Report

Residual Impact Assessment (RIA)

Includes: SimFer mine site and rail spur

June 2026

Foreword

Across the Simandou project, our commitment to work in line with international standards and best practice guides our work every day. An important element of this is protecting the unique biodiversity found in the region around Simandou and the project infrastructure, which includes critically endangered species such as the Western Chimpanzee.

Any development project has impacts, but by following internationally accepted best practice such as compliance with the International Finance Corporation (IFC)'s Performance Standards, and Guinea's own high legislative standards for environmental management, we firmly believe we can balance development with sustainability.

Under IFC Performance Standard 6 (PS6), we are committed to assessing impacts on Natural and Critical Habitats and to implementing the Mitigation Hierarchy: avoid, minimise, restore, and offset.

We have also committed as part of IFC PS6 to achieve a Net Gain for Critical Habitat Qualifying and Range Restricted species - meaning there will be a gain of biodiversity compared to when we began operations following the full implementation of the Mitigation Hierarchy.

As part of the Mitigation Hierarchy, we have already taken significant practical steps on avoidance and mitigation:

- *Avoidance: preventing adverse impacts on biodiversity by selecting project locations and designs that avoid harm to sensitive ecosystems. In the case of Simandou, we have invested significantly in redesigning the SimFer mine so that it avoids critical chimpanzee habitat and protects biodiversity areas with an abundance of range restricted species (species which are unable to move far beyond their habitat).*
- *Minimisation: reducing the severity and extent of impacts that cannot be avoided through best environmental practices. At the SimFer mine, this includes measures such as building underpasses for animals to travel through, buffer zones and dust, light and noise suppression.*
- *Restoration/rehabilitation: repairing degraded ecosystems and restoring biodiversity in areas affected by project activities. Post-mining land rehabilitation programs at Simandou aim to restore ecosystems and support biodiversity regeneration, often in collaboration with conservation organisations. This will happen progressively throughout mine operations and at the point where the mine becomes non-operational.*

Once the initial steps of the Mitigation Hierarchy have been applied, a detailed Residual Impact Assessment (RIA) is prepared to identify the impacts that remain on important habitats and species. This helps determine what offset actions are needed.

Offsets involve protecting and restoring ecologically suitable areas outside the project footprint so that residual impacts are counterbalanced and the project can achieve no net loss in Natural Habitat and net gain in Critical Habitat, in line with PS6.

The SimFer RIA identifies significant potential residual impacts on species like the Western Chimpanzee as well as impacts on other species of plants and animals. These are modelled forecasts for impacts on overall populations across the life of the project prior to the offset program being implemented, including existing animals as well as future animals who may have used habitat based impacted by the project.

The RIA uses complex monitoring, forecasting and modelling to project our impacts, followed by review and validation by independent experts. For SimFer's impact, this includes studies on biodiversity dating back to 2004. These studies will continue to be updated based on ongoing monitoring.

Now that the RIA is complete, work is well underway to identify and secure high-quality sites elsewhere in Guinea to offset these impacts and achieve a long-term gain in the populations of these species. In total, the project may require up to 2 million hectares of offsets to meet its commitments and studies have been ongoing since 2023 to identify suitable areas across Guinea. This work is expected to continue over the next 3-5 years, driven by a dedicated team. Once sites have been identified as feasible, SimFer and the Simandou partners will work with the Government to ensure biodiversity is protected in these areas for the long term. A critical part of this is working with local communities to ensure this provides economic opportunities, for example through ranger and eco-guard employment programmes, and sustainable forestry management.

Through this approach, Simandou has the potential to carefully manage its impact alongside providing materials that are critical for a lower carbon future while making a transformative contribution to Guinea's economy and development.

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Acronyms and abbreviations

Acronym/abbreviation	Definition
BMEP	Biodiversity Monitoring and Evaluation Plan
CH	Critical Habitat
CHA	Critical Habitat Assessment
CTG	La Compagnie du TransGuinéen (rail & port operator JV)
EAAA	Ecologically Appropriate Area of Analysis
ERM	Environmental Resources Management
ESIA	Environmental and Social Impact Assessment
GoG	Government of Guinea
IBA	Important Bird Area
IFC	International Finance Corporation
IFC PS6	International Finance Corporation, Performance Standard 6
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
KDE	Kernel Density Estimate
LSA	Local Study Area
MCP	Minimum Convex Polygon
NG	Net Gain
NH	Natural Habitat
NNL	No Net Loss
PdF CF	Pic de Fon Classified Forest
PS6	Performance Standard 6
QH	Quality Hectare
RBG Kew	Royal Botanic Gardens Kew
RIA	Residual Impact Assessment
RSA	Regional Study Area
RT	Rio Tinto
TIPA	Tropical Important Plant Area
WCS	Winning Consortium Simandou

Executive Summary

Purpose of this report

This report is the Residual Impact Assessment (RIA) for the SimFer mine and rail spur and associated infrastructure ('the Project'). To align with the requirements of International Finance Corporation Performance Standard 6 (IFC PS6) (IFC 2012) and Guinean national legislation[1], the Project aims to achieve net gain (NG) for critical habitat-qualifying biodiversity and no net loss (NNL) for natural habitat.

This assessment:

1. Quantifies residual impacts (losses) to significantly impacted priority biodiversity features that remain after the application of the mitigation hierarchy.
2. Compiles those impacts across the SimFer mine and rail spur.
3. Provides biodiversity targets to achieve NG/NNL (required gains) to inform the selection of offset options, design and implementation.

Priority biodiversity features

The Project undertook a PS6 aligned Critical Habitat Assessment (CHA) to identify priority biodiversity features. Results of the CHA are presented in Table 4. There are a total of:

- 57 species qualifying for CH under PS6 Criteria 1-3 (34 of these species are plants)
- 4 habitat types or specific sites qualifying for CH under PS6 Criterion 4
- 0 biodiversity features qualifying for CH under Criterion 5 of PS6
- 3 habitat types qualifying for NH

Project impacts

This RIA quantifies impacts to priority biodiversity features after avoidance and minimisation has been undertaken, following the mitigation hierarchy. Significant impacts are assessed to be:

Categories of Project Impacts	Cause
Habitat loss, and fragmentation due to Project footprint	Direct impacts from mine footprints, rail corridor and port infrastructure causing permanent and temporary loss of Natural Habitat (NH) and Critical Habitat (CH), including bowal grasslands, gallery forests, submontane forest, mangroves and freshwater ecosystems; resulting in landscape-scale fragmentation and barrier effects for terrestrial and aquatic species
Habitat degradation and edge effects	Degradation of adjacent habitats due to dust deposition, altered hydrology, noise, vibration and light
Disturbance to fauna behaviour and movement	Operational noise, vibration, rail traffic and human activity disrupting feeding, breeding and movement patterns of mammals, birds and herpetofauna, with heightened sensitivity in CH areas
Hydrological alteration and freshwater ecosystem impacts	Changes to surface water flow, sedimentation and water quality affecting streams, rivers and wetlands connected to the mine and rail corridors, with knock-on effects for aquatic biodiversity
Increased pressure from in-migration and induced access	Indirect impacts from workforce influx and improved access leading to increased hunting, fishing, fuelwood collection and small-scale agriculture, potentially reducing wildlife populations and degrading habitats beyond the project footprint

[1] Relevant legislation includes:
Loi L/2019/0034/AN du 04 juillet 2019 – Code de l'Environnement
Décret N°199/PRG/SGG/2019 – ESIA procedures
Arrêté A/2022/1646/MEDD – Environmental assessment procedures
Code Minier (2011, amended)

Categories of Project Impacts	Cause
Risk of invasive alien species	Introduction and spread of invasive species via construction materials, transport corridors and disturbed land, with potential to outcompete native and endemic species

Approach to assessing residual impacts

To quantify the residual impacts for natural habitats the Project has adopted a 'Quality Hectare' (QH) approach for habitats. The QH approach combines a measure of area and a measure of condition of the habitat to obtain an overall measure of loss (ICMM & IUCN 2013). For the following species the number of individuals was used to quantify losses:

- Western Chimpanzee (*Pan Troglodytes verus)*
- Sierra Leone Prinia (*Schistolais leontica)*
- Amphibian (Guinea Screeching Frog - *Arthroleptis crusculum)*
- Plant (Fabaceae - Eriosema - *Eriosema triformum)*
- Plant (Asteraceae - Simandou Daisy - *Lipotriche tithonioides)*
- Plant (Orchidaceae - Jaegers Habenaria - *Habenaria jaegeri)*

For the remaining species, residual impacts were most appropriately assessed using habitat-based proxies. This approach is suitable where:

- Species distributions closely track habitat extent and condition.
- Residual impacts are anticipated to be low or moderate; or
- Detailed population-level data are not feasible to collect.

Results of the residual impact assessment

Table 1 presents a summary of residual impacts for the RIA priority biodiversity features and their no net loss (NNL) / net gain (NG) targets.

Table 1 Summary of offset targets for the Project.

Habitat/Species	CH/NH	Provisional offset target
Habitats		
Closed Evergreen Lowland Forest	CH	>95 QH
Gallery Forest	CH	>1,951 QH
Submontane Forest	CH	>628 QH
Submontane Grassland	CH	>1,226 QH
Grass Savannah	NH	≥ 8,129 QH
Shrub Savannah	NH	≥ 16,304 QH
Tree Savannah	NH	≥ 1,755 QH
Species		
Western Chimpanzee	CH	>79 individuals
Sierra Leone Prinia	CH	>50 pairs
Arthroleptis crusculum	CH	>20 – 30 individuals
Eriosema triformum	CH	>1,300 individuals
Lipotriche tithonioides	CH	>150 individuals
Habenaria jaegeri	CH	>Several thousand individuals

To achieve no net loss and net gain objectives, the Project will offset residual impacts to priority biodiversity features via actions in selected offset sites. This assessment provides estimated NNL/NG targets to support the development of suitable offset options and will be refined over time as impacts and mitigations are finalised.

Strengths and limitations of the assessment

IFC Performance Standard 6 (PS6) aligned Residual Impact Assessments (RIAs) face several inherent limitations and challenges, many of which stem from uncertainties in ecological data and the dynamic nature of biodiversity. For these reasons, an RIA should always be understood as an estimate rather than a fixed or definitive baseline. It provides a structured, defensible prediction based on available data and reasonable assumptions, but it is not static.

As with all RIAs, the SimFer RIA has certain strengths and limitations. In advance of the publication of this document, the Project requested a third-party review of all aspects of the residual impact assessment by suitably qualified consultants. Significant limitations to the RIA include:

- **Over-precautionary and inconsistent impact evaluation**: Not all priority species and habitats identified in the Critical Habitat Assessment are significantly impacted, yet they are all treated similarly in the RIA. This risks overstating residual impacts and offset requirements instead of focusing mitigation and offsets on the features that are genuinely and materially affected.
- **Insufficient transparency and justification of species RIAs**: Species-level RIA estimates for the SimFer Mine lack clear explanation of methods, assumptions, and data sources. This limits confidence in the findings, creates uncertainty around residual impact figures, and increases the risk of external scrutiny and challenge.
- **Systematic over- or under-estimation of habitat condition**: Habitat condition is assumed to be 100% pre-impact, likely inflating residual impacts and offset needs.

