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Chimpanzee Offset Pre-Feasibility Study and Strategy for the GAC Bauxite Project

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Cover Photo: Chimpanzee in wooded savannah on edge of GAC concession on plateau 26 © Rene Fontaine, GAC

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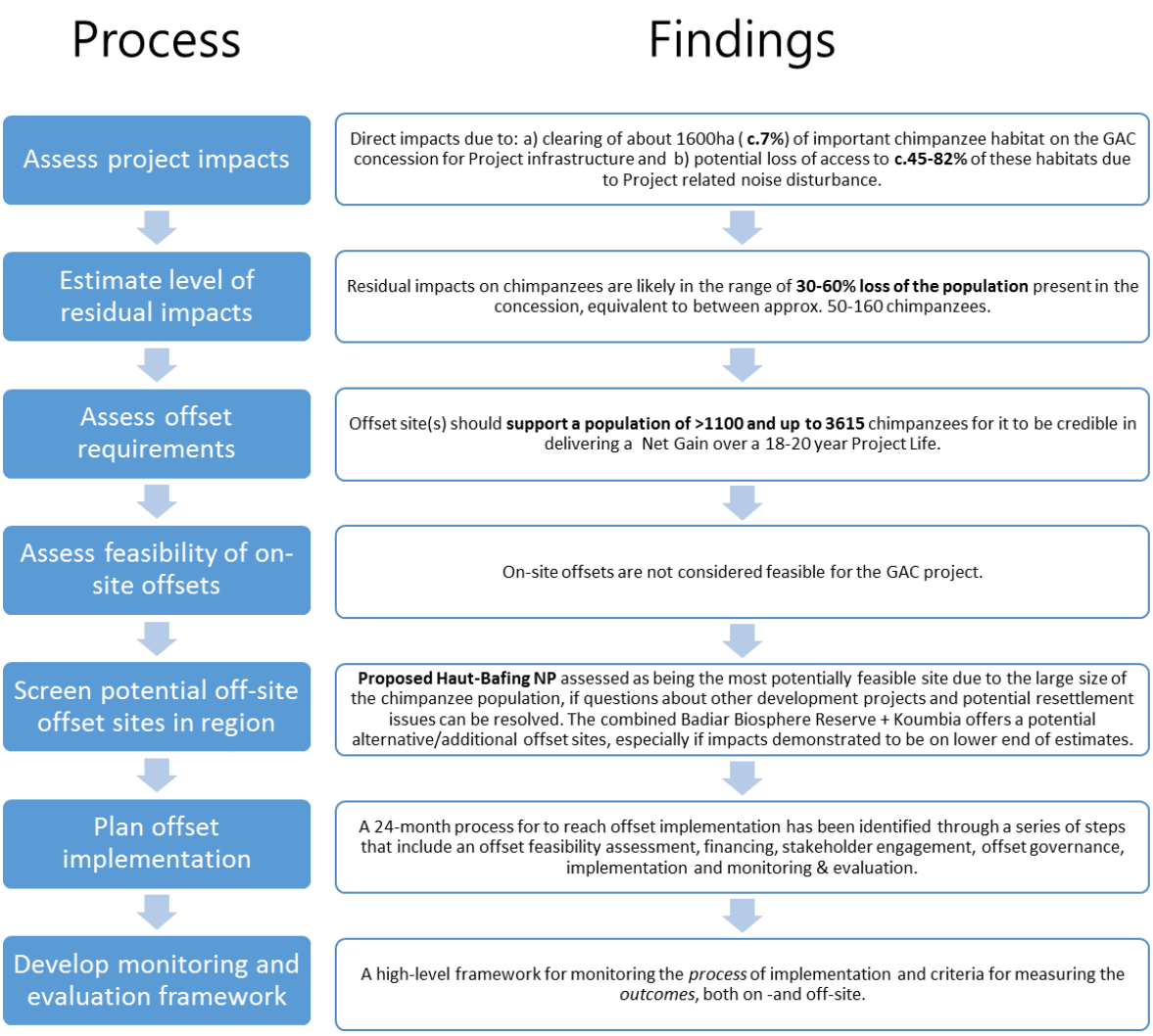
Executive summary

Purpose of study

Guinea Alumina Corporation S.A. (GAC) commissioned The Biodiversity Consultancy (TBC) to assess the need and feasibility of biodiversity offsets to deliver a Net Gain for the endangered West African Chimpanzee (*Pan troglodytes verus*) on its concession in the préfecture of Boké in north-western Guinea.



