meliaceae)

This large tree has been assessed as **VU** according to the IUCN Red List, based on the assumption of high threat due to habitat loss and low regeneration rate. However, this assessment was made in 1998 and should be updated because additional specimens have been collected since and evidence of cultivation throughout Africa has been reported, which points toward this widespread species that ranges across tropical Africa in fact not being threatened. It likely corresponds to a threat status of Least Concern (**LC**).

In addition to the species mentioned above, our study highlighted one additional species that was preliminarily assessed as **VU**. While not corresponding to a threat status that would trigger the presence of critical habitat, according to the International Finance Corporation Performance Standard 6 (IFC PS6), it should be considered in further studies as a re-assessments could result in a change in status.

- ***Cathormion rhombifolium*** (Benth.) Hutch. & Dandy (Fabaceae)

Description. Tree to 8-10 m tall. Flowers white and odorant. Fruits in elongated pods.

Distribution. GUINEA – GUINEA-BISSAU – SENEGAL – SIERRA LEONE. This rare species is known from 11 specimens, albeit well distributed in west Africa, which appear to represent 10 different locations.

Habitat. *Cathormion rhombifolium* is known from swampy forests and river banks.

Conservation status. This species has not been assessed using the IUCN Red List criteria. However, with ten known locations, *Cathormion rhombifolium* could qualify as **VU**. It is threatened by ongoing reduction in the quality of its habitat, and is potentially impacted by agricultural development, mining and drought.

Note. Even though this species was not mentioned in the Kew report, it is very likely to occur in the DMU as our analysis showed that specimens have been collected there in the past. The preliminary assessment as VU should be taken with caution. Many specimens are old and are not accompanied by precise information on the site of collection, which makes it difficult to determine the precise number of locations. Moreover, these specimens may have been collected in places where the species no longer occurs. New specimens should be collected, and the species should be searched for in habitats similar to those where it has been previously collected: swamp forests and river banks.

6. Recommendations

- As suggested in the Kew report, fieldwork during the wet season (October and November) should be a priority for assessing floristic diversity. Without reliable information from this time of year, there is a significant risk that many potentially threatened plant species occurring within the DMU will remain undocumented. Targeted inventories should be conducted in the bowal because this particular habitat might contain many potentially threatened species, but it has not yet been surveyed during the appropriate period.
- The presence of *Ledermanniella abbayesii*, *Pseudoprosopis bampsiana*, *Cathormion rhombifolium*, *Eriocaulon plumale* subsp. *kindiae*, and *Fleurydora felicis* within the DMU should be confirmed by targeted inventories in appropriate habitats.
- An update of the identification of the specimens collected by Kew should be undertaken by Kew specialist.
- Available material of *Eriocaulon plumale* should be examined to determine if *E. plumale* subsp. *kindiae* should be considered as threatened. Without this information it is impossible to provide a reliable assessment of the status of this taxon. It should, however, be regarded as threatened until proven otherwise.

APPENDICES

Appendix 9.12 Biodiversity Action Framework (BAF)



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Biodiversity Action Framework for the CBG Expansion Project

COMPAGNIE DES BAUXITES DE GUINÉE

SEPTEMBER 30, 2015

PROJECT NUMBER: 14EB085

PREPARED FOR:

Xavier van Lierde, Responsable Approvisionnement – Projet Extension

Compagnie des Bauxites de Guinée

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1 INTRODUCTION

Compagnie des Bauxites de Guinée (CBG) has been operating since 1973. It is now proposing to increase its bauxite production at its existing treatment plant and port facilities at Kamsar and mine in Sangarédi in northwest Guinea (the CBG Expansion Project). This document presents the Biodiversity Action Framework (BAF). It identifies the key issues relating to biodiversity for the Expansion Project and outlines how CBG will manage its biodiversity risks and comply with IFC's Performance Standards and OPIC's Environmental and Social Policy Statement (OPIC, 2010). The framework will be followed up with a detailed Biodiversity Action Plan (BAP) to be released in November 2015.

This document has been informed by the data, impacts and mitigation measures identified in the Environmental and Social Impact Assessment (ESIA, 2014), the Supplementary Information Package (SIP, 2015), the Critical Habitat Assessment (CHA, 2015) prepared by The Biodiversity Consultancy (TBC), and the initial chimpanzee report prepared by the Wild Chimpanzee Foundation (WCF, 2015). It also builds upon the recommendations of numerous experts and the outcomes of a meeting in Paris in early August between representatives of IFC, OPIC, CBG and other interested parties and their consultants.

The structure of this document includes two main parts. The first part describes:

- The nature of the Expansion Project (Section 2); and
- The existing biodiversity context (Section 3).

The second part deals with impacts to biodiversity and how to deal with them and includes:

- A statement on CBG's commitment to biodiversity protection (Section 4);
- A listing of elements comprising the international and national framework for conserving biodiversity (Section 5);
- An assessment of issues related to biodiversity conservation in the Expansion Project and a strategy for addressing those issues (Section 6);

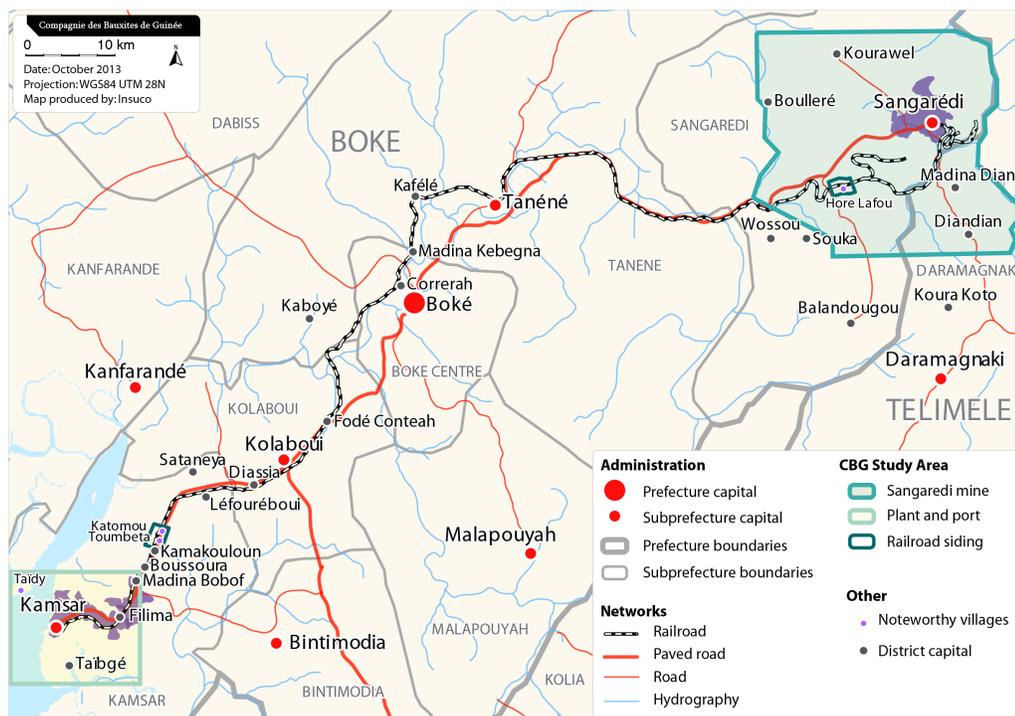
- A discussion of methods of implementing biodiversity conservation actions (Section 7);
- A short description of action plans to be included in the BAP (Section 8); and
- A short description of the monitoring framework (Section 9)

1.1 Background

Compagnie des Bauxites de Guinée (CBG) is a mining company owned jointly by the Government of Guinea (GoG) and Halco Mining (Alcoa, Rio Tinto Alcan and Dadco). CBG currently mines, transports by railroad, treats and ships about 13.5 million tonnes per annum (MTPA) of bauxite at 3% humidity (nominal capacity of the treatment plant) at facilities in Kamsar and Sangarédi in northwest Guinea. CBG facilities have been in operation since 1973. The company operates three sites:

- The Sangarédi mining area (plateaus of N’Dangara, Sangarédi, Boundou Wandé, Bidikoum, Parawi and Silidara);
- The railroad network; and
- The treatment plant at Kamsar (including the port).

Map 1 Map of Project area



CBG is considering increasing its bauxite production by 9 MTPA of shipped material to a production capacity of 22.5 (at 3% humidity) by the last trimester of 2017 with another increase of 5 MTPA, to a production capacity of 27.5 MTPA around 2022. An intermediate step is planned at 18.5 MTPA. The CBG Expansion Project (the Project) includes an increase in the rate of bauxite extraction, transport and treatment, and construction and modifications to CBG's infrastructure, equipment and operations.

In 2013, CBG mandated ÉEM to conduct an environmental and social impact assessment (ESIA) of the Expansion Project. This study was conducted according to legal and regulatory requirements at the national level as well as the performance standards of the International Finance Corporation (IFC). The terms of reference were approved by the Guinean Ministère de l'Environnement, des Eaux et Forêts on November 8, 2013, and the final scoping report was submitted to the Bureau Guinéen d'Études et d'Évaluation Environnementale (BGÉÉE) on December 5, 2013.

The final French version of the ESIA was submitted to CBG on January 10, 2015. The BGÉÉE organized a meeting of interested agencies in Conakry on May 18, 2015 at the conclusion of which it approved the ESIA, subject to clarification on a few points.

1.2 Objectives of the Biodiversity Action Framework and Biodiversity Action Plan

CBG's approach to managing biodiversity risks is to seek to avoid impacts on biodiversity and ecosystem services. Where avoidance is not possible, CBG will identify measures to minimize impacts, and implementing good practice rehabilitation. If the predicted residual impacts are still considered significant, then offsetting measures will be developed.

This framework and subsequent action plan will outline how CBG will:

- Refine its understanding of risks by revising the impact assessment based on additional studies;

- Minimize those risks by putting in or elaborating on mitigation measures outlined in the ESIA;
- Implement further actions to achieve a no net loss of biodiversity and a net gain for those features that trigger critical habitat designation;
- Involve experts and stakeholders;
- Facilitate the involvement or participation of local populations and organizations in the project; and
- Ensure effective and independent monitoring.