Although there are some limitations of this RIA, there are also significant strengths of the approaches taken. These include:

- **A precautionary approach:** The SimFer mine sites has assumed 100% quality for all habitat impacted. This is an incredibly precautionary approach which is likely to significantly overestimate impacts. Residual impacts to Western Chimpanzees at the SimFer mine site are also very precautionary with the highest impact figure in the estimated range of impact being accepted as the residual impact.
- **Significant underlying data sets which have fed into the RIA:** The SimFer project first began biodiversity surveys at their site in 2004. This means that there is more than 20 years of biodiversity data which has contributed to this RIA.
- **Collaboration with world leading experts:** The Project has engaged world leading experts in the collection and analysis of baseline data which has contributed to this RIA.
- **Use of external expertise for review and discussion:** Independent consultants with significant expertise in designing and implementing PS6 aligned projects have been involved in the review and discussion of the various components of the RIA throughout the process of development.

Next steps

To progress the development and implementation a biodiversity offsets programme for the SimFer, the following key next steps are proposed:

- **Consolidate residual impacts:** Compile all residual impacts across JV components (mines, rail, ports) into a single, project-wide residual impact assessment for the Simandou Project.
- **Define unified offset targets:** Develop a single set of offset targets to guide a coordinated portfolio of offset sites.
- **Finalize offset site selection:** Complete feasibility studies and prioritise a suite of technically, socially, institutionally and financially viable offset sites.
- **Develop strategy and integration:** Prepare a Biodiversity Offset Strategy and integrate it into the SimFer Biodiversity Action Plan.
- **Establish monitoring framework:** Develop and implement a Biodiversity Monitoring and Evaluation Plan (BMEP), applying the Quality Hectare (QH) or population based approach to track losses and gains.

- **Address review gaps:** Prepare a plan and timeline to address third-party review findings following completion of the consolidated residual impact assessment.

1 Introduction

1.1 Purpose and scope

This document presents the Residual Impact Assessment (RIA) for all components of the SimFer mine (hereafter "the Project"). The RIA brings together the key biodiversity findings from the mine (both Oueleba main and Oueleba North pits and provision for the future Pic de Fon pit development), rail spur and associated infrastructure, to provide an assessment of the Project's residual impacts on priority biodiversity features after application of the mitigation hierarchy.

The Project has committed to aligning with the International Finance Corporation's (IFC) Performance Standards. Under Performance Standard 6 (PS6), the Project is required to achieve:

- Net Gain (NG) for biodiversity features that qualify as Critical Habitat (CH); and
- No Net Loss (NNL), where feasible, for biodiversity features assessed as Natural Habitat (NH).

The objective of this RIA is therefore to summarise the residual impacts on priority biodiversity features and to provide the quantitative basis for determining the NG/NNL targets that will ultimately guide offset selection, design and long-term implementation.

This assessment is based on the Project design as of September 2025. Any deviations from these designs may result in changes in the outcomes of this assessment and either increase or decrease the scale of residual impacts.

1.2 Project description

The SimFer mine centres on one of the world's largest high-grade iron ore deposits split into two resources (Ouéléba and Pic de Fon), located along the Simandou mountain range in southeastern Guinea. The mining resource is 2.1 billion tonnes (Bt) of high-grade iron ore contained within the Ouéléba pit. Rio Tinto Simfer aims to produce 60 million tonnes per annum (Mtpa) of iron ore from the Ouéléba deposit, based on the capacity of the rail spur, over 26 years of operation, as described in the Project Agreements. The Pic de Fon deposit, the mineral resources of which are still being defined, is approximately 5 km south of the Ouéléba deposit. Each deposit is approximately 6 to 8 km in length, 1 to 1.5 km wide and extends about 500 m below the surface.

The mine site is located within a land access boundary with an area of 104.6 km2 (10,460 ha), which includes safety and security zones around the works. Within this area, a total of approximately 1,860 ha will be occupied by the open pit, crushers, run of mine (ROM) stockpile, waste rock storage facilities (WRSF), conveying systems, stockyard, and train loadout facilities. The mine components also include provision of utilities and infrastructure (power, explosives and bulk fuel storage facilities, waste management, access, accommodation, administration buildings, workshops, medical facilities, helipad, etc.) needed to support mining operations.

Ore will be transported to the port via the rail spur which will connect to the Trans-Guinean Railway near Kérouané. The rail spur consists of approximately 70 km of track, a 926 m long tunnel, five major bridges and other water crossings. The railway will be a 25-tonne axle load single-track with a design life of 50 years.

Figure 1 shows the locations of the mine and rail spur.

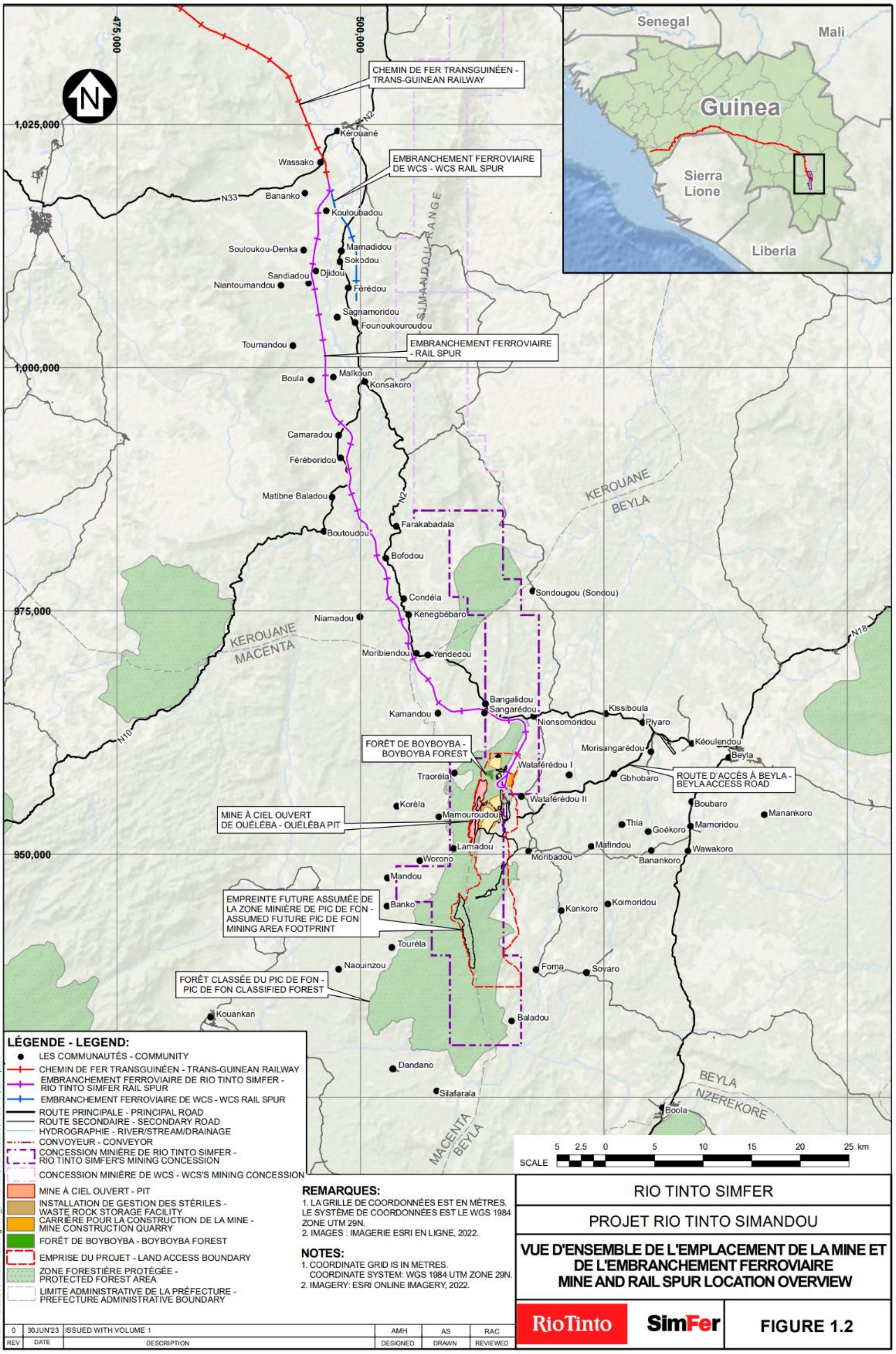


Figure 1 Mine and rail spur location overview.

1.3 Biodiversity context

The project is located in the south Guinea, in a part of the country that is included in the Guinean Forests of West Africa Hotspot, one of the 34 global biodiversity hotspots defined by Conservation International (Critical Ecosystem Partnership Fund 2015). The “Upper Guinea Forests” Biodiversity portion spans Guinea in the west to Benin in the east. The upland areas of Guinea have developed specific habitats and species, many are under threat due to a number of activities that have resulted in habitat loss (Critical Ecosystem Partnership Fund 2015).

The proposed SimFer mine at Ouéléba on the Simandou ridge is in this biologically important part of Guinea and the Pic de Fon Classified Forest (PdF CF), established in 1953 and 252 km2 in surface area, is considered as one of the most important biological sites in Guinea, probably second only to Mont Nimba in terms of the presence of threatened and restricted range species. It is recognized as a protected site under Guinean law as a Classified Forest, and it has been recognized internationally as a Key Biodiversity Area (KBA), a Tropical Important Plant Area (TIPA), and an Important Bird Area (IBA). Many of the habitats in the PdF CF are globally threatened, and it also supports 64 Critical Habitat qualifying species (IFC PS6 2012,2019).

The mountain ridge acts as a prominent drainage divide, with the Project situated in the headwaters of two major river basins: the Niger to the north and the Diani to the south. The ridge is an important groundwater recharge area and source of surface water flows. Perennial spring fed streams run through the steep sided valleys providing water supply for local ecosystems, villages and agriculture.

1.4 Structure of this report

This report is structured to guide the reader sequentially from baseline information through to quantified residual impacts and the resulting Net Gain/No Net Loss requirements. It describes the priority biodiversity features, the indicators and methods used to assess residual impacts, and the basis on which NG/NNL targets have been derived. Key assumptions and limitations are also highlighted.

Because the RIA draws on multiple datasets and methods, it is important to first describe how the assessment was undertaken. For this reason, the next chapter sets out the approach to the RIA and how residual impacts were quantified.

The report is organised as follows:

- Section 1 – Introduction
    - Sets out the purpose and context of the RIA, provides an overview of the Project and biodiversity context, and explains how the report is structured.
- Section 2 – Approach to the RIA
    - Summarises the analytical approach, including how residual impacts were derived from the Critical Habitat Assessment (CHA), how the mitigation hierarchy was applied, and the methods used to quantify impacts.
- Section 3 – Priority Biodiversity Features
    - Describes the biodiversity features included in the assessment and presents the available baseline information. This includes data sources, survey methods, indicator selection and key data gaps relevant to the RIA.
- Section 4 – Results of the Residual Impact Assessment
    - Presents the quantified residual impacts for each Project component.
- Sections 5 - 6 – NG/NNL Targets and Implications for Offsetting
    - Outlines the strengths and limitations of the RIA
    - Sets out the NG/NNL targets derived from the residual impacts and discusses the implications for offset site selection, offset design and long-term implementation.
    - Presents a set of next steps

2 Approach to assessing residual impacts

2.1 Overview

The Residual Impact Assessment (RIA) builds directly on the work completed as part of the Project ESIA. The RIA assumes that all avoidance and minimisation actions developed as part of the biodiversity action planning and associated environment and social management plans for each project component are fully implemented. The RIA therefore focuses solely on the impacts that remain after the mitigation hierarchy has been fully applied. It is important to note that this assessment did not consider cumulative impacts. Given the scale of the Project further investigation into cumulative impacts will be undertaken by a specialised group which will include external stakeholders.