The key steps and findings of the assessment are outlined in **Error! Reference source not found.**.

Figure 1 Summary of offset pre-feasibility assessment process and findings

Driver of a Net Gain requirement

GAC is seeking project finance from a consortium of financiers including the International Finance Corporation (IFC) and the African Development Bank (AfDB). The presence of chimpanzees (and other species of concern) on the GAC concession qualifies the area as Critical Habitat, which requires the Project to

demonstrate a Net Gain, accounting for any residual impacts. Since the Project activities will impact chimpanzees, GAC is required to demonstrate full implementation of the mitigation hierarchy with an emphasis on impact avoidance and minimisation measures, and offsets as a last resort.

How will the Project impact chimapanzees and their habitat?

The most significant potential impacts identified for chimpanzees on the GAC concession are:

- Habitat loss (directly due to Project footprint and indirectly (e.g. burning for agricultural activities);
- Habitat avoidance ('equivalent to loss/ degradation') due to disturbance;
- Habitat fragmentation;
- Increased hunting;
- Increased inter-group conflict; and
- Increased vulnerability to disease.

These increased stressors may impact the chimpanzee population through increased mortality and decreased reproductive rate.

The analyses conducted for this study estimated that mining infrastructure will result in direct clearance of ~7% of habitat important for chimpanzees (gallery forest, wooded savannah and isolated forest patches) within the concession. Noise disturbance associated with mining activities could potentially impact on 45-82% of the important chimpanzee habitat. These estimates are constrained by uncertainties relating to actual chimpanzee numbers on the concession (high confidence intervals and variations over the four year dataset), and the sensitivity of chimpanzees to noise disturbance.

Avoidance and minimisation measures

GAC has incorporated a suite of avoidance and minimisation measures (recommended by the Wild Chimpanzee Foundation, WCF) into its Project design. These include avoidance buffers 50 m from any waters, 100 m buffer from any sensitive ecological site and from the Tinguilinta River, 250 m from water abstraction/wells and 300 m along headwaters feeding gallery forests, 500 m from the periphery of plateaus, temporary buffer zone of up to 800 m from blasted areas during blasting operations depending on specific blasting parameters. It is not considered economically feasible to implement set-asides and/or on-site offsets on the concession. However some of the conservation initiatives that are already underway could be refined and expanded to provide tangible benefits for chimpanzees inhabiting the concession (e.g. investigating conservation opportunities in the Boullere area, a recognised KBA, in collaboration with CBG).

Estimating residual impacts and offset gain requirements

There is significant uncertainty over how chimpanzees will respond to estimated levels of habitat clearance and disturbance (especially noise) and how their responses will translate into impacts. However, based on a set of assumptions derived from the literature and expert input, the study estimated a residual loss of 30 – 60 % of chimpanzees found on the GAC concession over the 20 year Project Life; this is equivalent to a loss of 50 - 160 individual chimpanzees.

To offset a residual loss of 50 - 160 individual chimpanzees, an estimated 1100 to 3615 chimpanzees (depending on whether the offset is designed for the 'optimistic', 'conservative', or 'worst-case' scenario) would need to be protected at an offset site for at least 18 years to ensure a Net Gain. The high effective loss:gain ratio reflects both 1) chimpanzees' intrinsically low reproductive rate (which means either a large population or a long time is required to deliver gains) and 2) specific offset design criteria and conservative estimates of gains that are appropriate given the level of stakeholder concern about chimpanzees. The wide range reflects the wide confidence intervals in estimates of both impacts and gains from available data. Biodiversity loss-gain accounting is an input designed to identify a "fair exchange" for project impacts; it is based on a set of assumptions and there is no single 'right answer'. Further review of critical assumptions with stakeholders would help ensure there is wide acceptance that this scale of offset is considered a 'fair exchange'. Where uncertainty exists, the project has the option of conducting further studies to reduce confidence intervals. However, if stakeholders consider that these estimates do in fact represent a fair exchange, it may be more cost and time effective to proceed using these initial estimates.