2 PROJECT SCOPE

2.1 Project Area

According to the description of the CBG Expansion Project, its footprint can be divided into three separate zones (Map 1):

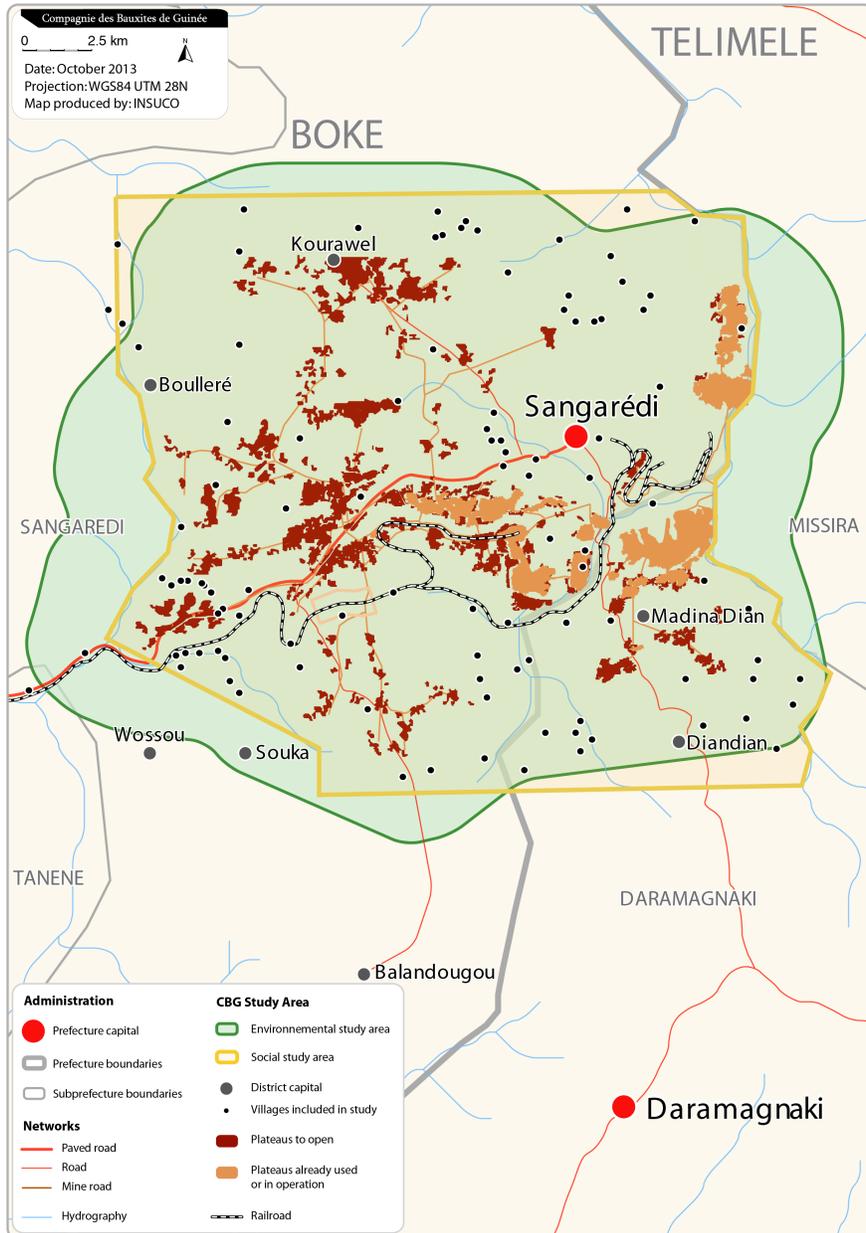
- The bauxite mining area around Sangarédi;
- The mouth of Rio Nuñez, an area that encompasses the CBG plant, the mineral loading port and the area used by the ships carrying the ore out to the estuary limit; and
- A corridor along the railroad between Sangarédi and Kamsar, with particular emphasis on two sections where rail sidings are to be built.

The boundaries of the ESIA Environmental Study Area for the mine (Map 2) correspond to the perimeter of the areas that will be mined, plus an additional 3 km around the perimeter to take into account the effects of mining operations (noise, dust, etc.).

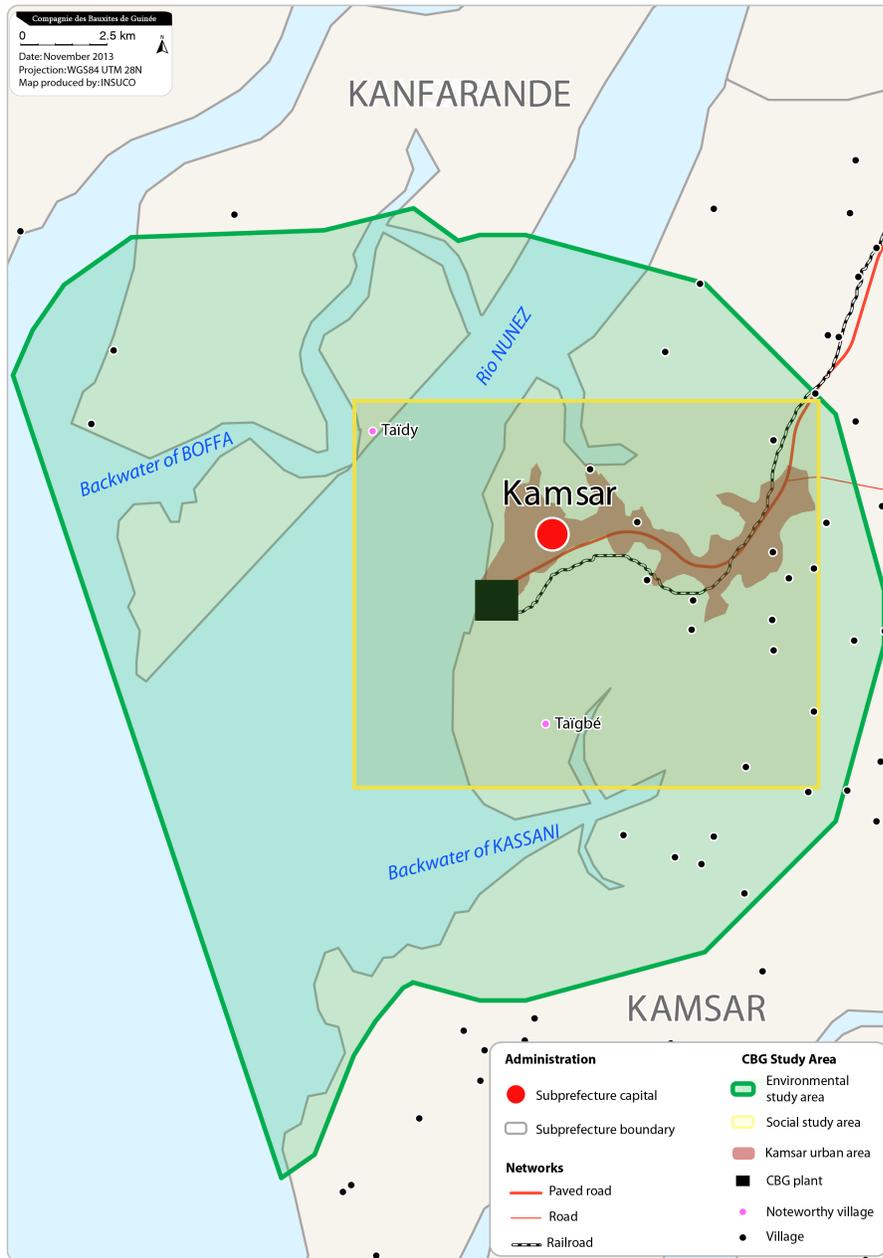
The ESIA Environmental Study Area for plant and port was determined by superimposing two potential impact zones. The first is a 10-km area around the CBG plant and port; this is a conservative buffer for impacts related to air quality and noise. The second is a marine area likely to see impacts from the port facilities and increased marine traffic. This area covers the mouth of Rio Nuñez as well as certain important biological environments nearby.

The Study Area for the railroad is a corridor 2 km wide (1 km on either side of the railroad).

Map 2 Sangarédi Study Area

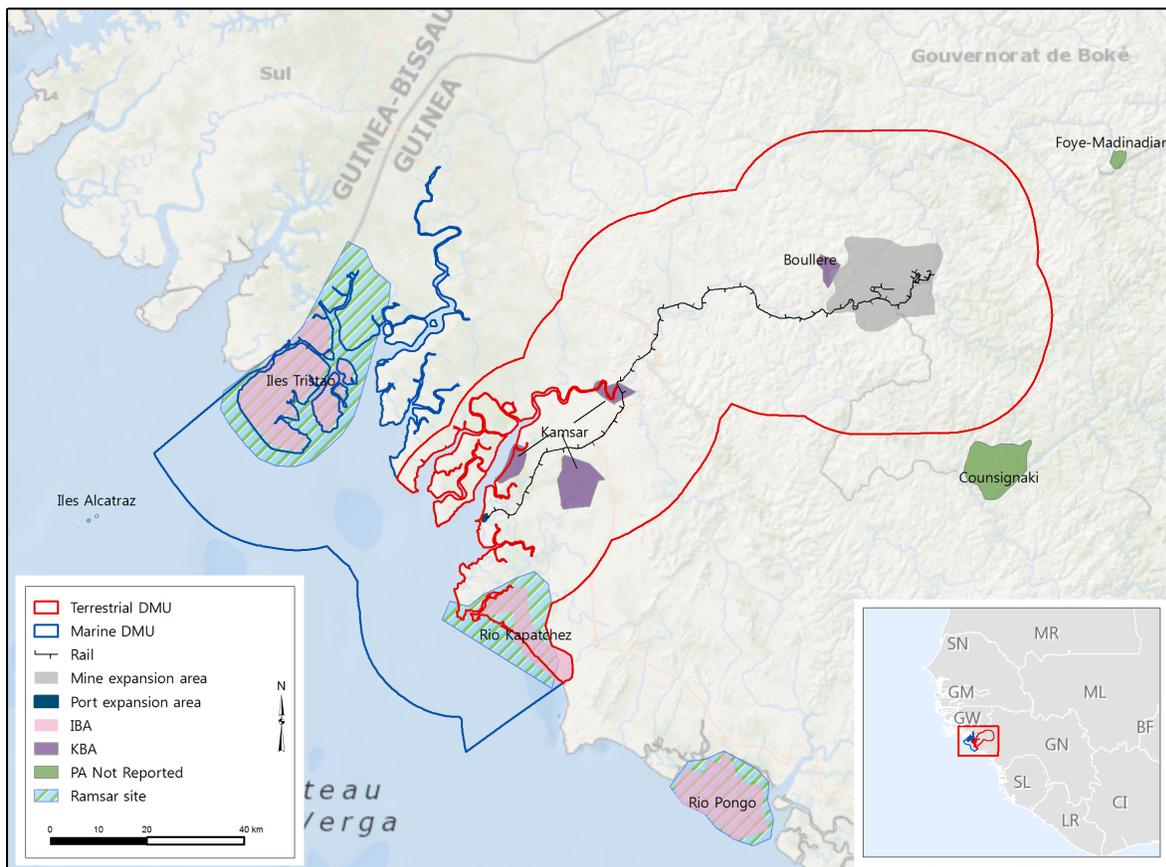


Map 3 Kamsar Study Areas



In addition to the Study Areas defined in the ESIA based on likely impact areas, the CHA report identified much broader discrete management units (DMUs) according to the methodology of Performance Standard 6 of the IFC. These are useful in terms of identifying potential species of concern that may be present.

Map 4 Discrete management units identified in the CHA report (TBC, 2015)



Source: TBC, 2015. *CBG mine expansion project: Critical and Natural Habitat Assessment*

2.2 Project components

The CBG facilities have been in operation for over 40 years. The Expansion Project ESIA looks at the implications of an increase in production rate. Without the Expansion Project the operations would continue as they have, including the gradual mining of all of the new mining areas considered in the ESIA. It is admittedly hard to separate out background of the continued operations and the effects of an increased production rate and the ESIA has tended to generally consider broader implications. The following are short descriptions of changes anticipated in the operation of the facilities.

At the mine site, the Expansion Project will mainly consist in acquiring equipment (loaders, trucks, bulldozers, water tanks), hiring people to operate it and increasing the rate of extraction from the mines. The use of surface miners will also be studied for ore extraction on some of the plateaus. With the addition of new heavy machinery, the existing shops will no longer be adequate, and new facilities will be built. Construction of the new rail and stockpiling yard at Parawi and the associated infrastructure (road, bridges, railroad)—already planned by CBG for the move to the north side of the national highway—will be accelerated.