Outline priority biodiversity features
The Project undertook individual PS6 aligned Critical Habitat Assessment (CHA) to identify priority biodiversity features. The assessment confirms the species, habitats and ecosystems that qualify as Critical Habitat (CH) or Natural Habitat (NH) in accordance with IFC PS6. These features form the basis of the RIA.

Quantify residual impacts
For each priority biodiversity feature, residual impacts were quantified. Depending on the feature, this included: spatial analysis of direct habitat loss and ecologically relevant degradation buffers. Indirect impacts were also considered. For species with species-specific metrics, occupancy estimates were used alongside decay functions and defined functional impact zones.

Derive Net Gain / No Net Loss requirements
The consolidated residual impacts were translated into NG/NNL targets for each priority biodiversity feature. These targets define the minimum ecological outcomes that must be achieved through offsets to meet IFC PS6 requirements.

Document assumptions and limitations
All key assumptions, limitations and areas of uncertainty were recorded to ensure transparency and to guide future monitoring, adaptive management and offset design.

2.2 Scope: Project impacts

This report quantifies significant impacts to biodiversity features after mitigation (avoidance and minimisation) has been undertaken by the Project, following the mitigation hierarchy (Figure 2). A summary of significant residual impacts is presented in Table 2 with a description. These are drawn from Project ESIA and its relevant impacts chapters. This section presents a high-level overview of the anticipated impacts, but further detail can be found in the ESIA.

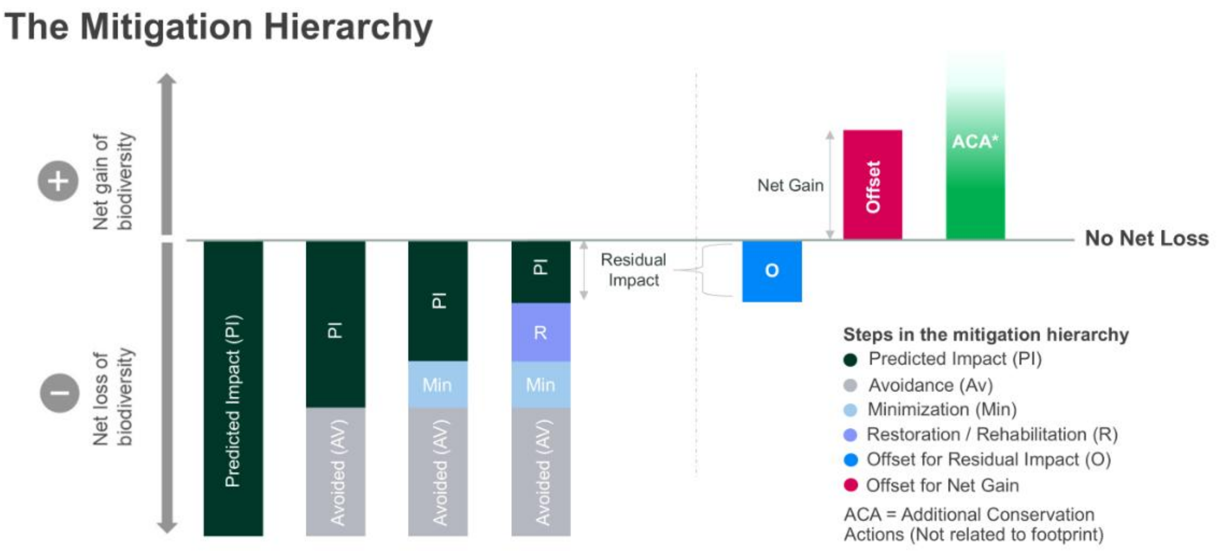


Figure 2 The mitigation hierarchy.

Table 2 Summary table of impacts included in this residual impact assessment.

Project impacts	Cause	Terrestrial			Aquatic
		Critical and Natural Habitat	Terrestrial fauna	Terrestrial flora	Aquatic fauna
Habitat loss, and fragmentation due to Project footprint	Direct impacts from mine footprints, rail corridor and port infrastructure causing permanent and temporary loss of Natural Habitat (NH) and Critical Habitat (CH), including bowal grasslands, gallery forests, submontane forest, mangroves and freshwater ecosystems; resulting in landscape-scale fragmentation and barrier effects for terrestrial and aquatic species	X	X	X	X
Habitat degradation and edge effects	Degradation of adjacent habitats due to dust deposition, altered hydrology, noise, vibration and light	X	X	X	X
Disturbance to fauna behaviour and movement	Operational noise, vibration, rail traffic and human activity disrupting feeding, breeding and movement patterns of mammals, birds and herpetofauna, with heightened sensitivity in CH areas		X		
Hydrological alteration and freshwater ecosystem impacts	Changes to surface water flow, sedimentation and water quality affecting streams, rivers and wetlands connected to the mine and rail corridors, with knock-on effects for aquatic biodiversity	X			X
Increased pressure from in-migration and induced access	Indirect impacts from workforce influx and improved access leading to increased hunting, fishing, fuelwood collection and small-scale agriculture, potentially reducing wildlife populations and degrading habitats beyond the project footprint	X	X	X	X
Risk of invasive alien species	Introduction and spread of invasive species via construction materials, transport corridors, and disturbed land, with potential to outcompete native and endemic species	X		X	

3 Summary of priority biodiversity features

3.1 Baseline data collection

This RIA is informed by a substantial body of biodiversity data generated over more than two decades. In addition to the ESIA, data has been supplemented by earlier survey campaigns, long-term monitoring, and specialist studies, all of which have improved the understanding of local and regional biodiversity features.

The baseline biodiversity data, summarised in Table 3, have been collected over an extended period and at different stages of project development.

Table 3 Summary of baseline biodiversity data collected for each of the project components.

Type of Survey	Date	Ref
RAP 35	2004	Conservation International Mccullough et al., 2004).
RAP 40	2006	Conservation International (Wright 2006).
Botanical and wildlife study of the PdF CF	2005	Winrock International
Biodiversity Surveys in the LSA and RSA	2006-2010/11	Rio Tinto Volume D Biodiversity Baseline (2010) and (2012 ESIA)
Western Chimpanzee Surveys - (transect and camera trap work) including population estimates, Presence and distribution of other mammal species.	2012 to 2021	Oueleba Janis Carter and BERB. (Carter, 2021a, 2021b, and 2021c) and report for the PdF area (Carter, 2022). PdF area (Carter, 2022).
Surveys of birds reptiles and amphibians	2018 - 2020	Samec (2020)
Field investigations at the mine site (especially at the two iron deposits at Ouéléba and Pic de Fon) for plants, amphibians, birds, bats, aquatic ecology and ecosystem services	2021 - 2022	Sylvatrop
Field investigations along the proposed rail spur to Kérouané (including quarries and access roads) (June 2022 April 2023) for plants, amphibians, reptiles, birds, bats, aquatic ecology and ecosystem services.	2022 - 2023	Sylvatrop

3.2 Critical Habitat Assessment

The Project component undertook a PS6 aligned Critical Habitat Assessment[2] (CHA) to identify priority biodiversity features. Results of the CHA are presented in Table 4. There are a total of:

- 57 species qualifying for CH under PS6 Criteria 1-3 (34 of these species are plants)
- 4 habitat types or specific sites qualifying for CH under PS6 Criterion 4
- 0 biodiversity features qualifying for CH under Criterion 5 of PS6
- 3 habitat types qualifying for NH

[2] Critical Habitat Assessment forms part of the Project ESIA

Table 4 Summary of CH/NH qualifying features.

Biome	Feature	Number of biodiversity features	CH/NH	Target (if impacted)
Terrestrial	Amphibian / reptile	5	CH	NG
	Bird	1	CH	NG
	Mammal	5	CH	NG
	Plant	34	CH	NG
	Habitat (CH)	4	CH	NG
	Habitat (NH)	3	NH	NNL
Aquatic	Crustacean	2	CH	NG
	Fish	10	CH	NG

See Appendix 1 for a list of all the CHQ features.

3.3 Approach to developing indicators and metrics

Although numerous priority biodiversity features occur within the Project landscape, they vary substantially in their sensitivity to impact, their likelihood of being affected, and the ecological consequences of any impact. It is neither practical nor scientifically justified to quantify residual impacts for every feature individually. Instead, a structured indicator and metric framework has been developed to ensure that the assessment is focused, proportionate, and ecologically meaningful.

Ecosystem-level indicators and metrics

For ecosystems, the standard metric applied is area × condition, expressed as Quality Hectares (QH). This metric captures both the extent of habitat affected and its ecological integrity and provides a robust basis for assessing No Net Loss/Net Gain requirements at the habitat scale.

Species assessed using habitat proxies

For the majority of species, residual impacts are most appropriately assessed using habitat-based proxies (Barton et al., 2014; Lindenmayer et al., 2014). This approach is suitable where:

- species distributions closely track habitat extent and condition;
- residual impacts are anticipated to be low or moderate; or
- detailed population-level data are not feasible to collect.

For a smaller subset of species, habitat proxies are insufficient to capture population-level risk. These species exhibit strong sensitivity to fragmentation, have spatial ecology (home range, movement, density) that is not reliably predicted by habitat extent or condition; or have population dynamics that require explicit demographic consideration.

For these species, species-specific metrics (e.g., density × area of functional habitat, occupancy modelling, core range loss, or functional impact zones with decay coefficients) are used in addition to the broader ecosystem metrics. This dual approach provides a more precise and actionable understanding of residual impacts and ensures that population-level consequences are appropriately quantified.

An outline of the approach taken for the various species/taxa/habitats in this RIA is presented in Table 5.

Table 5 Overview of indicators used to assess residual impacts for CH/NH/CHQS.

Biome	Feature	SimFer approach
Terrestrial	Amphibian	Habitat used as proxy for 4 species. Individual approach for *Arthroleptis crusculum.*
	Bird	Individual population-based approach taken
	Mammal	Habitat used as proxy apart from the Western Chimpanzee where a population approach was taken.
	Plant	Habitat used as proxy for 47 species. Population approach taken for three endemic, high-altitude species: *Eriosema triformum* *Lipotriche tithonioides* *Habenaria jaegeri*
	Reptile	Habitat used as proxy
	Habitat (CH4)	Extent and condition assessed
	Habitat NH	Extent and condition assessed
Aquatic	Crustacean	Habitat used as proxy
	Fish	Habitat used as proxy

4 Residual impact assessment

4.1 Overview of approach

The RIA for the SimFer mine includes both the mine and associated infrastructure, and also the rail spur which links to the mainline rail. Two specific approaches suitable to the mine and rail have been developed to assess residual impacts.

4.2 SimFer RIA

Terrestrial and aquatic habitats

The Simandou ridge is a biologically important part of Guinea. The PdF CF, established in 1953 and 252 km^2 in surface area, is considered to be one of the most important biological sites in Guinea, second only to Mont Nimba in terms of the presence of threatened and restricted range species. The PdF CF is recognized as a protected site under Guinean law, and it has been recognized internationally as a KBA, TIPA, and an IBA.