Selecting a suitable offset site

The Haut-Bafing proposed national park is considered the most favourable option considering chimpanzee numbers and social and technical feasibility criteria. It is the only site currently anticipated to meet gain requirements under all scenarios evaluated, has strong government support (from e.g. BGEEE, DNEF and OGUIPAR) and benefits from an NGO (WCF) actively promoting establishment of a protected area presence. The pre-feasibility study screened a long-list of potential chimpanzee offset sites in Guinea against widely accepted criteria and identified four preferred sites (or combinations of sites) that included Haut-Bafing proposed National Park and Badiar N'Dama Reserve.

Stakeholder engagement

Given the unique status of chimpanzees, GAC should expect intense scrutiny of both on-site mitigation, offset scale, and offset delivery. Ongoing stakeholder engagement from conceptualisation to hand-over is critical to the success of the offset. GAC could minimise stakeholder risks by developing a stakeholder engagement plan that ensures appropriate consultation throughout the process.

Monitoring, offset feasibility assessment and planning for offset implementation

On and off-site monitoring is an important component of biodiversity management and would be used to refine residual impacts and gain requirements. The key next steps for an offset feasibility study and development of an offset implementation plan have been defined and it is anticipated to take 20-24 months before on the ground offset implementation could commence.

Estimated costs of offsetting

The cost of offset implemetation is roughly estimated to be in the range of USD 15 to 23 million over the 20-year Project life. This figure would be refined based on the final offset site selected.

Leading the way

Guinea does not currently have a formalised biodiversity offset requirement but national interest in biodiversity offsets is gathering considerable momentum with a number of initiatives currently underway. This Project presents GAC with an opportunity to lead the way in chimpanzee offset implementation in Guinea.

Report at a glance

Chimpanzee status in the concession

The GAC concession area is situated in the Guinean forest-savannah mosaic ecoregion. The concession supports a population of chimpanzees (initial estimates are in the range 152-277, (WCF 2015a) that, within the confidence limits of available data, is probably stable in the absence of Project impacts.

According to recent studies undertaken by the Wild Chimpanzee Foundation (WCF), chimpanzees are present in natural habitat across the concession, but principally use areas with large trees: gallery forest and wooded savannah. Bowal and grassy areas may be used by chimpanzees on an occasional basis for specific resources, or as transit routes, especially where there are patches of larger trees within them. According to studies undertaken as part of the ESIA (ERM 2015) and WCF (WCF 2015b) chimpanzees are rarely hunted by local communities in this area. However, anecdotal evidence in Guinea suggests chimpanzees are sometimes killed by villagers when they compete for food resources or by hunters from other regions of Guinea. Increased competition on resources and movement of non-indigenous people into the Project area due to in-migration could lead to an increase in hunting pressure. There is also an existing market for the export of baby chimpanzees as pets. A further investigation into the extent of this demand and implications for hunting on the GAC concession would assist in managing this risk.

Project impacts and mitigation

Direct footprint impacts of mining and associated infrastructure on important chimpanzee habitat are predicted to be relatively small (c.7% area of the treed vegetation types in the ESIA study area) but disturbance (especially due to noise) may displace chimpanzees from a far larger area, possibly 45-82% of important chimpanzee habitat types.

Indirect impacts, principally hunting and loss of habitat due to agriculture and wood-fuel / charcoal are difficult to quantify but have been qualitatively assessed and are likely to be considerable due to the anticipated influx of job seekers.

The GAC concession is almost completely surrounded by other active or potential bauxite projects (Figure 12). CBG (located immediately east of GAC) is currently the only project with active mining, while RUSAL, located north, is in the process of developing a road through the CBG concession to transport its ore to Kamsar via rail link. These nearby mining activities will limit the availability of natural habitat that chimpanzees could access in the future, should they be forced off the southern portion of the GAC concession by direct and indirect impacts associated with the Project. Opening of roads in the surrounding area may increase access to the GAC concession for hunting and transport of agricultural products. Cumulative impacts of mining in the region may therefore exacerbate direct and indirect impacts of GAC's mining activities.