From the mine, the bauxite is hauled to the Kamsar plant via a railroad line conceded to CBG by the Government of Guinea (ANAIM). At present, an average of five 120-car trains loaded with ore leaves the Sangarédi mine every day for Kamsar. Each car contains some 82 tonnes of bauxite. In order to increase the production rate, the train runs will be modified and improved: instead of two to three locomotives and 120 cars, they will have three locomotives and 130 cars. Besides increasing the number of cars in each train, the addition of locomotives will make it possible to maintain a rhythm of up to nine trains a day to Kamsar, seven days a week. To optimize the train runs, new sidings will have to be built between the mine and Kamsar, at kilometers 14 and 118, to allow the trains to pass each other.

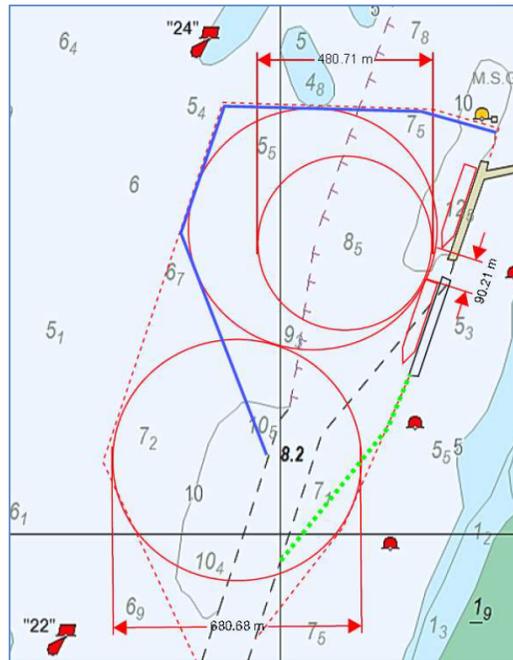
The plant modifications are within the perimeter fence of the Kamsar CBG facility and do not directly affect natural habitat. The modifications are therefore only

briefly described here. Changes to noise and air quality from the modifications are covered in Chapters 2 and 4 of the ESIA, and the SIP.

The Expansion Project will require the construction of a new car dumper and, consequently, modifications to the tracks in the rail yard at the plant entrance. All the necessary equipment will be built within CBG's existing property (zoned industrial). The impact crushers now in use will be replaced by a two-stage crushing system capable of processing the equivalent of 27.5 MTPA. Two new dryers will be needed to dry all of the ore extracted. As part of the Expansion Project, new covered conveyors will be installed and some of the existing ones will be modified to improve ore transport and adapt it to the new equipment. Dust control will be ensured at all chutes and transfer points. Dust will be controlled by suppression in the wet plant and by collection in the dry plant. Because the Project will increase power demand by 28.35 MW, four additional generators will be needed at Kamsar, two of which are planned for the 18.5 MTPA phase.

The expansion of ore production will necessitate modifications to the ship-loading quay. Now 275 m long, the quay will be extended by 301 meters so that two Kamsar Max type carriers can be docked at the same time, thereby allowing continuous loading. Lengthening of the quay and expansion of the turning basins will require dredging in the estuary. However, the dredging has been reduced to a minimum, with a total volume of 419,000 m³ (Map 5). At maximum production rate, ore ship traffic will double.

Map 5 Dredging area and quay extension



Source: Royal Haskoning DHV. *Quay Structures – Pre-Feasibility Study* – Dredging zone indicated by red dotted line

2.3 Project timing

Phase I consists in raising production to 22.5 MTPA in 2017 or later. Works and investments in this phase include a new rail yard (Parawi), extension of the siding at PK 72, and the purchase of new railcars.

Phase I has an intermediate stage, which consists in raising production to 18.5 MTPA. A series of works and investments must be made in order to achieve this

increase in ore production, processing and shipping—such as the purchase of new rolling stock (railcars, locomotives), a new rail yard at Kamsar, extension of the existing quay (south) and dredging of part of the port.

Phase II of the Extension Project will raise production to 27.5 MTPA by 2022. Works and investments for this phase include construction of shops at the N'Dangara mine and construction of railroad sidings at PK14 and PK118.

3 BIODIVERSITY CONTEXT

3.1 Introduction

There are two distinct biological environments covered by the project.

The mine area is a region of plateaus with bauxite deposits cut by a dense network of watercourse and associated valleys. The port and plant At Kamsar are located in a low coastal plain with mangroves and tidal inlets.

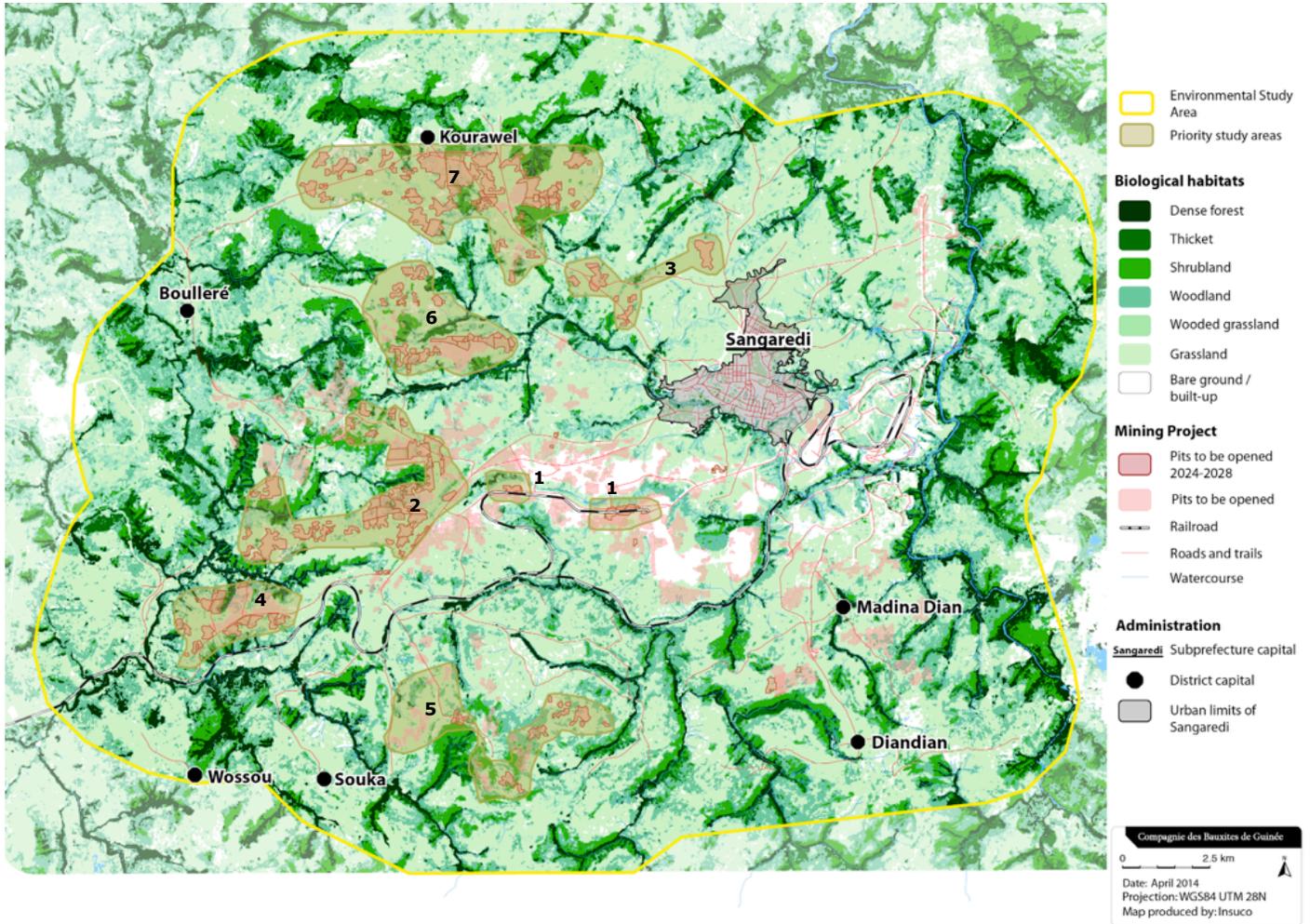
3.2 The mining area - Sangaredi

The Upper Guinea forest area is a biodiversity hotspot, although it is under great pressure across the region because of the increasing human population. There are remnants of this forest in the gallery forests and occasional treed islands found in the general area of the Project. The Fouta Djallon, east of the Study Area, is a hotspot for regional endemics, but many of these do not stretch as far west as the Project area.

The Study Area around Sangarédi (Map 6) was once largely a matrix of wooded grassland and woodland, grassland bowal vegetation and forest along the rivers and watercourses. Much of this wooded grassland and woodland was cleared for farming in previous centuries, and the gallery forests are increasingly impinged upon

because of fires set to clear land for agriculture; however, fragments and gallery forest can provide refuge for a number of conservation-important forest species.

Map 6 Habitats around Sangarédi



Dense forest

This is a climax vegetation type that is generally diverse in species, including conservation-priority species. Surviving forest is rarely encountered since all the forests visited have been modified more or less strongly by human activities, such as harvesting of species for wood and encouraging the growth of specific species such as the oil palm. In the Study Area, what remains is therefore degraded forests, particularly along watercourses: the gallery forests.

Gallery forest

Occurring in ribbons along watercourses, possibly persisting because of the need to stabilize river banks, this vegetation is relatively respected by people on the banks. The gallery forests often include swamp forest species that are present because the water table is higher on river banks than under "forest islands." In general the gallery forests in the survey areas were narrow (around 50m wide) and partially degraded on the landward edges, owing to agriculture, including burning.



Wooded grassland and woodland

The wooded grassland and patches of woodland are typical of the Sudan-Guinea grassland-woodland biome, and the diversity of these formations is lower in areas with limited precipitation, such as in the Study Area. These are the most widespread and common vegetation types in Guinea and have a broadly similar species composition from Mauritania in the west to South Sudan in the east. This vegetation type has often been termed “savannah” but that term has been widely misapplied.

Bowal grassland

Bowal is a form of grassland characterized by a hard substrate, impeded drainage and thin or absent organic soils that result in an absence of woody plants. It is seasonally inundated grassland and with a unique assemblage of species, including some restricted to bowal.

Bowal appears superficially as flat grassland without trees. It is defined by the substrate of concretized ironstone that forms an orange-red rock-like, usually flat surface, more or less impervious to water. Bowal grassland is usually shorter (typically 1 m) and sparser than the grassland that occurs in wooded grassland, where soils are deeper. The bowal in the Sangarédi area appears to have a lower diversity than other bowal grassland found in Guinea such as that at the edge of the Fouta Djallon.



3.3 The plant and port – Kamsar

The habitats around Kamsar consist of a complex pattern of tidal inlets, mangrove and agricultural land (Map 7). Mangrove is characterized by open or closed stands of trees or bushes occurring on shores between the high and low water mark. It is an important habitat for marine species and terrestrial species. Along the shore there are some areas with sand banks or beaches, or more commonly mud flats.



Map 7 Habitats around Kamsar



3.4 Protected and internationally recognized areas

The DMUs include several important areas of high biodiversity (see Map 4). These include the Rio Kapatchez and the Îles Tristao Ramsar and Important Bird Area (IBA) sites on the coast. Inland there are two Key Biodiversity Areas (KBAs) near Kamsar and Boulléré, both identified as important for chimpanzees. Finally there is a candidate marine IBA (Île Alcatraz and Île du Naufrage) along the coast north of the Rio Nuñez estuary. None of these are within the ESIA Study Areas except one piece of the Kamsar KBA that is crossed by the Kamsar to Sangarédi railway and the Boulléré KBA near Sangarédi.