The mountain ridge acts as a prominent drainage divide, with the Project situated in the headwaters of two major river basins: the Niger to the north and the Diani to the south. The ridge is an important groundwater recharge area and source of surface water flows. Perennial spring fed streams run through the steep sided valleys providing water supply for local ecosystems, villages and agriculture. A detailed description of the ecological context and systems is provided in the Critical Habitat Assessment (CHA) (Rio Tinto SimFer, 2023) and the Environmental and Social Impact Assessment (ESIA) (Rio Tinto SimFer, 2024). Habitat mapping and the mapping of critical and natural habitats can be found in Figure 3 and Figure 4.

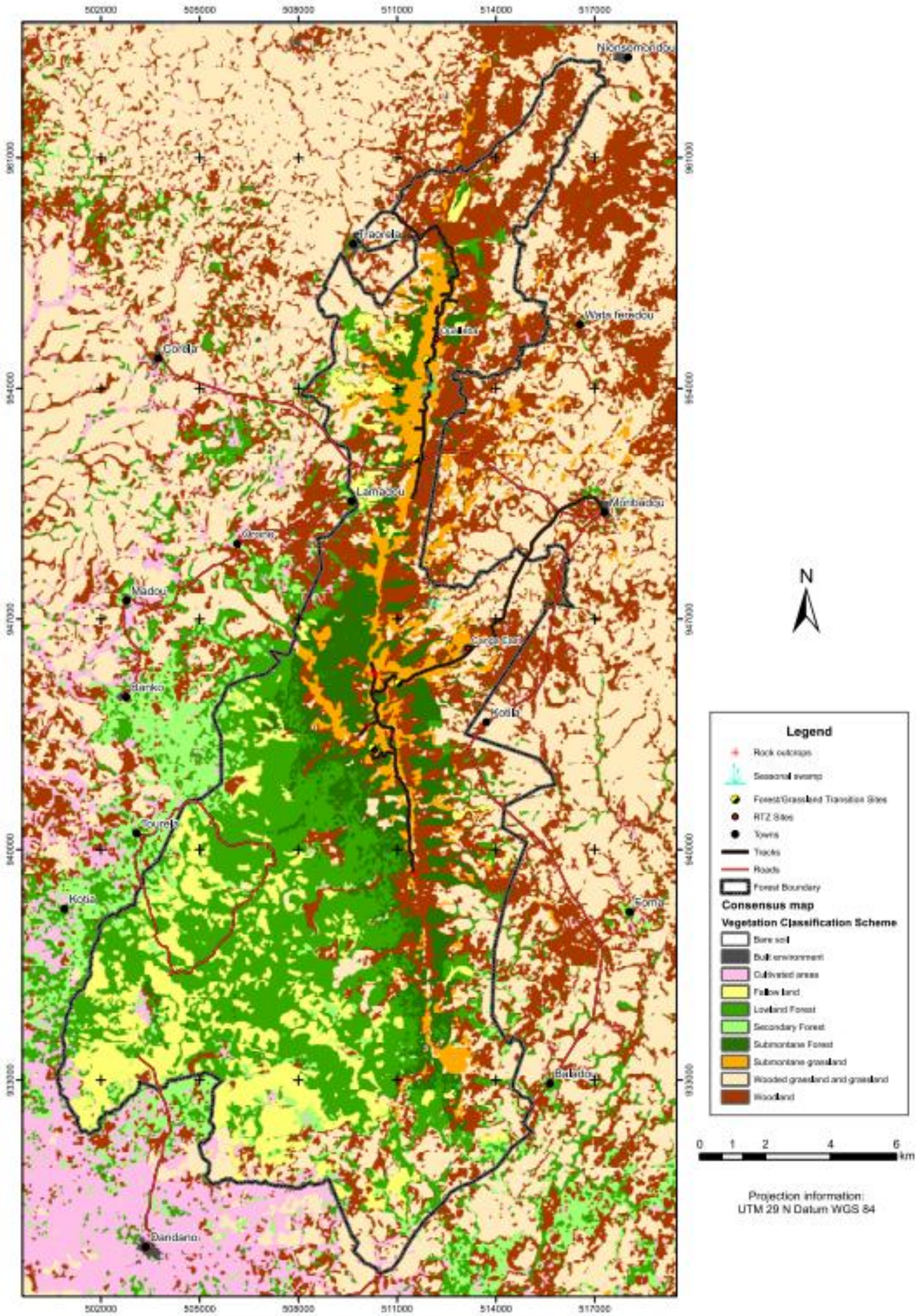
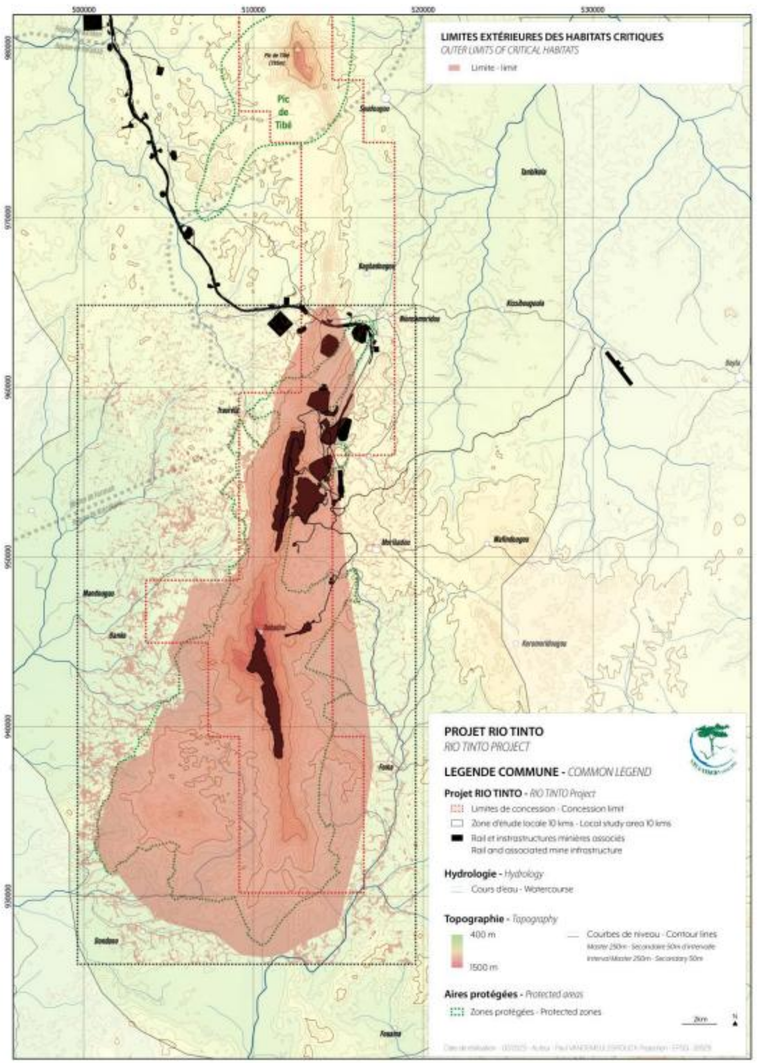


Figure 3 Habitat map created for the SimFer mine (Couch et al. 2019).



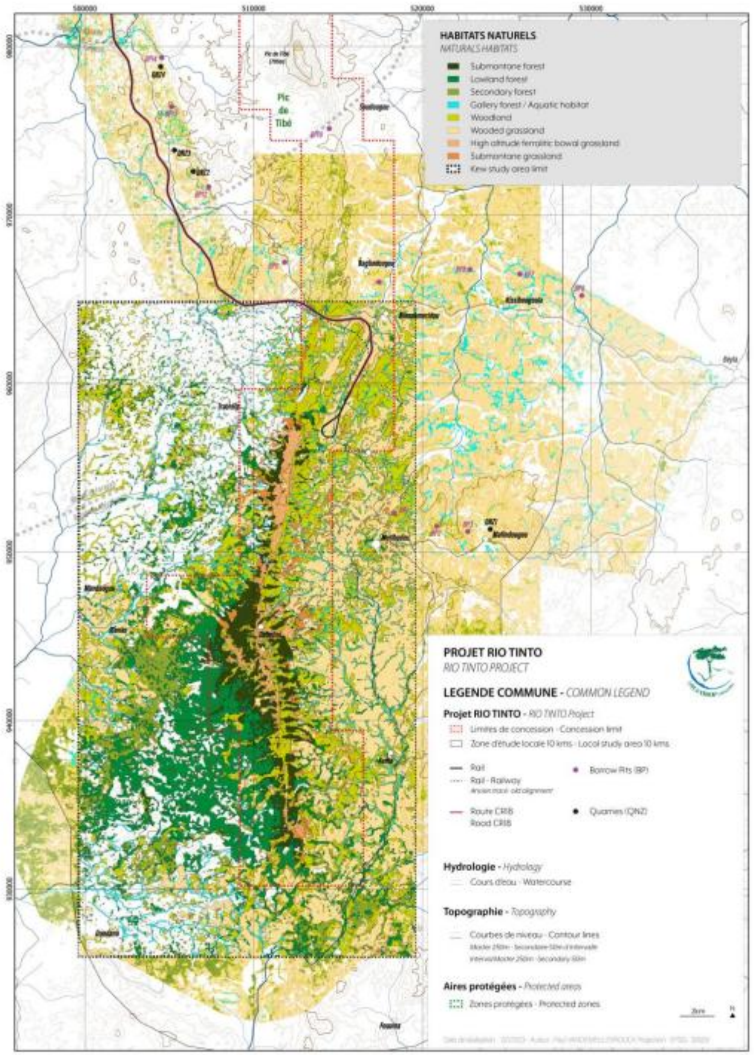


Figure 4 Maps showing Critical (left) and Natural (right) habitat within the terrestrial Ecologically Appropriate Area of Analysis (EAAA) for the SimFer mine and rail spur (maps taken from the Critical Habitat Assessment completed by Sylvatrop (Rio Tinto (2024)).

4.2.1 Use of a static baseline

The Project is in a landscape with existing land use activities including multiple villages, roads and agriculture (e.g. growing of subsistence crops). Although habitat conversion rates of natural habitat to modified habitat have not been assessed, there is an ongoing background rate of conversion due to pressure from agriculture and livestock grazing. Despite the ongoing background declines to terrestrial habitat quality, a static baseline has been used in the quantification of residual impacts; this is a precautionary approach.

4.2.2 Method to estimate Project footprint impacts

The SimFer mine footprint is calculated by compiling the spatial data for all infrastructure components of the Project from the most recent Project design. To account for habitat degradation arising from the construction and operational activities (e.g. dust impacts), several buffers were defined and applied around the footprint of the Project. The impact to terrestrial habitats was calculated by overlaying the Project footprint layers with the Kew Gardens typology and mapping data from 2011 (Figure 3).

The buffer system used here reflects a generalised precautionary gradient, but it is also consistent with published evidence on species' responses. The buffer system avoids a "one-size-fits-all" underestimation of loss. Buffers make residual impact assessments more ecologically realistic by accounting for functional habitat loss. They also help signal where additional mitigation (e.g. noise reduction, light management, hydrological buffers) could reduce the effective zone of influence.