Additional avoidance and minimisation measures, above and beyond those included in the ESIA, have been identified and GAC has already incorporated some of these into the mine plan and infrastructure design (e.g. buffers 50 m from any waters, 100 m buffer from any sensitive ecologicalsite and from the Tinguilinta River, 250 m from water abstraction/wells and 300 m along headwaters feeding gallery forests, 500 m from the periphery of plateaus, temporary buffer zone of up to 800 m from blasted areas during blasting operations depending on specific blasting parameters.). There remains an opportunity for GAC to reduce residual impacts further through implementation of additional avoidance and restoration measures, aimed at conserving intact chimpanzee habitat and restoring important chimpanzee habitat where this has already been degraded (e.g. revegetation of previously mined pits with natural vegetation and specifically tree species used by chimpanzees for feeding, and nesting and restoration of gallery forests). These mitigation measures, if implemented, could potentially reduce both direct and indirect impacts. The level of reduction is difficult to quantify precisely, due to the paucity of good information on the exact size and location of chimpanzee populations in the proposed mining areas, as well as difficulty in assessing the extent of impact of increased human population on chimpanzee habitat loss.

Residual impacts

Our analysis suggests that residual impacts on chimpanzees will be in the range of a 30-60% reduction (c.50-160 individuals) of the population present in the concession. This broadly concurs with findings by WCF. An improved understanding of chimpanzee response to mining noise, confirmation of population stability in close proximity to mining activities and a better understanding of chimpanzee movement patterns and resource use would allow the range of estimates to be narrowed. However, two features of chimpanzee ecology and behaviour mean that it is difficult to predict the actual magnitude of Project impacts:

1. Chimpanzees have a very slow natural rate of population growth. This means that:
    - Even minor impacts that affect reproductive success can push the chimpanzee population growth rate below the replacement rate, leading to a declining population. Such impacts may not be observed for a long time (1-2 chimpanzee generations or 20-40 years) but can be very significant.
    - Small chimpanzee populations are highly vulnerable to external shocks (e.g. disease, drought or other disturbances). It can take many years for populations to recover from such unpredictable events.
2. Chimpanzees are territorial and inter-group conflict is a regular occurrence. If a group of chimpanzees is forced (e.g. by mining disturbance) into the territory of another group, significant mortality may result, including the complete loss of one group.

These factors mean that Project impacts could potentially be multiplicative. It is impossible to completely rule out the possibility that Project impacts could lead to a complete loss of viability of chimpanzee populations in the concession over the long term (2-3 chimpanzee generations). Some recent data collected by Sylvatrop on CBG's South Cogon concession shows that chimpanzees are present at short distances (<1km) from mined areas, indicating that at least some individuals still use these areas. However, it is not known whether these are healthy reproducing groups, nor how the increased rate of mining for the

Expansion Project planned by CBG might alter their tolerance to active mining operations (Sylvatrop Consulting 2015).

Offset requirements

In the context of significant uncertainty regarding impact magnitude, it is appropriate to take an adaptive approach to offset development based on a precautionary estimate of impacts. The actual offset requirements can then be scaled up or down based on monitoring of actual impacts. Given the unique status of chimpanzees, two further specific design considerations are appropriate:

- Accepting only offsets that are likely to result in a stable or increasing population of chimpanzees (rather than slowing declines) so that the offset demonstrably contributes to an overall improvement in chimpanzee conservation;
- Considering the use of additional 'insurance' off-site offset sites to mitigate against the risk of failure at the preferred offset site(s).

Based on these criteria, a simple model was used to estimate the required offset area. The scenarios ('optimistic', 'conservative' and 'worst-case') were based on studies undertaken by WCF using the upper and lower estimates of population size based on 95% confidence intervals and using a range of estimates for the proportion of the population that would be impacted. The model showed that, under these assumptions, delivering a Net Gain would be achievable within 18 years with sufficient and timely investment. These estimations indicate that the proposed offset site(s) should support a population of at least 1,130 (for the 'optimistic' scenario), and up to 3,615 chimpanzees (for the 'worst-case' scenario), which are clearly threatened without the additional interventions associated with offset implementation, for a Net Gain to be credibly predicted (Table 1; Section 3.7). This study suggests that the offset needs to plan for the 'conservative' or 'worst-case' scenario. There are too many uncertainties to plan the offset around the 'optimistic' scenario.