3.5 Species to be included in the BAP

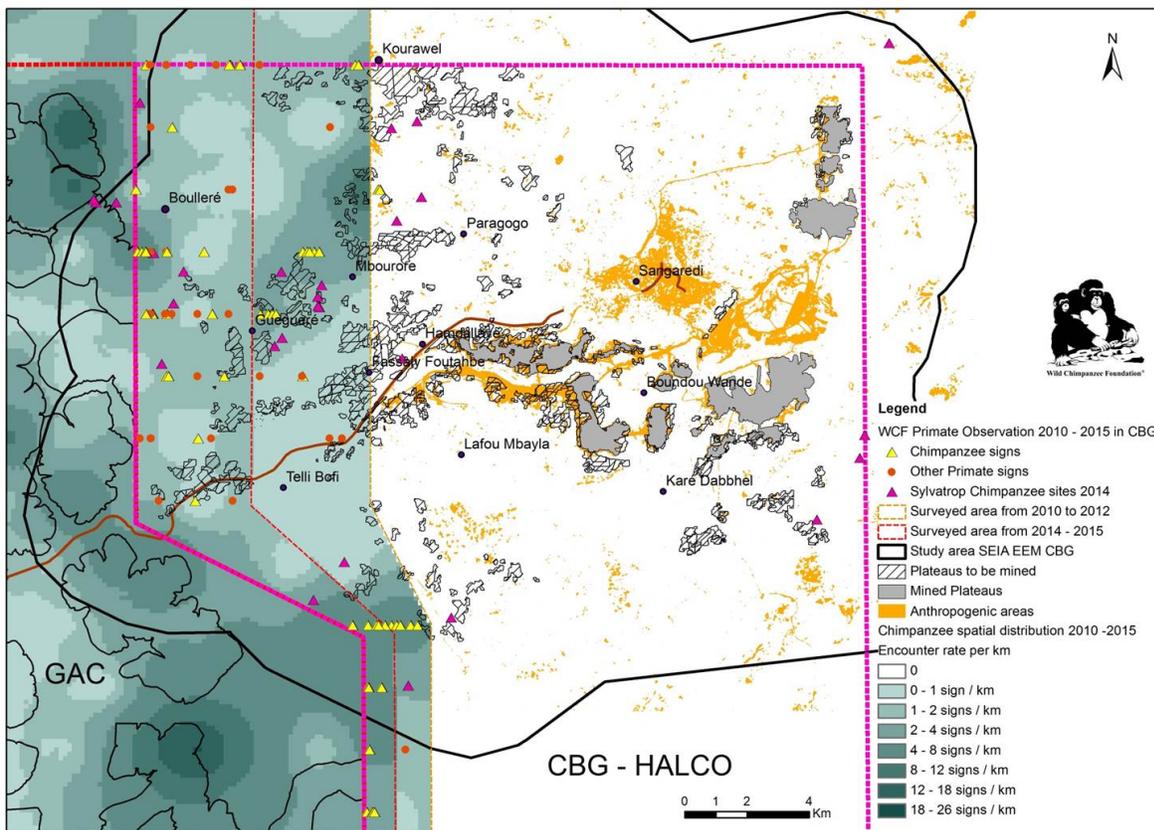
Studies for the ESIA identified a large number of species of concern, including two Critically Endangered species and 12 Endangered species. In addition other species are deemed to be of high priority because of their limited range, their status is likely to be upgraded or they are thought to be of high stakeholder concern.



African golden cat ©Sylvatrop Consulting, 2014



West African chimpanzee ©Sylvatrop Consulting, 2014



Summary of chimpanzee observations (Source: Wild Chimpanzee Foundation, 2015)



Kunda half-toed gecko ©Sylvatrop Consulting, 2014

Appendix 10.1 lists all the potential species of concern identified from the DMUs and the SAs and identifies those species that will be carried forward to the BAP and have species action plans developed for them (see also maps in Appendix 10.3). Results from fieldwork currently being undertaken may result in changes to that list.

3.6 Habitats to be included in the BAP

The CHA considered the estuary, mangrove and the freshwater aquatic system as critical and quasi all other habitats as potentially critical based on the possible presence of CH-qualifying species, but did not map them. The issue of identification of critical habitat will be re-examined in the BAP following fieldwork on key species

during September to November 2015 and therefore at this stage all of the identified habitats are being carried forward in the BAP.

4 CBG'S COMMITMENT TO PROTECTING BIODIVERSITY

As stated above CBG is committed to effectively managing biodiversity risks of project development. CBG's Environmental and Social Management Plan (ESMP) for the Expansion Project states:

"One objective of this ESMP is to make sure the Project complies with international and Guinean environmental and social legislation and requirements throughout the four Project phases: design, construction, operations and closure. Given the importance given by the Republic of Guinea to biodiversity, demonstrated in its laws, action plans and international conventions it has ratified, CBG reaffirms its adherence to the principles and recommendations of these texts and reminds them to its employees and subcontractors...

In view of the presence of numerous important species for conservation and of critical habitats in the study areas, discovered during the ESIA, and that might be impacted by the Expansion Project, CBG commits to take mitigation measures required by applicable Guinean and international texts and the IFC Performance Standards for their protection."

It is understood that this includes meeting Performance Standard 6 of the IFC (PS6), and in particular causing no net loss to natural habitats, a net gain in critical habitats and the requirements in relation to internationally recognized areas.

The ESMP recognizes that the BAP will be the mechanism for achieving biodiversity goals for the Expansion Project.

5 FRAMEWORK FOR CONSERVING BIODIVERSITY

As stated in the quote in Section 4 from the ESMP, the Expansion Project “...complies with international and Guinean environmental and social legislation and requirements throughout the four Project phases: design, construction, operations and closure.”

The detailed framework for conserving biodiversity within the Expansion Project is presented in the SIP, notably identifying:

- International conventions and treaties;
- National biodiversity strategies and action plans;
- Legislation; and
- Finance and industry guidelines.

6 BIODIVERSITY ASSESSMENT AND STRATEGY

6.1 Main issues

The main issues to be resolved during the production of the BAP are related to:

- Chimpanzee distribution and habitat use near the areas to be mined;
- Presence of other endangered species in the plateau areas to be mined;

- Impacts outside of the mine areas proper related to noise and water quality and resources;
- Dredging impacts in the Rio Nunez estuary;
- Underwater noise impacts in the Rio Nunez estuary;
- Further reducing impacts to sensitive species and critical habitat by avoidance and/or specific mitigation measures as new data on species distribution is gathered;
- Re-assessing impacts;
- Compensating residual impacts to sensitive species and critical habitat; and
- Approaches towards regional and cumulative impact assessment.

The specific measures that CBG has committed to in order to conserve biodiversity are summarized in the SIP. The issues listed are addressed in a more comprehensive way in a table in Appendix 10.2 showing the problems and the proposed solutions to the problems.

6.2 Develop a CBG biodiversity strategy

A CBG Biodiversity Strategy establishing the company-specific approach to biodiversity management will be produced and presented in the BAP.

6.3 Undertake additional studies and on-going monitoring during the BAP

As part of the BAP, CBG has undertaken to continue or initiate a number of studies to help clarify certain critical points:

- A concession-wide survey of primates with an emphasis on chimpanzees by the Wild Chimpanzee Foundation (WCF) – September to October 2015;
- A focused survey of chimpanzee nests near the proposed mining areas by Sylvatrop Consulting – October to November 2015;

- A focused survey of chimpanzee use of plateau habitats on or near the proposed mining areas by Sylvatrop Consulting – October to November 2015;
- A survey of endangered species identified as of potential concern on or near the plateau habitats near the proposed mining areas (Kunda half-toed lizard, purple marsh crab, endangered vultures, etc.) by Sylvatrop Consulting – October to November 2015;
- A survey of the sediments and benthic invertebrates at the dredging and dredging material disposal sites by ÉEM/CBG – ongoing;
- Additional physical sampling programs (surface water quality, sediment quality, water discharge, groundwater levels and quality, air quality, noise) by ÉEM/CBG/ARCADIS – ongoing; and
- Modeling of the underwater sound produced during quay construction to be conducted by ARCADIS – October to November 2015.

The terms of reference for these studies and the studies themselves are open to revision and review.

The results of these studies will be assessed in terms of impacts to natural and critical habitat and adequate mitigation will be put into place to address the issues.

6.4 Revise the impact assessment

Additional details have been added in the SIP to the original impact assessment in the ESIA. Using the additional data from the studies described in 6.3 and external consultation, the impact assessment will be revised in the BAP to determine more accurately residual impacts after implementation of:

- Avoidance measures - the studies may lead to the identification of certain areas to be avoided during the Project;
- Specific mitigation - the studies may lead to the identification of certain additional specific mitigation measures to be applied during the Project; and

- Pit restoration - further details on the rehabilitation and restoration of mined areas to promote their biodiversity value will be provided.

6.5 Develop a Biodiversity Offset Strategy

It is likely that even after all forms of impact reduction have been applied (avoidance, mitigation, restoration), various offset or compensation strategies will have to be implemented to protect biodiversity and meet IFC PS6 guidelines. CBG will develop a Biodiversity Offset Strategy in the BAP.

Biodiversity offsets are conservation activities designed to compensate for project-induced biodiversity losses that remain after all other feasible mitigation measures have been applied. Offset activities should result in verifiable conservation outcomes that are sustained over time and are additional to the baseline. The goal of CBG biodiversity offsets is to achieve a Net Gain for those biodiversity values for which the critical habitat was designated. The design of biodiversity offsets must adhere to the “like-for-like or better” principle.

The offsets to be included in the BAP will follow international standards and guidelines, including:

- Like for like or better: In general, biodiversity gains at an offset site should support similar species, habitats, ecosystems or ecological functions as those impacted. In practice however, “like for like” exchanges for all biodiversity values is difficult to achieve and conservation goals may not be best served by adhering to a strict like for like principle
- Offsets must deliver conservation gains beyond those that would be achieved by activities already being implemented by others.
- Offsets must be enduring, and should be monitored and managed adaptively to achieve biodiversity conservation objectives in the long term;
- Offsets must be based on sound science and enough reliable and relevant information;
- Offsets must be located appropriately, according to biodiversity priorities in the area and in support of strategic biodiversity plans;

- Offsets must be enforceable – through conditions, covenants or contracts;
- Offsets must provide long term security for tenure;
- Offset must provide long term security for management (specialist involvement where appropriate, management and/or restoration actions, monitoring and evaluation, auditing and reporting);
- Stakeholder participation: the effective participation of stakeholders should be ensured in decision-making about biodiversity offsets, including their selection, design, implementation and monitoring.
- Equity: a biodiversity offset should be designed and implemented in an equitable manner. This means sharing rights and responsibilities between stakeholders, as well as risks and rewards associated with a project and related offset in a fair and balanced way

CBG will be implementing both on site and offsite offsets. This is currently being explored in more detail. A feasibility study will be carried on a number of options. This study will be included in the BAP. Local offsets may involve measures to protect and restore important habitat such as the gallery forests, watercourses and wooded grassland. Protecting and enhancing the long-term role of the gallery forests as corridors for species is an important goal. The possibility of a protected area in the Boulléré region, between the GAC and CBG projects is an interesting possibility that could see inputs from both companies.

External offsets may include contributing to the development of a protected area in the Bafing region of Guinea (WCF 2015) where an estimated 4,000 chimpanzees currently live.

7 IMPLEMENTATION

7.1 Overview

This section in the BAP Framework remains at a fairly high level. Specifics of implementation will come from more detailed development of the action plan components in the BAP.