- Footprint = 100% loss. All biodiversity within the cleared/occupied area is lost.
- 0 - 100 m = 100% loss. Edge effects are most intense closest to the disturbance; habitats are functionally lost even if not physically cleared.
- 100 - 250 m = 50% loss. Medium-intensity disturbance (e.g. reduced species occupancy, altered vegetation structure) leads to partial functional loss.
- 250 - 500 m = 25% loss. Ecological effects persist but attenuate with distance; some sensitive species avoid the area, others remain.
- 500 - 1000 m = 10% loss. Disturbance is still detectable but relatively low, assumed to reduce biodiversity function by ~10%.
- In lowland hotspots, assumed 50% loss within 3 km to reflect sensitivity of aquatic and riparian systems to indirect pressures.

Residual impacts for the rail spur were calculated using the same general methodology and using the same baseline habitat data. The buffers used were slightly different to account for differing impacts anticipated between a mine and a railroad. Again, the buffer system reflects a precautionary approach.

- Footprint = 100% loss. All biodiversity within the cleared/occupied area is lost.
- 0 - 75 m = 100% loss. Edge effects are most intense closest to the disturbance; habitats are functionally lost even if not physically cleared
- 75 - 250 m = 50% loss. Medium-intensity disturbance (e.g. reduced species occupancy, altered vegetation structure) leads to partial functional loss.
- 250 - 3,000 m = 35% Ecological effects persist but attenuate with distance; some sensitive species avoid the area, others remain.

Maps showing the Project infrastructure and related buffers can be found in Figure 5 (top for the mine and bottom for the rail).

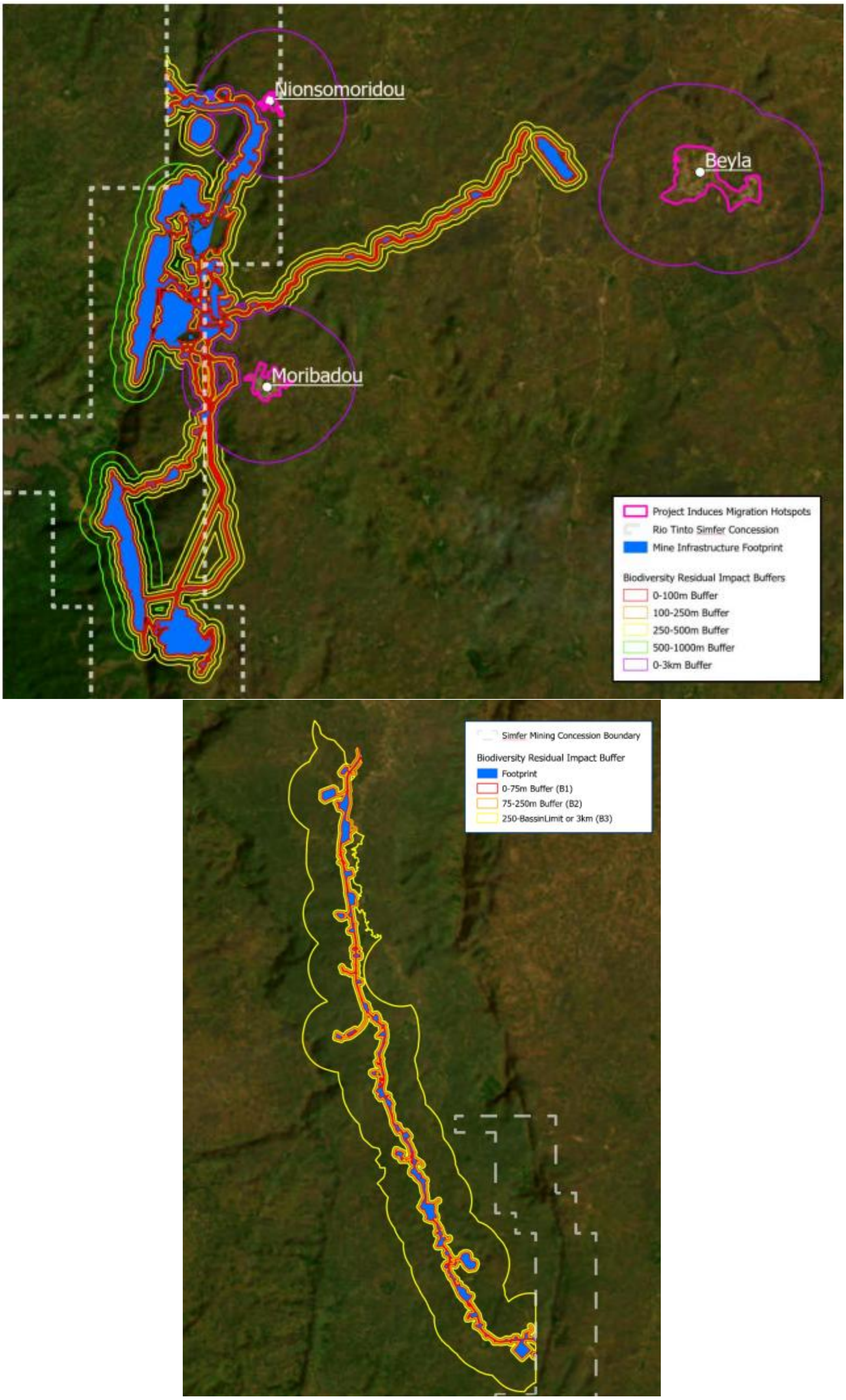


Figure 5 Mapped buffers to assess residual impacts at the mine site (top) and along the rail spur (bottom).

4.2.3 Habitat condition

Residual impacts are usually expressed not just in terms of area but also in terms of quality or condition. Adding a measure of quality ensures that when habitat losses are exchanged for gains through restoration and offset activities there is a fair and equivalent exchange. Habitat 'area × condition' metrics or quality hectares (QH), is a common and widely accepted means to account for habitat complexity through a standardised approach (e.g. Parkes et al. 2003; Temple et al. 2012).

The QH approach uses a combination of two measures: area (ha) and condition (or quality). In this metric, a theoretical "benchmark" habitat is considered the highest quality, at 100% condition. A degraded habitat is then considered at a lower percent condition. For example:

- 10 ha of highest possible condition habitat (100% quality) = 10 × 1 = 10 QH
- 10 ha of degraded habitat at 50% quality = 10 × 0.5 = 5 QH
- 10 ha of highly degraded habitat at 25% quality = 10 × 0.25 = 2.5 QH

Rather than assessing habitat condition, the Project has taken a precautionary approach and assumed that all CH/NH was in pristine condition prior to impacts. Therefore, all impacted habitats have been assessed as having a habitat condition of 100%.

4.2.4 Results and offset targets

The residual impact for terrestrial habitats that require offsets (CH and NH) is estimated at 30,088 QH (Table 6). As the goal for critical habitats is to achieve a net gain, the offset target is greater than 3,900 QH of critical habitat. The goal for natural habitats is to achieve a no net loss and the offset target is greater than or equal to 26,188 QH.

Table 6 Offset targets for Critical and Natural habitats at the SimFer mine and along the rail spur (figures have been rounded to the nearest whole number).

Habitat type	CH/NH	Residual impact at mine (QH)	Residual impact along rail spur (QH)	Offset target
Closed Evergreen Lowland Forest	CH	92	3	>95 QH
Gallery Forest*	CH	782	1,169	>1,951 QH
Submontane Forest	CH	628	N/A	>628 QH
Submontane Grassland	CH	1,226	N/A	>1,226 QH
Grass Savannah	NH	5,618	2,511	≥ 8,129 QH
Shrub Savannah	NH	3,722	12,582	≥ 16,304 QH
Tree Savannah	NH	1,738	17	≥ 1,755 QH
* = Gallery forests are linear strips of dense vegetation that occur along rivers and streams, making them closely associated with freshwater ecosystems due to their reliance on consistent water availability and riparian conditions. Therefore, impacts related to species associated with freshwater habitats are included within the assessed impacts to gallery forest.				

Species specific assessments

Where there are accepted methods for assessing populations or there are weaker habitat-occupancy links, population indicators were used to assess residual impacts. For the SimFer mine, species specific assessments were undertaken for three fauna species and three plant species.

4.2.5 Western Chimpanzee

The Western Chimpanzee is a wide-ranging charismatic species of high stakeholder concern that is influenced by various ecological and anthropogenic variables. The Project needs to clearly demonstrate NG for this species to align with IFC and achieving this requires a justifiable estimate of how many individuals have been impacted by Project development.

Population estimates

A variety of means of estimating the size of the Simandou chimpanzee groups have been used since 2007.

Transects have been used continually but a combination of the very challenging topography of Simandou and the fact that chimpanzees are not evenly distributed across the Pic de Fon Classified Forest (PdF CF) are all important factors limiting the effectiveness of this methodology.

Using camera traps within the framework of a systematic grid proved to be a more effective method for estimating the chimpanzee population size in the PdF CF.

One of the objectives of the ongoing camera trapping is to provide a reliable estimate of the population of chimpanzees in PdF CF through the process of identifying individuals. However, this procedure is not as direct as it could be because not all chimpanzees are photographed during each six-month dataset period due to the nature of their movements. Another limitation is the poor quality of some photos, preventing the possible identification of some individuals. As a result, the number of chimpanzees identified is likely an underestimate of the total population.

An alternative method for estimating total population is the 'single event estimate,' defined as the maximum number of chimpanzees observed in a single event for each age-sex class at each location. While individuals in group photos or processions are often not identifiable, these observations provide reliable counts of age–sex categories. In some cases, this approach yields higher counts than individual IDs alone, improving the precision of population estimates.

The overall population estimate is expressed as a range comprising two measures: a minimum population estimate (MiPE), based on individuals identified from photographs within the reporting year, and a maximum population estimate (MaxPE), which includes these individuals plus those identified in previous datasets but not observed during the reporting year. Both estimates may incorporate the 'single event estimate' where this exceeds the number of identified individuals within a given age-sex class. When estimating populations by habitat or community, the single event estimate is applied at the community level, with results aggregated to produce an overall population estimate.

The MiPE and MaxPE estimates for 2018 are considered here as the baseline estimates of chimpanzee population size in the PdF CF. Data from 2018 and the three previous years are relatively reliable and enable the calculation of adjustments including consideration of individuals not detected in 2018 but thought to be present.

In 2018, the MiPE for three discrete communities was 118 individuals; 16 in Ouéléba, 39 in Banko East (Community B) and 63 in Banko West (Community C). Of the 118 individuals, 101 were identified, and 17 were attributed to calculations using the single event estimate; seven in Ouéléba, four in Banko East and six in Banko West.

The MaxPE is calculated using two values; (i) the number of ID's + absents and (ii) the MiPE + absents. The second value has the potential of double counting individuals when using totals derived from the single event estimate. MaxPE calculations are done for each age/sex category and then summed together.

In 2018, the MaxPE for 3 communities is:

> 101 (# of ID's) + 31 (absents) =132 individuals
> or
> 118 (MiPE) + 31 (absents) = 149 individuals

The MaxPE for three discrete communities ranges from 132 to 149 individuals. The upper value of 149 individuals is the less conservative estimate, which potentially involves the double counting of 17 individuals. The combined maximum population estimate totals 132 to 149 individuals. Considering the adjustment factor for possible double counting (n=17), the 2018 population estimate for one population consisting of three communities is 118 to 126 individuals.

The community in Ouéléba has at least 13 - 16 individuals, 13 of which were identified by camera trapping; the community in the Banko West area has at least 63 individuals, 57 of which were identified by camera trapping; the community in the Banko East area has at least 39 individuals, 35 of whom were identified by camera trapping.