While the most significant impacts are likely to occur early in the Project, their effects could persist for decades and beyond the period of extractive operations on the southern portion of the GAC concession. The total impact on chimpanzees may therefore not be fully determined until well beyond the Project Life. Further, there will be a time-lag between impacts and offset gains, which will be achieved at a much slower speed. It may not be feasible to realise sufficient gains within the Project Life (18-20 yrs) depending on the success of reducing threats and averting chimpanzee losses at the offset site(s). Monitoring will take at least three, and more realistically five years, to appreciably narrow down estimates of chimpanzee losses and gains.

To reduce Project risks associated with failing to achieve sufficient gains, and to provide early evidence that the offset is on-track, selection of an offset site (or sites) that has at least 1130-3615 chimpanzees is recommended. Project contributions to the offset actions could then be scaled in proportion to actual impacts, if monitoring confirms them to be significantly lower.

Table 1 : 'Optimistic', 'Conservative' and Worst-case' scenarios for offset requirements, for details see Sections 2, 3 and 5.

Assumptions (Scenarios)	'Optimistic'	'Conservative'	'Worst-case'
Losses (all ind.)	54 **(31% impact on population of 173)**	98 **(45% impact on population of 217)**	161 **(58% loss of population of 277)**
Natural population growth without threats (%/yr)	1.65		
Net population growth with existing threats WITHOUT offset (%/yr)	-1.00		
Effectiveness of conservation actions to reduce threats (%)	50		
Net growth rate WITH offset (%/yr)	0.3		
Recovering population?	Yes		
Duration to achieve a NG (year)	20		
Minimum starting population required at offset site to achieve NG within 20 years WITHOUT uncertainty multiplier (included)	**208**	**392**	**667**
Multiplier to account for uncertainty in effectiveness of the offset	3	3	3
Minimum starting population required at offset site to achieve NG within 20 years WITH uncertainty multiplier (ind.)	**625**	**1176**	**2001**
Multiplier to account for time lag between impacts and gains based on discount rate of 3%/yr over 20 years	1.8		
Minimum starting population required at offset site to achieve NG within 20 years WITH uncertainty and time lag multipliers (ind.)	**1129**	**2124**	**3615**

Off-site offsets

Offset sites outside the GAC concession and within Guinea were screened based on the offset requirements identified above, and internationally recognised good practice criteria for offset sites. Screening resulted in a short list of four sites, each with advantages and disadvantages.

Of the sites, only the proposed Haut-Bafing National Park (NP) meets all the technical criteria for an offset site, notably due to the large size of the chimpanzee population. This site also has a significant advantage in terms of momentum, GoG support (it contributes to GoG's target of protecting 25% of the country) and the presence of an active technical partner. While the planned Koukoutamba dam and associated resettlement and possible mining associated with a large overlapping Société des Bauxites de Dabola-Tougué concession may mean conservation in some areas of the site is challenging, the site is very large and it would likely be possible for the Project to invest in a portion of the site free from dam impacts. GAC would need to consult the Ministry of Mines on this issue. The proposed Haut-Bafing NP is relatively isolated and the northern part in particular apparently has limited settlements resulting in less degradation

of habitat for charcoal production, agriculture and logging activities. However poaching is considered to be higher in the north (OGUIPAR, pers. comm. 19 January 2016).

If the Haut-Bafing proposed national park proves unsuitable, then a combination of the Badiar N'Dama Reserve (including N'Dama Classified Forest) and Koumbia areas could serve as appropriate offsets, but potentially with less margin of safety of achieving a Net Gain due to the lower chimpanzee populations: Badiar and Koumbia could be managed as an offset portfolio and have the advantage of being relatively close to the Project site, with similar habitats, so are likely to serve as offsets for other species and habitats that are impacted. However, a number of concerns have been raised for both Koumbia and Badiar as outlined in Table 2.