7.2 Management System Interfaces

7.2.1 Environmental and Social Impact Assessment (ESIA) and Supplementary Information Package (SIP)

The ESIA is a stand-alone series of documents that reflects information and analysis of environmental and social impacts arising from the CBG Expansion Project as they were understood in December of 2014, as well as commitments to mitigate these impacts by the CBG. The SIP serves to complement these analyses and commitments with responses to questions and additional information which have arisen since the ESIA's submission to the authorities. Readers must have both the ESIA and the SIP to fully grasp the state of knowledge of the Project's impacts.

The BAP includes and builds upon the measures detailed in the ESIA for reducing impacts to biodiversity.

7.2.2 Environmental and Social Management Plan (ESMP)

The current CBG ESMP for the Expansion Project is included in the SIP.

The ESMP constitutes the basis for the process of implementing the mitigation measures that were identified in the ESIA throughout the four Project phases: design, construction, operations and closure.

The ESMP includes measures related to biodiversity but it specifically delegates to the BAP the responsibility for bringing together all of the biology related measures and the development of a plan to meet the requirements under Performance Standard 6 of the IFC.

The ESMP is expected to evolve over time and incorporate lessons learned and new data. When the BAP is finished, it will explicitly become part of the evolving ESMP.

7.2.3 Stakeholder Engagement Plan (SEP)

Extensive stakeholder engagement was carried out as part of the ESIA. The BAP takes into account the results of the consultations undertaken under the SEP. Following the production of the BAF, the CBG will consult with stakeholders and explore partnerships. It is only through these partnerships and local involvement that effective protection plans can be implemented.

The SEP developed during the ESIA provides the structure for all interactions among stakeholders regarding the CBG Project, including the consultation process itself. The final BAP will include a stakeholder engagement program to address biodiversity and ecosystem services.

7.2.4 Resettlement Action Plans (RAPs)

Resettlement action plans are currently underway and will be produced as needed during the life of the Expansion Project. Resettlement of villages can have complex implications for biodiversity (development of a new village site proper, displacement of agricultural activities) and there is a need for ongoing communications and inputs from the BAP and RAPs.

7.3 Biodiversity control framework

The biodiversity control framework will work through a series of structures that will include:

- Existing control structures within CBG;
- The ESMP;
- Creation of a biodiversity management unit within CBG;
- Plateau management approach;
- Issue-specific management plans such as: Harvesting Management Plan (bushmeat and wood), Community Engagement Plan, Fisheries Management Plan, Induced Access Management Plan, Infrastructure Closure and Decommissioning Plan and species-specific management plans;
- RAPs;
- Stakeholder and partnership roles including establishing a biodiversity and ecosystem services working group;
- Compliance audits; and
- A review and improvement procedure.

7.4 Roles, responsibilities and resources

The BAP will outline specific responsibilities for carrying out and supervising the tasks in the action plans.

One specific role is worth specifying. The management of the various biodiversity-related issues in this Project will take considerable skill and expertise. The CBG will therefore name a biodiversity specialist of demonstrated experience and competence on similar jobs to coordinate and oversee the biodiversity-related tasks. In particular that person will be responsible for the carrying out of the action plans specified in the BAP.

7.5 Training and competence

The BAP will outline the training and competence requirement of:

- CBG employees in general (orientation sessions regarding biodiversity matters);
- CBG personnel in a management role;
- CBG personnel responsible for implementing key tasks related to biodiversity;
- The biodiversity specialist; and
- External consultants involved in implementing key tasks related to biodiversity.

7.6 Communication

Regular consultation of the public (especially local communities and authorities), and active and continuous public participation, must lead to achievement of the following objectives:

- Provide an opportunity for affected and concerned persons to express their preoccupations and to influence decision making right at the start of the Project;
- Inform and raise awareness in persons or groups affected by the Project or having an interest in it or in its potential impacts;
- Knowledge about the local situation and traditional values;
- Reducing conflict between stakeholders (CBG, civil society, etc.);
- Informed decisions, in particular regarding the most damaging impacts and the mitigation measures;
- Improved transparency and responsibility for CBG; and
- Trust between CBG, government institutions and affected communities.

Regular communication of environmental results and observations is essential. For this reason, an annual report will be produced for CBG management, government authorities and local stakeholders. It will also be sent to lending institutions (such as IFC) and, where applicable, to interested NGOs and other institutions concerned.

The report will contain a copy of all final or annual reports received on the various works under way during the year (additional studies, action plans, follow-up reports, site rehabilitation, etc.) as well as monitoring reports on air quality and noise.

In addition, it will report on incidents and animal sightings (including those by drivers, jobsite managers, etc.) and will contain summaries of all meetings held with the public or with government bodies on environmental topics.

8 ACTION PLANS

8.1 Habitat action plans (HAPs)

The habitat action plans are being developed as part of the final BAP but will include at least detailed actions related to:

- Restoration guidance;
- Protection of Critical Habitat;
- Local offsets;
- External offsets;
- Mining haul road studies: key areas and long-term use of roads; and
- Actions leading to regional approaches to protection of key habitats: Cogon corridor, gallery forests, bowal vegetation and the Rio Nuñez estuary.

The HAPs will be detailed in a BAP Register in the full BAP document, a spreadsheet listing all of the actions related to the HAPs, similar to the format used in the ESMP. The costs for the HAPs will likewise be detailed.

8.2 Species action plans (SAPs)

The species action plans are being developed as part of the final BAP but will include at least detailed actions related to:

- Protection of chimpanzees and other primates;
- Protection of freshwater endangered species (fish and frogs);
- Protection of endangered vultures;
- Protection of hippopotamus;
- Protection of endangered reptiles; and
- Protection of key marine species in the Rio Nuñez estuary.

The SAPs will be detailed in a BAP Register in the full BAP document, a spreadsheet listing all of the actions related to the SAPs, similar to the format used in the ESMP. The costs for the SAPs will likewise be detailed.

9 MONITORING FRAMEWORK

The monitoring work is being assessed as part of the final BAP, however it will include monitoring of at least:

- Restoration rates and success;
- Onsite offsets;
- Offsite offsets;
- Review of water quality and air quality monitoring; and
- Monitoring of key species (chimpanzees and other primates, hippopotamus, Kunda half-toed lizard, endangered fish and frogs, and Atlantic humpback dolphin).

The monitoring actions will be detailed in a BAP Register in the full BAP document, a spreadsheet listing all of the actions related to the monitoring, similar to the format used in the ESMP. The costs for the monitoring will likewise be detailed.

The BAP monitoring plans will include:

- A control mechanism and threshold values that launch investigations and/or corrective actions;
- The identification of the responsible person for reviewing monitoring results; and
- A mechanism for updating the monitoring approach based on results.

10 APPENDICES

10.1 Species of concern

10.2 Issues and way forward table

10.3 Maps of the Sangarédi area

APPENDICES

Appendix 9.3 BAF Appendices

Appendix 10.1 – Species of concern

Type	Latin name	English name	French name	IUCN status	Restricted range	Misc.	Confirmed in DMUs	Confirmed in ESIA Study Areas (SA)	Tier	Carry through BAP	Notes	Additional studies planned
Plant	<i>Azelia africana</i>			Vulnerable (A1d)				Sangarédi (field work BERCA-baara 2003)				Botanical work before clearing
Plant	<i>Albizia ferruginea</i>			Vulnerable (VU A1cd)				Sangarédi (field work BERCA-baara 2003)				Botanical work before clearing
Plant	<i>Eriocaulon plumate subsp kindiae</i>			Not Evaluated but could be listed as endangered if found to be distinctive from the parent species	Yes			Sangarédi (field work ÉEM ESIA, 2013)				Botanical work before clearing
Plant	<i>Fleurydora felicis</i>			Vulnerable (B1+2c)	Yes		(TBC CHA, 2015)		2			Botanical work before clearing
Plant	<i>Khaya senegalensis</i>		Caïlcédra	Vulnerable (VU A1cd)				Sangarédi (field work ÉEM ESIA, 2013)				Botanical work before clearing
Plant	<i>Ledermanniella abbayesii</i>			Data Deficient	Yes		(TBC CHA, 2015)		2			Botanical work before clearing
Plant	<i>Milicia regia</i>			Vulnerable (VU A1cd)				Sangarédi (field work ÉEM ESIA, 2013)				Botanical work before clearing
Plant	<i>Pseudoprosopis bampsiana</i>			Not Evaluated but could be listed as Endangered			Sangarédi (field work ÉEM ESIA, 2013)					Botanical work before clearing
Plant	<i>Rungia eriostachya</i>			Not Evaluated		Rare but not yet assessed by the IUCN		Sangarédi (field work ÉEM ESIA, 2013)				Botanical work before clearing
Plant	<i>Terminalia scutifera</i>			Not Evaluated		Species of restricted distribution		Kamsar (field work ÉEM ESIA, 2013)				Botanical work before clearing

Type	Latin name	English name	French name	IUCN status	Restricted range	Misc.	Confirmed in DMUs	Confirmed in ESIA Study Areas (SA)	Tier	Carry through BAP	Notes	Additional studies planned
Crustacean	<i>Afrithelphusa monodosa</i>	Purple marsh crab		Endangered (B1ab(iii)+2ab(iii); C2a(i))	Yes		RAP 41, 2006		1	If found in SA		Oct.-Nov. 2015
Marine fish	<i>Dasyatis margarita</i>	Daisy Stingray		Endangered (A2bd+3bd+4bd)			Kamsar (field work ÉEM ESIA, 2013) but could not confirm within SA		2			
Marine fish	<i>Epinephelus marginatus (=guaza)</i>	Dusky grouper	Mérou Brun	Endangered (A2d)				Kamsar (field work ÉEM ESIA, 2013)	2	Yes		
Marine fish	<i>Glaucostegus cemiculu syn Rhinobatos cemiculus</i>	Blackchin guitarfish	Guitare De Mer Fouisseuse	Endangered (A4bd)				Kamsar (field work ÉEM ESIA, 2013)	2	Yes		
Marine fish	<i>Rhinoptera marginata</i>	Lusitanian cownose ray	Mourine échancrée	Near Threatened				Kamsar (field work ÉEM ESIA, 2013)				
Marine fish	<i>Sphyrna lewini</i>	Scalloped hammerhead		Endangered (A2bd+4bd)			Kamsar (field work ÉEM ESIA, 2013) but could not confirm within SA		2			
Freshwater fish	<i>Epiplatys guineensis</i>			Vulnerable (D2)				Sangarédi (field work ÉEM ESIA, 2013)				
Freshwater fish	<i>Epiplatys hildegardae</i>	Hildegarde's panchax		Vulnerable (D2)	Yes			Sangarédi (field work ÉEM ESIA, 2013)	2	Yes		
Freshwater fish	<i>Epiplatys njalaensis</i>	Njala panchax		Endangered (B1ab(iii)+2ab(iii))				Sangarédi (field work ÉEM ESIA, 2013)	1	Yes		
Freshwater fish	<i>Epiplatys olbrechtsi ssp. olbrechtsi</i>			Near Threatened				Sangarédi (field work ÉEM ESIA,				