Chimpanzee communities

There are three main communities: Ouéléba (Community A), Banko East (Community B) including the Mandou and Western Spur subgroups), and Banko West (Community C) including the Tinkan, Gamandou, Foko and Zossasso subgroups) - see Figure 6.

The following three travel corridors are suggested to exist within the PdF CF:

- A travel corridor connecting the Banko Forest block to a smaller area of forest habitat to the east in Foko, where the distribution of chimpanzee records extensively overlaps the ore body
- A travel corridor linking Foko to Zossasso, which is located at the end of the ridge outside the area covered by the mine plan
- A small travel corridor connecting the forest pockets within the Zossasso area

These travel corridors are considered essential to enable chimpanzees to access core habitats. There has been no evidence to date to suggest a travel corridor between the Ouéléba community and the communities to the south.

Range estimates, population densities and estimated range impacts

The baseline for the range of chimpanzees was initially estimated using all records of nests and direct observations collected between the end of 2007 and mid-2011. Two methods of estimation were used: Minimum Convex Polygon (MCP) and Kernel Density Estimate (KDE).

The MCP calculated the total surface area of the chimpanzee range by constructing the smallest possible convex polygon around the data. A 500 m buffer was added where sufficient habitat existed within the forest limits. Using this method, which is often said to over-estimate area, the total chimpanzee range across all zones of the PdF CF equalled 56 km².

The KDE is another method to estimate range, which primatologists use more frequently. KDE estimates the size of the territory and the intensity of use, via a statistical analysis that uses the utilization distribution for estimating the overall range. From the distribution of nest locations over time the KDE estimates the probability of a nest being constructed at any given location. This method produced a total chimpanzee range of 49.5 km². The total KDE range for the two other communities is 37 km². After deductions are made for the mining zone, production zone and land outside of the CF, the total KDE range is 28 km². Based on the total KDE, chimpanzee density is 2.76 individuals per km²; after deductions the density is 3.64 individuals per km².

In assessing range changes, deductions must be included for the avoidance of disturbance. A suggested 200 m wide belt placed alongside and to the left of the buffer zone estimates the distance chimpanzees will displace to avoid disturbances. This displacement can be temporary and recoverable or permanent. The additional loss due to avoidance for the Ouéléba community is 1 km² which results in an overall total range of 4 km² and a minimum density of 4 individuals per km². The additional loss to the range for the other two communities is 1.5 km² which results in an overall total range of 26 km² and a minimum density of 3.92 individuals per km².

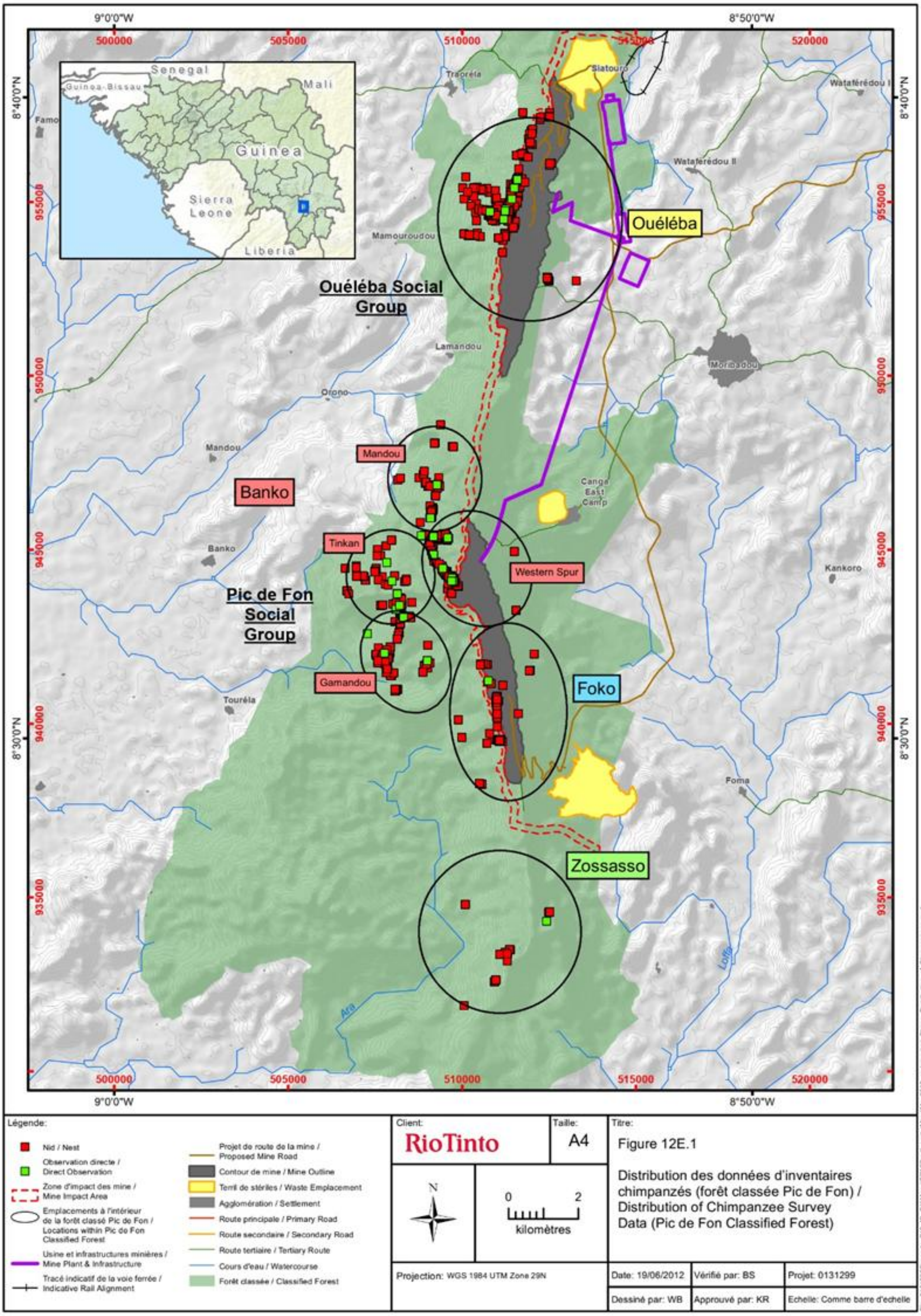


Figure 6 Distribution of Western Chimpanzees within the Pic de Fon Classified Forest.

Estimation of losses

While it is hard to predict chimpanzee responses to the Project impacts with precision, it is clear that unmanaged impacts could be highly significant. At the scale of the whole PdF CF, increased pressure on natural resources resulting from project-induced access and in-migration could have a significant impact that, if un-managed, could compromise the viability of the PdF CF chimpanzee population. The significance of direct impacts will vary for both the Ouéléba and Pic de Fon communities.

Ouéléba Community

The Ouéléba community is isolated and contains only a small number individuals and thus is less likely to recover even from small impacts on their community and/or core range habitat. Even in the absence of predicted project impacts, this community may not be viable in the long-term and is more vulnerable to shocks (e.g. due to disease or hunting) and to random population fluctuations. Approximately 31% to 36% of the core range of this community is under the planned mine footprint, and no suitable habitat is found in proximity, which precludes options for range-shifting (except for the possibility of ensuring protection and habitat improvement in areas currently under CF general use zoning). Furthermore, habitat disturbance (e.g. through construction of roads and blasting) is expected to be significant in the vicinity of the Ouéléba ridge, which corresponds to an area where most of the chimpanzee nests and signs of presence have been recorded. Therefore, the potential outcome of impacts for the Ouéléba community could be substantial, and the total loss of this community is possible. The Project will need to closely monitor effectiveness of management measures, especially in collaboration with its different partners, to avoid the complete extirpation of the Ouéléba community.

Pic de Fon Communities

The direct impacts for the Pic de Fon communities are expected to be significant:

- The combined effect of habitat loss and disturbance for each community could result in the death of individuals that cannot compete for limiting food resources and/or the community may try to shift their range. If this community was successful in shifting their range into unoccupied suitable habitat, it is possible that the habitat may be of lower quality and could not sustain the same chimpanzee density and/or the chimpanzees may need significant time to adapt to their new environment to be able to use and locate the resources efficiently. This could reduce fecundity and survival rates, resulting in an impact on the population.

- In addition to the above impacts, displacement and range shifting means that, there is an increased chance of intergroup encounters, which have been recorded to lead to the death of individuals in some cases (Boesch et al., 2007, 2008). In natural settings, where one or the other community has options to flee, many intergroup encounters are resolved without physical contact or mortality, but in situations where one community is unable to flee due to disturbance, significant mortality, including loss of entire communities, has been inferred (Boesch et al., 2007, 2008).

The worst-case scenario is based on the following key assumptions:

- Usage of Foko by chimpanzees would cease, permanently. The adjacent lowland areas to the west would not be used due to the historical high presence of hunting, and other options, such as moving permanently into Banko West would be considered to represent a lower risk.
- The travel corridor between Foko and Zossasso is lost, severing access to Zossasso.
- No alternative travel corridor is established to enable chimpanzees to reach Zossasso.
- Usage of the Western Spur valley by chimpanzees ceases.
- The ravine outside the Western Spur valley is lost (i.e. no further use by chimpanzees).
- There is a permanent shift of chimpanzees to northern Mandou.

The worst-case scenario would be that the two communities of PdF reside in the remaining core habitat which, after the reduction of the surface area of the Western Spur valley, provides a total surface area of 15.86 km².

- Community B will lose the Western spur area and Community C will lose the Foko and Zossasso areas.
- The only options for Community B will be either to cope with a reduced ranging area at higher density (only the Mandou area) or to conquer at least part of the Banko West area (Tinkan and Gamandou), which will result in inevitable conflicts with Community C which is numerically more important.
- The only options for Community C will be to cope with a reduced ranging area at higher density (only Tinkan and Gamandou) or to conquer the Mandou area where community B resides.
- If both Communities B and C decide to cope with a reduced ranging area, they will be faced with increased intra-group competition for food resources and other critical resources, resulting in increased stress and reduced fecundity in the long term. That scenario is the least likely.
- If either Community decides to conquer the territory of the other, which is the most likely scenario, that will lead to violent conflicts leading to the loss of one community, which should be community B (39 individuals) as Community C is twice as large (63 individuals) in terms of number of individuals.
- The worst-case scenario is that the Mining Project may cause the loss of the entire community of Ouéléba (at least 16 individuals) and the loss of Community B residing in the Western spur / Mandou area (at least 39 individuals), plus the loss of a substantial part of Community C through losses in fighting and reduced range (at least 24 individuals). This would lead to a worst-case scenario of the loss of at least 79 chimpanzees. In order to follow a precautionary approach, the Project has accepted the worst-case scenario estimate provided here as the residual impact to Western Chimpanzees from the SimFer mine. The Project will therefore need to achieve a net gain for this species through offsetting of more than 79 individuals.

4.2.6 Sierra Leone Prinia

The Rapid Assessment Program 35 (RAP-35) revealed the presence of a Sierra Leone Prinia (*Schistolais leontica)* pair for the first time in the PdF CF. During the 2007 to 2008 Rio Tinto baseline inventories, 26 additional localities were added, totalling 59 individuals: 15 localities in the Pic de Fon area (30 individuals), eight in the north part of the Ouéléba area (22 individuals) and three in the central zone between Ouéléba and Pic de Fon (seven individuals) (Demey, 2009). Twenty-five out of the 27 locations found so far are situated above 1,000 m altitude, the exceptions being two sites at 955 m and 907 m, respectively. Almost all patches of submontane forest were investigated in 2007 to 2008, except four or five that were particularly difficult to access (one on the western flank of Pic de Fon and three or four on the northwestern flank of Ouéléba). The species was found in all prospected patches except two, despite the presence of apparently suitable habitat in those patches. If, for some unknown reason, the species was missed there and if it also occurs in the four or five forest patches that have not been investigated, an additional six or seven pairs may occur. It is also likely that a few more pairs may be present in relatively large forest patches where only one or two pairs were noted. A total of 35 to 40 pairs therefore appears to be a reasonable estimate of the Sierra Leone Prinia population in the whole of PdF CF in 2007 to 2008 (Demey, 2009). *Schistolais leontica* was thus considered to be fairly common in the PdF CF within its preferred habitat.

Between 2002 (first observation of the species on Simandou) and 2009, the species was recorded in 27 sites with a total of 59 individuals, twice as many as in 2022. Taking account of areas that were not surveyed, it was estimated that there was a total of 35 to 40 pairs in the PdF CF in the 2002 to 2009 period. At that time, the species was considered fairly common in its favoured habitats (Demey, 2009). The species has either become less abundant over the last decade due to degradation and loss of its habitat or the findings reflect the reduced survey effort. More surveys are required to assess whether there has in fact been a decline in its population. Regular monitoring should be set up so that a more quantitative assessment can be made before and during the construction phase. Regardless of whether there are 30 or 60 individuals, the PdF CF is still a site of global importance for the preservation of this highly threatened species and a precautionary estimate of **50 pairs being impacted** would account for the loss of the entire population of *Schistolais leontica*.

4.2.7 Arthroleptis crusculum

The Evening Squeaker (*Arthroleptis crusculum*) is a Near Threatened, restricted-range amphibian and a Critical Habitat Qualifying (CHQ) species under IFC PS6 that is strongly associated with high-altitude submontane habitats within the Pic de Fon Classified Forest (PdF CF). Within the PdF CF, the species primarily occupies submontane grasslands and adjacent forest–grassland transition zones at elevations reaching up to approximately 1,750 m a.s.l., with seasonal movements into gallery forest, marsh edges and forested refugia during the dry season. These habitats coincide spatially with areas of the Simandou ridge that are subject to mine infrastructure, resulting in permanent loss and fragmentation of suitable habitat. Although the species' global extent of occurrence (EOO) is estimated at approximately 35,800 km², its distribution is highly patchy and dependent on the availability of intact high-altitude grassland–forest mosaics, which are rare and declining across the Upper Guinea Forests region. Within the PdF CF, residual impacts are driven by the permanent loss of submontane grassland and transition habitats and by the isolation of remaining habitat patches, which are expected to reduce population connectivity and long-term viability despite the species' broader regional range.

Targeted surveys for *A. crusculum* have been undertaken repeatedly in the PdF CF as part of the RAP-35 survey (2002), the 2007 - 2008 ESIA baseline campaigns, the 2019 SAMEC surveys, and intensive follow-up surveys during the 2021 - 2023 Biodiversity Update, with a specific focus on this species due to its conservation importance. Survey methods comprised night-time visual encounter surveys, acoustic detection of calling males during the wet season, targeted searches of high-altitude grasslands, forest–grassland ecotones and gallery forests, and standardized quadrat-based searches in representative habitats. While these surveys confirm the continued presence of *A. crusculum* across multiple locations within the PdF CF, no absolute population estimates or density figures are available, as survey methodologies were designed to establish presence, distribution and habitat associations rather than to support mark–recapture or abundance modelling. Consequently, residual impact significance for *A. crusculum* is linked to the species' reliance on habitats that are disproportionately affected by the Project and its sensitivity to habitat continuity. Residual impacts at the site scale are considered significant for this CHQ species, notwithstanding its wider regional distribution. Following detailed expert consultation and in recognition of the particular sensitivity of *Arthroleptis crusculum*, a precautionary estimate of **20–30 individuals** is considered likely to be impacted by the Project. This estimate is conservative and will be **validated and refined through targeted, long-term monitoring**, specifically designed to assess the species' presence, distribution and response to mining activities at the SimFer mine site.

4.2.8 Eriosema triformum, Lipotriche tithonioides and *Habenaria jaegeri*

Residual impacts are anticipated for three High Biodiversity Value and Critical Habitat Qualifying plant species that are strongly associated with rare high-altitude habitats within the Pic de Fon Classified Forest (PdF CF): *Eriosema triformum*, *Lipotriche tithonioides* (Simandou Daisy) and *Habenaria jaegeri*. *Eriosema triformum* is a Critically Endangered species that is globally endemic to the PdF CF and restricted to high-altitude lateritic (ferralitic) bowal grassland on the Simandou ridge crest, typically between 1,250 m and 1,600 m elevation. *Lipotriche tithonioides* is an Endangered, highly range-restricted species associated with the narrow ecotonal transition between submontane forest and submontane grassland, occurring between approximately 750 m and 1,600 m elevation; within Guinea it is known from only a small number of sites, including the PdF CF. *Habenaria jaegeri*, also Endangered, is a terrestrial orchid occurring primarily in submontane grassland and forest–grassland transition habitats at elevations of approximately 700 m to 1,600 m, with the PdF CF supporting the largest known global subpopulations. These habitat types are among the most spatially constrained and threatened within the PdF CF and overlap with areas subject to permanent land take and long-term modification, resulting in residual impacts that are not reversible within relevant ecological timescales.

Targeted botanical surveys underpinning the assessment of these species have been undertaken over multiple campaigns by the Royal Botanic Gardens, Kew and specialist consultants, as documented in the SimFer mine ESIA. Survey methods included systematic habitat mapping, plot-based botanical inventories, targeted searches of high-altitude grasslands and forest–grassland ecotones, and species-specific surveys focused on known and potential habitats, supplemented by opportunistic observations during wider vegetation surveys. In addition, ongoing monitoring activities at the SimFer site have generated species-specific stem counts, which are being used to quantify residual impacts for each species. Given the highly restricted ranges of these species and the fact that the Project footprint encompasses all areas of their associated habitats within the PdF CF, residual impacts are expressed directly in terms of affected individuals. Based on current monitoring data, residual impacts are quantified as:

- 1,300 individuals of *Eriosema triformum*
- 150 individuals of *Lipotriche tithonioides*

- several thousand individuals of *Habenaria jaegeri*

These stem counts provide a conservative and precautionary basis for residual impact assessment at the site scale and will continue to be refined through adaptive monitoring as Project implementation progresses.

5 Strengths and limitations of this RIA

5.1 Strengths and limitations

Residual Impact Assessment Limitations
IFC Performance Standard 6 (PS6) aligned Residual Impact Assessments (RIAs) face several inherent limitations and challenges, many of which stem from uncertainties in ecological data and the dynamic nature of biodiversity. One of the most common challenges is the accuracy and completeness of baseline information. Even robust surveys can only capture a snapshot in time and may miss cryptic species, seasonal variations, or longer-term ecological trends. Similarly, assessments of habitat quality often rely on expert judgment, proxy indicators, and habitat classifications that may not fully represent ecological function or species-specific requirements. These issues can lead to either over, or under-estimation of potential impacts.

Another key limitation lies in the assumptions embedded within mitigation design, buffers, and predictive impact modelling. Mitigation and restoration measures, while grounded in best practice, carry variable effectiveness because ecological responses are rarely linear or uniform across sites. Impact buffers, for example, are often based on generalised species sensitivities rather than site-specific behaviour and therefore may not fully prevent disturbance or displacement. Additionally, cumulative impacts from external pressures (e.g., climate change, land-use change) can interact with project impacts in ways that are difficult to predict during the assessment phase. As a result, any calculated residual impact inevitably contains a degree of uncertainty.

For these reasons, an RIA should always be understood as an estimate rather than a fixed or definitive baseline. It provides a structured, defensible prediction based on available data and reasonable assumptions, but it is not static. Under PS6, the RIA must be refined over time through monitoring, evaluation, and adaptive management, ensuring that real-world ecological outcomes guide future refinements to mitigation, offsets, and overall project biodiversity performance.

RIA Strengths and Limitations
As with all RIAs, this Project RIA has certain strengths and limitations. In advance of the publication of this document, the Project requested a third-party review of all aspects of the residual impact assessment by suitably qualified consultants. Their feedback, alongside potential ways forward is presented in Table 7.

Table 7 Limitations of the SimFer RIA identified during an independent third-party review.

Biodiversity feature	Limitation	Potential impact on RIA figures	Potential action to remedy limitation
All	Not all priority biodiversity species and habitats identified in the Critical Habitat Assessment will be significantly impacted by the Project. Clarifying this to understand the significance of the residual impacts will focus resources and effort to species and habitats that really require mitigation action and offset activities.	Could potentially overestimate residual impacts for certain biodiversity features which aren't impacted to the same degree as others.	A risk-based prioritisation which assesses the likelihood and consequences of Project impacts on the features could help to understand the significance of the residual impacts – and provide a refined/simplified list of features which require offset activities.
Species RIA estimates	Limited explanation of the approach, methods or assumptions made to reach these findings. This will likely attract interest from external stakeholders.	Unknown as the lack of methodological explanation makes it difficult to assess the approach is suitable for assessing residual impacts.	Many of the impacts where a species approach has been followed will occur at the Pic de Fon aspect of the SimFer mine. This area will undergo an ESIA update where species specific RIA figures could be updated and justified using existing data sets.
All	Direct infrastructure impact buffers appear to be reasonable, although a justification for the buffer distances is not clear. The 3 km buffer (at 50% loss) around settlements to account for project-induced in-migration impacts is considered highly likely to underestimate indirect effects for a project of this scale and operational life. Clear justification and assumptions are also missing from this buffer size, which could instigate criticism from external stakeholders.	Potential underestimate of impacts if indirect impact buffer is not sufficiently justified.	The RIA could include more explicit science-supported justifications for the buffer sizes used for both direct and indirect impacts, and revisit the buffer used for project-induced in-migration as appears likely to be too small.
Critical and Natural Habitats	Over precautionary estimate of habitat condition at the SimFer mine site. The Project has assumed 100% quality of habitats prior to mine impacts.	Likely to overestimate residual impacts to Critical and Natural habitat leading to an overestimated offset requirement.	The Project could re-assess habitat condition, but have currently assessed that taking a precautionary approach to habitat condition is the best approach.
Submontane grassland	The ecosystem classification system used to map habitats is likely including various high altitude ecosystems as submontane grassland.	Likely to significantly overestimate impacts to submontane grassland habitats.	The Project could re-map these habitats using an updated a more specific classification system.

Although there are some limitations of this RIA, there are also significant strengths of the approaches taken. These include:

- **A precautionary approach:** SimFer has assumed 100% quality for all habitat impacted. This is an incredibly precautionary approach which is likely to significantly overestimate impacts. Residual impacts to Western Chimpanzees at the SimFer mine site are also very precautionary with the highest impact figure in the estimated range of impact being accepted as the residual impact.
- **Significant underlying data sets which have fed into the RIA:** The SimFer project first began biodiversity surveys at their site in 2004. This means that there is more than 20 years of biodiversity data which has contributed to this RIA.
- **Collaboration with world leading experts:** SimFer has engaged world leading experts in the collection and analysis of baseline data which has contributed to this RIA.
- **Use of external expertise for review and discussion:** Independent consultants with significant expertise in designing and implementing PS6 aligned projects have been involved in the review and discussion of the RIA throughout the process of development.