Type	Latin name	English name	French name	IUCN status	Restricted range	Misc.	Confirmed in DMUs	Confirmed in ESIA Study Areas (SA)	Tier	Carry through BAP	Notes	Additional studies planned
								2013)				
Freshwater fish	<i>Ichthyborus quadrilineatus</i>			Near Threatened				Sangarédi (field work ÉEM ESIA, 2013)				
Freshwater fish	<i>Malapterurus barbatus</i>			Near Threatened				Sangarédi (field work ÉEM ESIA, 2013)				
Freshwater fish	<i>Malapterurus stiasnyae</i>			Near Threatened				Sangarédi (field work ÉEM ESIA, 2013)				
Freshwater fish	<i>Malapterurus teugelsi</i>	Teugel's electric catfish		Near Threatened	Yes			Sangarédi (field work ÉEM ESIA, 2013)	2	Yes		
Freshwater fish	<i>Nimbapanchax jeanpoli</i> (= <i>Archiaphyosemion jeanpoli</i>)	Jeanpoli's killi		Endangered (B1 ab(iii)+2ab(iii))				Sangarédi (field work ÉEM ESIA, 2013)	2	Yes		
Freshwater fish	<i>Paramphilius trichomycteroides</i>			Near Threatened				Sangarédi (field work ÉEM ESIA, 2013)				
Freshwater fish	<i>Petrocephalus levequei</i>			Near Threatened				Sangarédi (field work ÉEM ESIA, 2013)				
Freshwater fish	<i>Scriptaphyosemion roloffii</i>			Near Threatened				Sangarédi (field work ÉEM ESIA, 2013)				
Freshwater fish	<i>Synodontis kogonensis</i>			Data Deficient	Yes, restricted to Cogon watershed	Stakeholder concern (CHA, 2015)						
Amphibian - frog	<i>Phrynobatrachus pintoii</i>	Pinto's puddle frog		Endangered (B1 ab(iii))	Yes			Sangarédi (field work ÉEM ESIA, 2013)	1	Yes		Oct.-Nov. 2015
Reptile – marine turtle	<i>Chelonia mydas</i>	Green turtle	Tortue verte	Endangered (A2bd)				Kamsar (field work ÉEM ESIA, 2013)	2	Yes		
Reptile – marine and	<i>Crocodylus suchus</i>	Nile crocodile	Crocodile du Nil	Species status needs to be revised		DNA analyses indicate that		Kamsar and Sangarédi				

Type	Latin name	English name	French name	IUCN status	Restricted range	Misc.	Confirmed in DMUs	Confirmed in ESIA Study Areas (SA)	Tier	Carry through BAP	Notes	Additional studies planned
freshwater						the West African specimens belong to a different species		(field work ÉEM ESIA, 2013)				
Reptile - amphisbaenian	<i>Cynisca cf oligopholis</i>	Amphisbaenian sp.		Endangered (B1ab(iii))	Yes			Sangarédi (field work ÉEM ESIA, 2013)	1	Yes		Oct.-Nov. 2015
Reptile - amphisbaenian	<i>Cynisca leonina</i>	Los Archipelago worm lizard		Vulnerable (B1ab(iii))	Yes		Yes		2	If found in SA		Oct.-Nov. 2015
Reptile – marine turtle	<i>Eretmochelys imbricata</i>	Hawksbill turtle	Tortue à écailles	Critically Endangered (A2bd)				Kamsar (field work ÉEM ESIA, 2013)	2	Yes		
Reptile - lizard	<i>Hemidactylus albivertebralis</i>			Data Deficient (to be revised soon)		Rare species of restricted distribution		Kamsar (field work ÉEM ESIA, 2013)			Habitat indicates lack of impact	
Reptile - lizard	<i>Hemidactylus kundaensis</i>	Kunda half-toed gecko		Critically Endangered (B2ab(iii))				Sangarédi (field work ÉEM ESIA, 2013)	1	Yes		Oct.-Nov. 2015
Reptile – marine turtle	<i>Lepidochelys olivacea</i>	Olive Ridley turtle	Tortue de Ridley	Vulnerable (A2bd)		Potential stakeholder concern (CHA, 2015)		Kamsar (field work ÉEM ESIA, 2013)		Yes		
Reptile - crocodile	<i>Osteolaemus cf tetraspis</i>	(African dwarf crocodile)	(Crocodile nain Africain)	Vulnerable (A2cd)		Species not yet described and status to be reviewed by the IUCN and Endangered or Critically Endangered status likely		Sangarédi (field work ÉEM ESIA, 2013)		Yes		
Reptile - snake	<i>Philothamnus cf semivariiegatus</i>			Not Evaluated		Species not yet described		Sangarédi (field work ÉEM ESIA, 2013)		Yes		Oct.-Nov. 2015
Reptile - turtle	<i>Trionyx triunguis</i>	Nile soft-shell turtle		Status under review		Until recently <i>Critically Endangered</i> however it has been removed from the list in		Kamsar (field work ÉEM ESIA, 2013)				

Type	Latin name	English name	French name	IUCN status	Restricted range	Misc.	Confirmed in DMUs	Confirmed in ESIA Study Areas (SA)	Tier	Carry through BAP	Notes	Additional studies planned
						2010. May be relisted soon as Endangered						
Bird	<i>Calidris alba</i>	Sanderling		Least Concern		Over 1% biogeographic population during migration		Kamsar (field work ÉEM ESIA, 2013)	2	Yes	Present in large nos.	
Bird of prey	<i>Circaetus beaudouini</i>	Beaudouin's snake eagle	Circaète de Beaudouin	Vulnerable (A2bcd+3bcd+4bcd;C1+2a(ii))		Stakeholder concern (CHA, 2015)		Sangarédi (field work ÉEM ESIA, 2013)		Yes		Oct.-Nov. 2015
Bird of prey	<i>Gyps africanus</i>	African white-backed vulture	Gyps africain	Endangered (A2bcd+3bcd+4bcd) (to upgraded to Critically Endangered)				Kamsar, Sangarédi (field work ÉEM ESIA, 2013)	2	Yes		Oct.-Nov. 2015
Bird of prey	<i>Gyps rueppellii</i>	Rueppell's griffon vulture	Vautour de Rüppell	Endangered (A2abcd+3bcd+4abcd) (to upgraded to Critically Endangered)				Sangarédi (field work ÉEM ESIA, 2013)	2	Yes		Oct.-Nov. 2015
Aquatic bird	<i>Limosa limosa</i>	Black-tailed godwit	Barge à queue noire	Near Threatened				Kamsar (field work ÉEM ESIA, 2013)				
Bird of prey	<i>Necrosyrtes monachus</i>	Hooded vulture	Percnoptère brun	Endangered (A2acd+3cd+4acd) (to upgraded to Critically Endangered)				Kamsar, Sangarédi (field work ÉEM ESIA, 2013)	2	Yes		Oct.-Nov. 2015
Aquatic bird	<i>Numenius arquata</i>	Eurasian curlew	Courlis cendré	Near Threatened				Kamsar (field work ÉIES ÉEM, 2013)				
Mammal - carnivore	<i>Aonyx capensis</i>			Near Threatened		Stakeholder concern (CHA, 2015)		Kamsar (field work ÉEM ESIA, 2013)		Yes		
Mammal - carnivore	<i>Caracal aurata</i>	African golden cat	Chat Doré Africain	Near Threatened		Stakeholder concern (CHA, 2015)		Sangarédi (field work ÉEM ESIA, 2013)		Yes		Oct.-Nov. 2015

Type	Latin name	English name	French name	IUCN status	Restricted range	Misc.	Confirmed in DMUs	Confirmed in ESIA Study Areas (SA)	Tier	Carry through BAP	Notes	Additional studies planned
Mammal - primate	<i>Cercocebus atys</i>	Sooty mangabey	Mangabey enfumé	Vulnerable (A2cd)		Stakeholder concern (CHA, 2015)		Sangarédi (field work ÉEM ESIA, 2013)		Yes		Oct.-Nov. 2015
Mammal - primate	<i>Colobus polykomos</i>	Western black and white colobus		Vulnerable (A2cd)		Stakeholder concern (CHA, 2015)	Sangarédi (field work ÉEM ESIA, 2013) (skin found in market)			If found in SA		Oct.-Nov. 2015
Mammal	<i>Hippopotamus amphibius</i>	Hippopotamus	Hippopotame	Vulnerable (A4cd)		Status being revised and may move up to Endangered. Stakeholder concern (CHA, 2015)		Sangarédi (field work ÉEM ESIA, 2013)		Yes		
Mammal - primate	<i>Pan troglodytes verus</i>	West African chimpanzee	Chimpanzé_	Endangered (A4cd)				Sangarédi (field work ÉEM ESIA, 2013)	2	Yes		Sept.-Nov. 2015
Mammal - primate	<i>Papio papio</i>	Guinea baboon		Near Threatened (NT)		Stakeholder concern (CHA, 2015)	Sangarédi (field work ÉEM ESIA, 2013) (found in market)					
Mammal - primate	<i>Procolobus badius</i>	West African red colobus	Colobe Bai D'Afrique Occidentale	Endangered (A2cd)				Sangarédi (field work ÉEM ESIA, 2013)	2	Yes		Oct.-Nov. 2015
Marine mammal	<i>Sousa teuszii</i>	Atlantic humpback dolphin	Dauphin à Bosse de L'Atlantique	Vulnerable (C2a(i)) (may be uplisted to Endangered or Critically Endangered in 2015)				Kamsar (field work ÉEM ESIA, 2013)	2	Yes		
Marine mammal	<i>Trichechus senegalensis</i>	West African manatee	Lamantin D'Afrique	Vulnerable (A3cd)		Stakeholder concern (CHA, 2015)		Kamsar (field work ÉIES ÉEM, 2013, observation CBG 2014)		Yes		

Critically Endangered or Endangered species whose ranges overlap DMU or which may be present but whose presence is not confirmed in the DMU :

Reptiles

Slender-snouted crocodile (*Mecistops cataphractus*)

Marine fish

Smalltooth sawfish (*Pristis pectinata*)

Large-tooth sawfish (*Pristis pristis*)

Sawback angelshark (*Squatina aculeata*)

Smoothback angelshark (*Squatina oculata*)

Atlantic Goliath grouper (*Epinephelus itajara*)

Great hammerhead (*Sphyrna mokarran*)

Common guitarfish (*Rhinobatos rhinobatos*)

African wedgefish (*Rhynchobatus luebberti*)

White skate (*Rostroraja alba*)