5.2 Use of multipliers

Biodiversity offset multipliers are often used to increase the scale of offsets. Multipliers are based in the precautionary principle and are used to account for different types of risk and uncertainty associated with achieving no net loss/net gain. They are often used to account for factors such as:

- The inherent risks and uncertainties in data, impact prediction
- Counterfactual uncertainty: Assumptions about what would have happened to biodiversity in the absence of the Project (the counterfactual) may be inaccurate, especially in dynamic or poorly monitored landscapes
- Offset delivery and implementation risk: Offsets may underperform due to delays, land tenure challenges, governance issues, or insufficient management over time
- Time-delay effects and discounting: Many biodiversity gains, can take years or decades to materialise

Some authors (e.g. Pilgrim & Ekstrom 2014) caution against relying only on simple multipliers to deal with this kind of implementation and performance risk, noting that uncertainty is not purely a function of area and that design, context and management quality are equally important.

In practice, however, multipliers are widely used to help address the risk that offsets underperform and are often combined with a “bet-hedging” approach. Several countries have specific requirements around multipliers (Australia, Colombia, US, Canada, South Africa, UK, and numerous European Countries). Guinea has no specific requirement for multipliers.

Although additional multipliers may need to be considered, this will be done as part of an exercise under the offset strategy document where the following factors will be considered to assess if multipliers are necessary and what scale they should be applied at:

- **Rigorous application of the mitigation hierarchy** – Have avoidance and minimisation measures been prioritised prior to offsetting to reduce residual impacts?
- **Detailed baseline data and strong monitoring** – Is there a sufficient amount of baseline data to draw accurate conclusions about impacts? Are there strong monitoring programs in place to accurately assess the success of mitigation measures?
- **Selection of offset sites** – Can we ensure “like-for-like” or “better” equivalence to minimize risk of non-comparable biodiversity?
- **Precautionary assessment of residual impacts** – Have impacts been assessed in a precautionary manner where there are levels of uncertainty?
- **Are the structures in place to ensure offset delivery** – Have governance, financial and institutional arrangements which reduce that can undermine offset performance been considered?
- **Front-load offset delivery** - Have offsets been implemented before or during project impacts to reduce time-lag risk?
- **Adaptive management and contingency planning**

6 Summary and next steps

6.1 Summary results and offset targets for all project components

Table 8 presents a summary of residual impacts for the RIA priority biodiversity features and their no net loss (NNL) / net gain (NG) targets.

Table 8 Summary of offset targets for the Project.

Habitat/Species	CH/NH	Provisional offset target
Habitats		
Closed Evergreen Lowland Forest	CH	>95 QH
Gallery Forest*	CH	>1,951 QH
Submontane Forest	CH	>628 QH
Submontane Grassland	CH	>1,226 QH
Grass Savannah	NH	≥ 8,129 QH
Shrub Savannah	NH	≥ 16,304 QH
Tree Savannah	NH	≥ 1,755 QH
Species		
Western Chimpanzee*	CH	>79 individuals
Sierra Leone Prinia	CH	>50 pairs
Arthroleptis crusculum	CH	>20 – 30 individuals
*Eriosema triformum***	CH	>1,300 individuals
*Lipotriche tithonioides***	CH	>150 individuals
Habenaria jaegeri **	CH	>Several thousand individuals

To achieve no net loss and net gain objectives, the Project will offset residual impacts to priority biodiversity features via actions in selected offset sites. This assessment provides estimated NNL/NG targets to support the development of suitable offset options and will be refined over time as impacts and mitigations are finalised.

6.2 Next steps

The results of this version of the RIA are being used to:

- Understand which priority biodiversity features will require offsets to achieve a no net loss / net gain;
- The magnitude of the no net loss / net gain targets;
- Focus attention on mitigation measures to look for ways to further reduce residual impacts through Project design and operations while there is still opportunity to do so;
- Provide the basis for developing a suite of offset options which will be designed to provide the required gains for like for like or better biodiversity, achieving the NNL/NG targets.

SimFer is part of a broader joint venture that includes Winning Consortium Simandou (WCS) and Compagnie du TransGuinéen (CTG), encompassing two mines, a mainline railway and two ports. In recognition of the integrated nature and scale of these developments, a joint approach to biodiversity offsetting has been proposed. As a result, residual impacts from all infrastructure components will be consolidated into a single, project-wide residual impact assessment for the Simandou Project. This unified approach will enable the definition of a single set of offset targets, facilitating the efficient design, implementation and long-term monitoring of an appropriate and coordinated portfolio of offset sites.

A suite of potential offset options has been developed and feasibility studies are being carried out to provide assurance that the offset options are feasible from a technical, social, institutional, and financial perspective.

Once deemed feasible and acceptable to key stakeholders, a prioritised set of offsets sites will be compiled into a Biodiversity Offset Strategy and integrated into the Biodiversity Action Plan for SimFer.

It will be important for the Project to measure changes in biodiversity in both the impacted areas and offset sites to demonstrate that an equivalent amount of biodiversity has been gained through offset activities. To ensure there is uniform accounting for losses across the Project area and offset areas (gains) for natural habitat, a ‘Quality Hectare’ (QH) approach for terrestrial and aquatic habitats is being used. A Biodiversity Monitoring and Evaluation Plan (BMEP) will be developed for the Project to gather data to track offset gains for impacted priority biodiversity, using appropriate metrics.

Lastly, the Project will need to develop a plan and a timeline to address the limitations from the third-party review identified in Section 5.1. This plan will most likely be developed following the publication of the compiled RIA as it will address residual impacts at the scale of the Simandou Project and there may be further limitations which will need to be addressed from other project components (e.g. WCS mine, mainline rail and the ports).

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Appendix 1 - Full list of Critical and Natural Habitat qualifying features

Taxa/habitat type/Common name	Biodiversity Feature	CH Criterion	Habitat Association
Habitat	Closed Evergreen Lowland Forest	CH4	N/A
Habitat	Gallery Forest	CH4	N/A
Habitat	Submontane Forest	CH4	N/A
Habitat	Submontane Grassland	CH4	N/A
Habitat	Grass Savannah	N/A	N/A
Habitat	Shrub Savannah	N/A	N/A
Habitat	Tree Savannah	N/A	N/A
Fish	*Brycinus carolinae*	1a,2a	Freshwater (Gallery Forest)
Fish	*Enteromius eburneensis*	2a	Freshwater (Gallery Forest)
Fish	*Enteromius foutensis*	1a, 2a	Freshwater (Gallery Forest)
Fish	*Enteromius lauzannei*	2a	Freshwater (Gallery Forest)
Fish	*Epiplatys njalaensis*	2a	Freshwater (Gallery Forest)
Fish	*Epiplatys roloffi*	1a,2a	Freshwater (Gallery Forest)
Crab	*Liberonautes rubigimanus*	2a	Freshwater (Gallery Forest)
Crab	*Liberonautes sp. nov.*	2a	Freshwater (Gallery Forest)
Fish	*Nimbapanchax viridis*	2a	Freshwater (Gallery Forest)
Fish	*Rhexipanchax kabae*	2a	Freshwater (Gallery Forest)
Fish	*Rhexipanchax nimbaensis*	2 (maybe 1b)	Freshwater (Gallery Forest)
Fish	*Sarotherodon tournieri*	2a	Freshwater (Gallery Forest)
Rosevear's Serotine	*Pseudoromicia (Neoromicia) roseveari*	1a	Lowland Evergreen Forest Gallery Forest
Guinean Horseshoe Bat	*Rhinolophus guineensis*	1a	Submontane Forest Submontane Grassland
Maclaud's Horsehoe Bat	*Rhinolophus maclaudi*	1a	Submontane Forest Gallery Forest Lowland Evergreen Forest
Black and white Colobus	*Colobus polykomos*	1a	Lowland Evergreen Forest Submontane Forest Submontane Forest
Western Chimpanzee	*Pan troglodytes verus*	1a	Lowland Evergreen Forest Submontane Forest Submontane Grassland
Sierra Leone Prinia	*Schistolais leontica*	1a	Submontane Forest Submontane Grassland
Pic de Fon White Lipped Frog	*Amnirana (Hylarana) fonensis*	1a	Gallery Forest Submontane Forest
Ziama Toothed Frog	*Odontobatrachus ziama*	2a	Streams (Gallery Forest)
Evening Squeaker	*Arthroleptis crusculum*	2a	Submontane Grassland Gallery Forest
	Ptychadena pujoli	2a	Submontane Grassland
	Ptychadena submascareniensis	2a	Submontane Grassland
Flora	*Eriosema triformum*	1a Site endemic	Submontane Grassland

Taxa/habitat type/Common name	Biodiversity Feature	CH Criterion	Habitat Association
Flora	*Keetia futa*	1a	Submontane Forest
Flora	*Gymnosiphon fonensis*	1a	Submontane Forest
Flora	*Allophylus samoritourei*	1a	Submontane Forest Lowland Evergreen Forest
Flora	*Asplenium schnellii*	1a	Submontane Grassland
Flora	*Cola angustifolia*	1a	Lowland Evergreen Forest
Flora	*Gymnosiphon samoritoureanus*	1a	Lowland Evergreen Forest Submontane Forest
Flora	*Habenaria jaegeri*	1a Rare	Submontane Grassland
Flora	*Lipotriche tithonioides*	1a Site endemic	Submontane Grassland
Flora	*Sporobolus montanus*	1a	Submontane Grassland
Flora	*Vernonia nimbaensis*	1a	Submontane Grassland
Flora	*Xysmalobium samoritourei*	1a	Submontane Grassland
Flora	*Anacolosa* (soon to be *Keita*) *deniseae sp nov. ined.*	1a	Submontane Forest Gallery Forest
Flora	*Polystachya orophila*	1a	Submontane Grassland
Flora	*Psychotria sp nov aff humilis*	1a	Submontane Forest
Flora	*Acalypha guineensis*	2a	Submontane Grassland Submontane Forest
Flora	*Anubias gracilis*	2a	Gallery Forest
Flora	*Blotiella reducta*	2a	Submontane Grassland
Flora	*Brachystephanus oreacanthus*	2a	Submontane Forest
Flora	*Anaheterotis* (formerly *Dissotis) pobeguinii*	2a	Submontane Grassland
Flora	*Dorstenia astyanactis*	2a	Submontane Forest
Flora	*Eriosema spicatum subsp. Collinum*	2a	Submontane Grassland
Flora	*Gladiolus praecostatus*	2a	Submontane Grassland
Flora	*Isoglossa dispersa*	2a	Submontane Forest Lowland Evergreen Forest
Flora	*Kotschya lutea*	2a	Submontane Grassland
Flora	*Kotschya micrantha*	2a	Submontane Grassland
Flora	*Nemum bulbostyloides*	2a	Submontane Grassland
Flora	*Pavetta platycalyx*	2a	Submontane Forest Lowland Evergreen Forest
Flora	*Psychotria samoritourei*	2a	Submontane Forest
Flora	*Rhytachne glabra*	2a	Submontane Grassland
Flora	*Utricularia macrocheilos*	2a	Submontane Grassland
Flora	*Coleus ferricola*	2a	Submontane Grassland
Flora	*Hibiscus fabiana*	2a	Gallery Forest Submontane Grassland
Flora	*Droogmansia scaettaiana*	2a	Submontane Grassland