Appendix 10.2 – Issues and ways forward

Issue	Description	Size/population	Habitat	Impacts	Quantification of impact	Further studies	Measures to be taken	Monitoring
Sangarédi – impacts on key habitats								
Direct loss of gallery forest	Gallery forest is a Critical Habitat with many Endangered species.	There are 4,941 ha of dense forest (practically all gallery forest) in the mapped habitats around the mining areas.			Based on satellite imagery analysis there may be 7 ha or 0.14% of the total dense forest in the mining footprint.	Exact limit of any gallery forest close to mining areas to be determined in the field before mining and avoided. Gallery forest protection plan and Cogon River corridor protection plan.	Avoidance if required based on field studies.	
Direct loss of woodland and wooded grassland	Woodland and wooded grassland may be Critical Habitats depending on the presence of chimpanzees and Half-toed Kunda geckos.	There are 14,382 ha of woodland and 7,398 ha of wooded grassland in the mapped habitats around the mining areas.			There are 297 ha of woodland and 244 ha of wooded grassland in the mining footprint. These represent 2% and 3% of these habitats in the mapped habitats around the mining areas. Many of these are small isolated patches.	The Sept.-Nov. 2015 field studies will help determine to what extent these specific habitats in or near the mining footprint qualify as Critical Habitat based on the presence of Endangered species and their use of these habitats.	Potential avoidance of key habitats. Restoration of mined areas. Compensation through onsite and offsite offsets.	Monitoring of restoration. Monitoring of offset results.
Direct loss of bowal and grassland	Bowal (a specific form of grassland) and other grassland are not currently considered to be Critical Habitat but like all habitats have the potential to be if CH-qualifying species are found.	Grassland (including bowal) is the most common habitat type in mapped habitats around the mining areas with 32,379 ha representing 44% of the total.			Grassland is the dominant type of habitat within the mining footprint accounting for 2,166 ha or 68% of the habitat to be cleared (3,200 ha total). Of that, the majority (1,800 ha) is bowal. Overall this represents 7% of the grassland and 12% of the bowal in the mapped habitats around the mining areas.	The Sept.-Nov. 2015 field studies will help determine to what extent these specific habitats in or near the mining footprint qualify as Critical Habitat based on the presence of Endangered species and their use of these habitats. Botanical surveys are to be conducted in these areas before any clearing. A specific bowal protection action plan is to be produced in the BAP.	Potential avoidance of key habitats. Restoration of mined areas. Compensation through onsite and offsite offsets.	Monitoring of restoration. Monitoring of offset results
Impacts on adjacent habitats	Habitats close to the mining footprint have the potential to be affected through air quality impacts, noise, and disturbance.	Area involved is hard to estimate and varies according to cause of impact. Dust deposition studies (in SIP) show fairly limited impact zones.		Dust deposition can damage vegetation. Noise can startle or disturb animals.	Dust deposition effects are limited to areas accounting for a fraction of a percent of the total habitat types in the mapped habitats around the mining areas. Noise impacts could affect animals in larger areas.	Much-expanded physical sampling program to include additional air quality and noise sampling points. Review of biology impact assessment and mitigation measures as new data come in. Review of noise impacts as biology field surveys (Sept.-Nov. 2015) identify key sensitive areas.	Wide range of air quality and noise control measures. Measures to reduce or eliminate blasting impacts.	Physical parameter monitoring. Biological parameter monitoring.
Impacts on watercourses and springs	Mining activities have the potential to affect springs and water levels in smaller streams. Potential for			Chimps and other animals depend on springs as a source of water. Water level changes can	Quantification will depend on the ongoing sampling and monitoring programs.	Much-expanded physical sampling program to include groundwater, stream discharge and expanded surface water quality sampling. Production of water balance study. Review of biology impact assessment and	Wide range of measures specified to reduce impacts to watercourses from erosion including 50m vegetation	Physical parameter monitoring. Biological parameter monitoring.

Issue	Description	Size/population	Habitat	Impacts	Quantification of impact	Further studies	Measures to be taken	Monitoring
	aluminum level increases.			affect fish survival. Aluminum at high levels can be toxic.		mitigation measures as new data come in. More detailed review of aluminum toxicity and observed levels. Review in BAP of measures to protect slopes during mining activities.	zone. Specific commitment to protect springs.	
Fragmentation effects	Opening of mining areas and associated roads have the potential to affect the size of the remaining habitat units and their connectivity.			Wide and busy mine haul roads and operating mines may be avoided by animals	Three key road-crossing areas of valleys will need detailed environmental input to reduce barrier effects. Overall fragmentation effects are complex as the operating mines move and prior mines are restored.	Environmental input into detailed engineering of roads to help avoid key areas. Study on induced access issues and determination of future use of mining roads.	Restoration of mined areas. Decisions regarding fate of mining haul roads.	Monitoring of restoration. Monitoring of fate of roads and possible public use.
Sangarédi – impacts on key species								
West African chimpanzee	An Endangered primate species.	Around 50 likely on CBG Halco concession.	A wide variety of habitats are used. Treed areas essential for nesting. Foraging in other areas.	Elimination of some habitat as a result of mining. Disturbance from blasting and human presence. Potential changes to springs.	Field studies will improve the quantification of impacts,	Three sets of studies on-going or planned for Sept.-Nov. 2015: WCF sampling survey, Sylvatrop nest survey near mining areas, Sylvatrop camera trap survey.	Depends on findings of the field surveys. Potential avoidance of key habitats. Restoration of mined areas. Compensation through onsite and offsite offsets.	Chimpanzee and other primates are to be a major focus of monitoring efforts. Monitoring of offset results.
Red colobus	An Endangered primate species.	Likely very low as only one colony found, outside of Study Area along the Cogon River.	Typically gallery forest but may also be found in more open areas.	Potential elimination of some habitat as a result of mining. Disturbance from blasting and human presence.		New data may be acquired during Sylvatrop camera trap survey.	Depends on findings of the field surveys.	Chimpanzee and other primates are to be a major focus of monitoring efforts.
Other primates	Sooty mangabey and black and white colobus are other primate species of concern.	Likely very low. The sooty mangabey was seen infrequently during the 2013 surveys and considered not common. The black and white colobus was noted only as a skin on a market.	Forested habitat primarily.	Potential elimination of some habitat as a result of mining. Disturbance from blasting and human presence.		New data may be acquired during WCF sampling and Sylvatrop camera trap survey.	Depends on findings of the field surveys.	Chimpanzee and other primates are to be a major focus of monitoring efforts.
Hippopotamus	A Vulnerable species that may be uplisted. Also of stakeholder concern.	Small number along the Cogon.	Larger rivers, Cogon River.	Very limited.				Monitoring to be done to confirm the role of the Cogon River corridor.
Vultures	Three Endangered (and soon to be Critically	Thirty hooded vultures alone in Sangaredi town.	Regularly present in Sangaredi	Very limited unless nesting colonies found		Presence to be verified near mining areas during Oct.-Nov. 2015. Any signs of nesting to be specifically sought.	Depends on findings of the field surveys. If nesting colonies	Presence of nests to be checked before

Issue	Description	Size/population	Habitat	Impacts	Quantification of impact	Further studies	Measures to be taken	Monitoring
	Endangered) vulture species.		town and other built-up areas. May also frequent other habitats.	near mining areas.			are found this would affect activities close to the nests.	any clearing takes place.
Half-toed Kunda gecko	A Critically Endangered and range-restricted lizard.	Only one found in 2013 surveys. Likely small population.	Dry slope forests, may also be found in houses	Potential elimination of some habitat as a result of mining. Disturbance from blasting.		Presence to be verified near mining areas during Oct.-Nov. 2015.	Depends on findings of the field surveys. If found on planned mining area or area very close to the mining area, this could affect mining plan.	Presence to be checked before any clearing takes place.
<i>Cynisca cf oligopholis</i> – undescribed worm lizard	An Endangered and range-restricted worm lizard.	Chirio collected 29 at Cogon Lengué in 2013. May be comparatively abundant locally.	Gallery forest	Expected to be minor given habitat.		Presence to be verified near mining areas during Oct.-Nov. 2015. This will also include searches for <i>Cynisca leonina</i> and other reptiles.	None required unless presence confirmed on areas to be mined.	
African dwarf crocodile	Currently listed as Vulnerable but likely to be uplisted.	Present in several locations and comparatively abundant.	Gallery forest	Expected to be minor given habitat.			None required unless presence confirmed on areas to be mined.	
Pinto's puddle frog	An Endangered and range-restricted frog.	Found in two areas during 2013 surveys.	Gallery forest	Expected to be minor given habitat.		Presence to be verified near mining areas during Oct.-Nov. 2015, especially plateau ponds.	Depends on findings of the field surveys. If found on planned mining area or area very close to the mining area, this could affect mining plan.	
Purple marsh crab	An Endangered freshwater crab.	Not found in the SA but known from a site 60 km away.	Freshwater marshes and wet agricultural areas	Not found during 2013 surveys that included crabs along watercourses.		Presence on plateau ponds to be verified during Oct-Nov 2015 surveys.	None required unless presence confirmed on areas to be mined.	
Freshwater fish	Several fish species are of concern because they are Endangered and/or are range-restricted.	2013 survey results suggests several species of concern are fairly numerous and well distributed.	Watercourses	Impacts are possible from potential water level changes in smaller streams and aluminum levels.		Much-expanded physical sampling program to include groundwater, stream discharge and expanded surface water quality sampling. Production of water balance study, including ecological flow considerations. Review of biology impact assessment and mitigation measures as new data come in. More detailed review of aluminum toxicity and observed levels. Review in BAP of measures to protect slopes during mining activities.	Wide range of measures specified to reduce impacts to watercourses from erosion including 50m vegetation zone.	Physical parameter monitoring. Biological parameter monitoring.
Plants	No CH-qualifying plant species found in SA.		All habitats	Potential elimination of some habitat as a		Botanical surveys are planned before any clearing of an area.	None required unless presence of CH-qualifying	

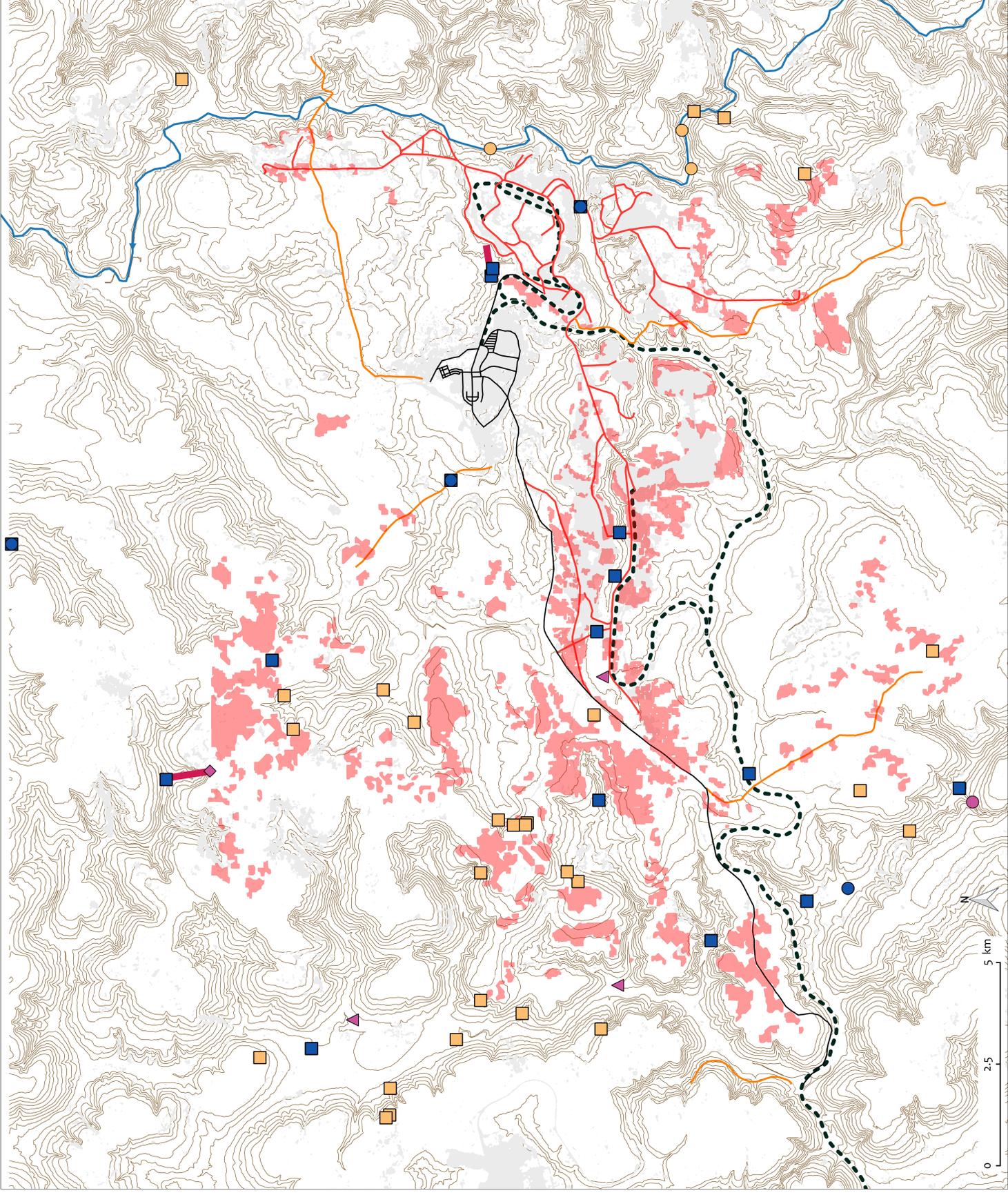
Issue	Description	Size/population	Habitat	Impacts	Quantification of impact	Further studies	Measures to be taken	Monitoring
				result of mining and destruction of individuals.			species confirmed on areas to be mined.	
Kamsar – impacts on key habitats								
Impacts on the estuary	The entire estuary is considered Critical Habitat because of the presence of a range of Endangered marine species.		Estuary	The key impacts are the extension of the present quay and the dredging of an area adjacent to it to allow ships to turn. At maximum production rate the number of ore ships will double.		The entire estuary should be considered during joint cumulative impact analyses. The BAP will consider measures for the protection of the estuary as a whole.		
Dredging at port	Dredging of an additional area to allow turning of ships near quay.		Estuary, particularly muddy bottom	Sound of dredging activities. Damage possible to marine turtles during dredging. Disturbance of sediments leading to increased turbidity. Impacts on benthic fauna where deposited.	Fairly limited compared to channel dredging.	Additional studies of sediments at dredging location and deposition site underway. Benthic invertebrate surveys at dredging location and deposition site underway.	Volume of dredging has been kept to a minimum through consideration of environmental issues in planning. Detailed measures to reduce dredging impacts. Deposition of dredged materials out of estuary in government approved site.	
Impacts from underwater noise	Construction of the quay extension and dredging will generate underwater noise.		Estuary	Underwater noise can impact sensitive species		Underwater noise modeling study planned Oct.-Nov. 2015 that will identify species of concern and impact zone.	Measures are already specified but may be modified or expanded as result of the underwater noise study.	Monitoring of at least Atlantic humpback dolphin population planned.
Impacts from increased ship traffic	At maximum production rate, ore ship traffic will double.		Estuary	Increase ship traffic will increase noise and risk of collisions		Underwater noise modeling study planned Oct.-Nov. 2015 that will identify species of concern and impact zone.	Measures are already specified to reduce impacts.	Monitoring of at least Atlantic humpback dolphin population planned.
Impacts on the mangroves	The mangroves are the one habitat type that is qualified as Critical Habitat in its own right.			There are no direct impacts on the mangroves. No construction is taking place in mangroves.				

Issue	Description	Size/population	Habitat	Impacts	Quantification of impact	Further studies	Measures to be taken	Monitoring
Kamsar - impacts on key species								
Marine fish	At least two species of Endangered marine fish are present in the estuary.		Estuary	Disturbance of sediments leading to increased turbidity. Impacts on benthic fauna where deposited.		Additional studies of sediments at dredging location and deposition site underway. Benthic invertebrate surveys at dredging location and deposition site underway.	Volume of dredging has been kept to a minimum through consideration of environmental issues in planning. Detailed measures to reduce dredging impacts. Deposition of dredged materials out of estuary in government approved site.	
Marine mammals	Atlantic humpback dolphin (Vulnerable but may be uplisted) and West African manatee (Vulnerable) are present in the estuary. Both are of stakeholder concern.	At least 47 dolphins, likely part of a permanent population. Manatee less abundant and hard to estimate.	Estuary	Underwater sound impacts. Increased risk of collision with ships.	Quantification will be possible after underwater sound modeling study.	Underwater noise modeling study planned Oct.-Nov. 2015 that will identify species of concern and impact zone. Compensation through onsite offsets may have to be considered based on results of the modeling study.	Measures are already specified but may be modified or expanded as result of the underwater noise study. Measures are already specified to reduce collision impacts.	Monitoring of at least Atlantic humpback dolphin population planned.
Marine turtles	Several species of marine turtles are present (up to Critically Endangered status) and some may nest near the SA. Of stakeholder concern.	Numbers seem low.	Estuary, with particular emphasis on some sandy shores for nesting.	Dredging effects. Underwater sound impacts. Increased risk of collision with ships.		Underwater noise modeling study planned Oct.-Nov. 2015 that will identify species of concern and impact zone.	Detailed measures to reduce dredging impacts. Measures to reduce noise are already specified but may be modified or expanded as result of the underwater noise study. Measures are already specified to reduce collision impacts.	
Congregatory birds	Typically shorebird species.	At least one species of shorebird (sanderling) is present in numbers over the 1% biogeographic threshold. Other species are close.	Mudflats	Not anticipated				

Issue	Description	Size/population	Habitat	Impacts	Quantification of impact	Further studies	Measures to be taken	Monitoring
Overall issues								
Cumulative impacts	Several other mining developments – can affect plateaus and estuary.				Hard to quantify w/o details of other projects	CBG has agreed to continue work on this and to work with other companies and agencies – possibility of a regional program.	CBG striving to exchange information with others.	
Impacts on Internationally Recognized Areas (IRAs)	Two IRAs are within the ESIA defined SAs: one part of the Kamsar Key Biodiversity Area (KBA) and the Boulléré KBA. Both were identified in terms of chimpanzees as a result of the 2006 RAP41 study.	The Kamsar KBA may be in question since it is suggested that chimpanzees no longer occur in the Kamsar area (ÉEM, 2014). The Boulléré KBA has been degraded since the RAP study because of agricultural practices but still supports a good chimpanzee population.		Impacts to the Kamsar KBA (if still justified) are limited to an increase in train traffic. The railway predates the KBA by 30 years. Impacts to the Boulléré KBA could include disturbance impacts to chimpanzees depending on the exact spatial definition of the KBA.		The Boulléré area has been one of the key focal points of the CBG local offset approach. The area still has some of the better gallery forest habitats in the vicinity. It is hoped that GAC and CBG could together plan for the protection and restoration of this area. In that sense, the requirements of the IFC regarding IRAs can be met. This will form part of the CBG Offset Strategy.	Liaison with GAC and local stakeholders. Development of onsite offset plan.	Monitoring of restoration. Monitoring of offset results.

MINING BAUXITE PLAN AND THREATENED SPECIES

- Fish**
 - *Epiplatys njalaensis*
 - *Nimbapanchax jeppoli*
- Amphibians**
 - *Phrynobatrachus pintoi*
- Mammals**
 - *Hippopotamus amphibius*
 - *Pan troglodytes verus*
- Reptiles**
 - *Cynisca oligopholis*
 - ◆ *Hemidactylus kundaensis*
 - ▲ *Osteolemus tetraspis*
- Mining plan**
 - Areas to be mined
- Anthropic**
 - Mine road
 - Roads and trails
 - Paved road
 - - - Railroad
 - Built-up and open
- Physical geography**
 - Cogon river
 - Contour Lines
 - Contour interval : 15m



Source : Sylvatrop Consulting / EEM 2014



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MINING BAUXITE PLAN AND THREATENED SPECIES

Actinopterygians

- Epiplatys njalaensis*
- Nimbapanchax jeppoli*

Amphibian

- Phrynobatrachus pintoii*

Mammals

- Hippopotamus amphibius*
- Protonotus badius*
- Pan troglodytes verus*

Reptiles

- Cynisca oligopholis*
- Hemidactylus kundaensis*
- Osteolemus tetraspis*

Mining plan

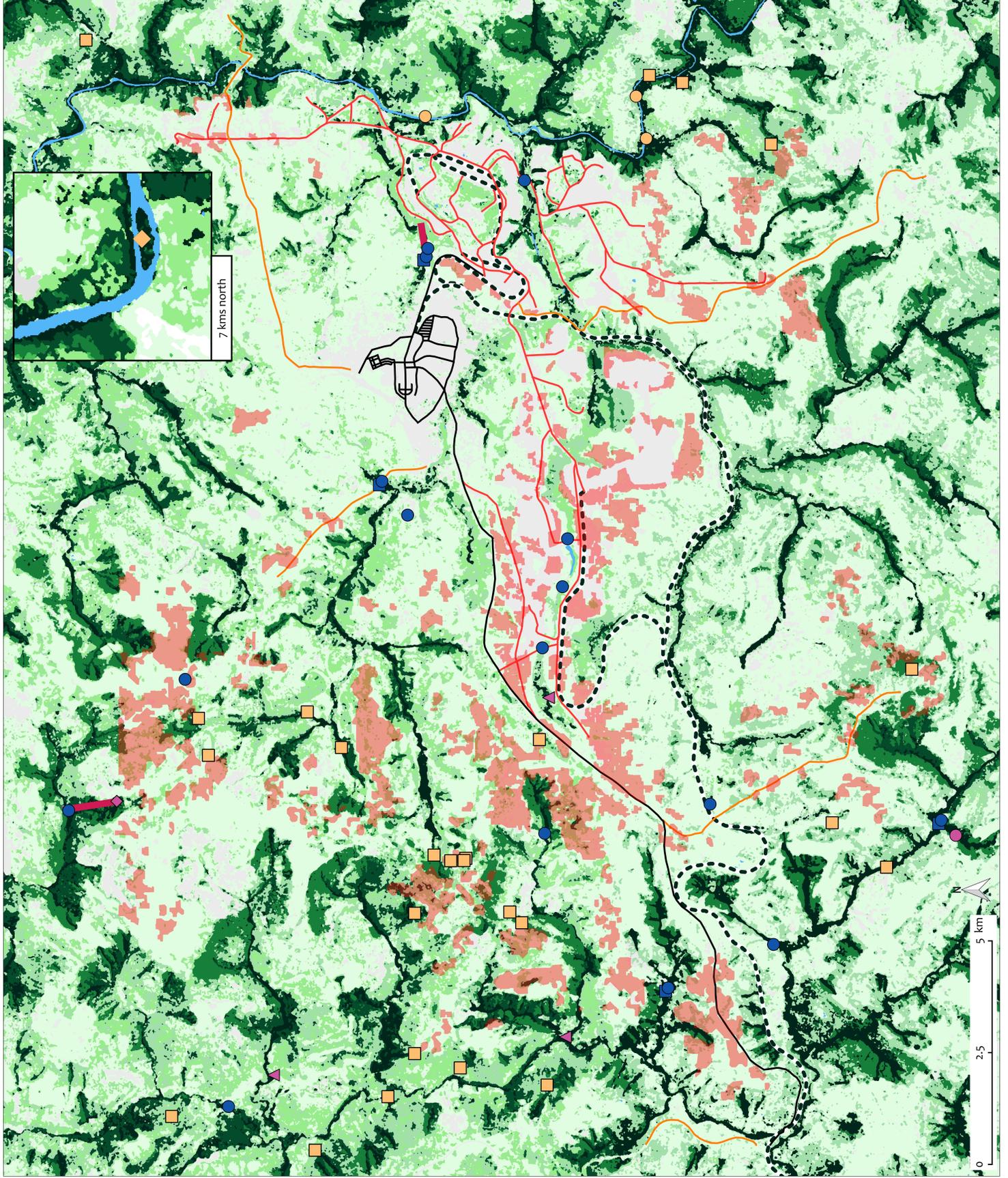
- Bauxite

Anthropic

- Mining trail
- Main trail
- Tanned road
- Railroad
- Build space

Habitat

- Water
- Dense forest
- Thicket
- Shrubland
- Woodland
- Grassland
- Wooded grassland



Source : Sylvatrop Consulting / EEM 2013



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