Table 2: The short listed sites for an off-site offset, with advantages and disadvantages of each specifically for chimpanzees but also other species of conservation value.

Short-listed site	Pros	Cons
Haut-Bafing proposed National Park	• The large number of chimpanzees enables a 'scaled offset' (i.e. if the number of chimpanzees required for Net Gain is found to be greater than anticipated this requirement could still be met by the site); • High additionality as much of the area is not effectively protected or managed and there are demonstrated threats; • Strong government support as contributes to the national target of 25% protected areas by 2020; • Extremely important area for chimpanzee conservation so likely very high stakeholder support (e.g. WCF); • Strongly supported by OGUIPAR, DNEF and Ministry of Environment; • Additional conservation gains as accommodates many threatened species; • Could form part of a transboundary park with Mali; • Possibility of an aggregated offset.	• Requires additional funding beyond GAC; • Possible resettlement issues; • Potentially significant direct and indirect impacts of the planned Koukoutamba dam in the medium term and potentially the Boureya dam in the long-term; • The Société des Bauxites de Dabola-Tougué (SBDT) concession (5684 km^2) overlaps with the southern part of Haut-Bafing NP; • Does not address the risk of external failure of offset site; • Poaching in the north is a concern; • May require collaboration with neighbouring countries.

Badiar N'Dama Reserve + Koumbia	• Close to the impacted site, i.e. similar habitat; • Existing project to convert N'Dama CF into a core area of the Badiar N'Dama Reserve; • Limited human population in N'Dama - resettlement and compensation have already been agreed on (Sylvatrop 2016) (See Appendix 3.2 for full report); • A combination of sites provides a potential buffer against the risks of external failure of offset due to factors associated with a single site; • Although Badiar is already under some level of protection, there is good additionality for the combination of sites as Koumbia is not currently protected at all.	• Number of chimpanzees potentially limited to cover the 'conservative' scenario which is likely to require a longer time to achieve Net Gain objective; • No legal status or pending project for Koumbia; • Concession of the forthcoming AMC mining project overlaps with c.15% of the Koumbia area. • The Koumbia area is characterised by bauxite deposits therefore it is likely that the area will be mined even if the AMC project does not proceed (Mr Diallo, *pers. comm.*, 20 January 2016); • A major road passes through Koumbia connecting Guinea to Senegal; • Large portions of Koumbia have already been deforested; • If CBG proceeds with mining on its North Cogon concession the likely influx of people is anticipated to lead to further habitat degradation in Koumbia; • The complexities associated with managing more than one site have not been investigated as part of the pre-feasibility assessment; • Agricultural encroachment in Badiar.

If a combination of sites or a single site is chosen that does not exceed or come close to covering the 'Worst-case' scenario of estimates of offset requirements, then there would be a considerable burden of proof on GAC to demonstrate that the sites can be considered a "fair exchange" given the potential scale of impacts. In practice this would require that:

1. Mitigation actions on the GAC concession are clearly demonstrated to be significantly more successful than expected; and/or
2. Feasibility study data show that chimpanzees are much more threatened at the offset sites than currently estimated (i.e. current or projected net loss rate >> 1%/yr) AND it is feasible to reduce these threats rapidly in order to generate sufficient gains; and
3. GAC commits to including an additional site in the offset portfolio if needed to make up any shortfall in the balance between losses and gains; and
4. Clear endorsement of the approach by stakeholders, including lenders, GoG and ape conservation specialists.

We emphasise that such an approach is not completely precautionary and might end up costing more than starting with a larger site in the first place.

Moving towards offset implementation

A road-map towards offset implementation is outlined in Figure 2 below. The first step is to address potential red flag issues at the shortlisted offset sites to facilitate an initial choice of site(s) to be made. The offset shortlist needs to be reviewed with stakeholders, especially GoG, before starting detailed feasibility assessment. A timeline of 24-27 months to reach offset implementation is ambitious but feasible. Overall costs are estimated to be c.US$15.5m-23m; these are order-of-magnitude estimates that should be refined during the feasibility phase.

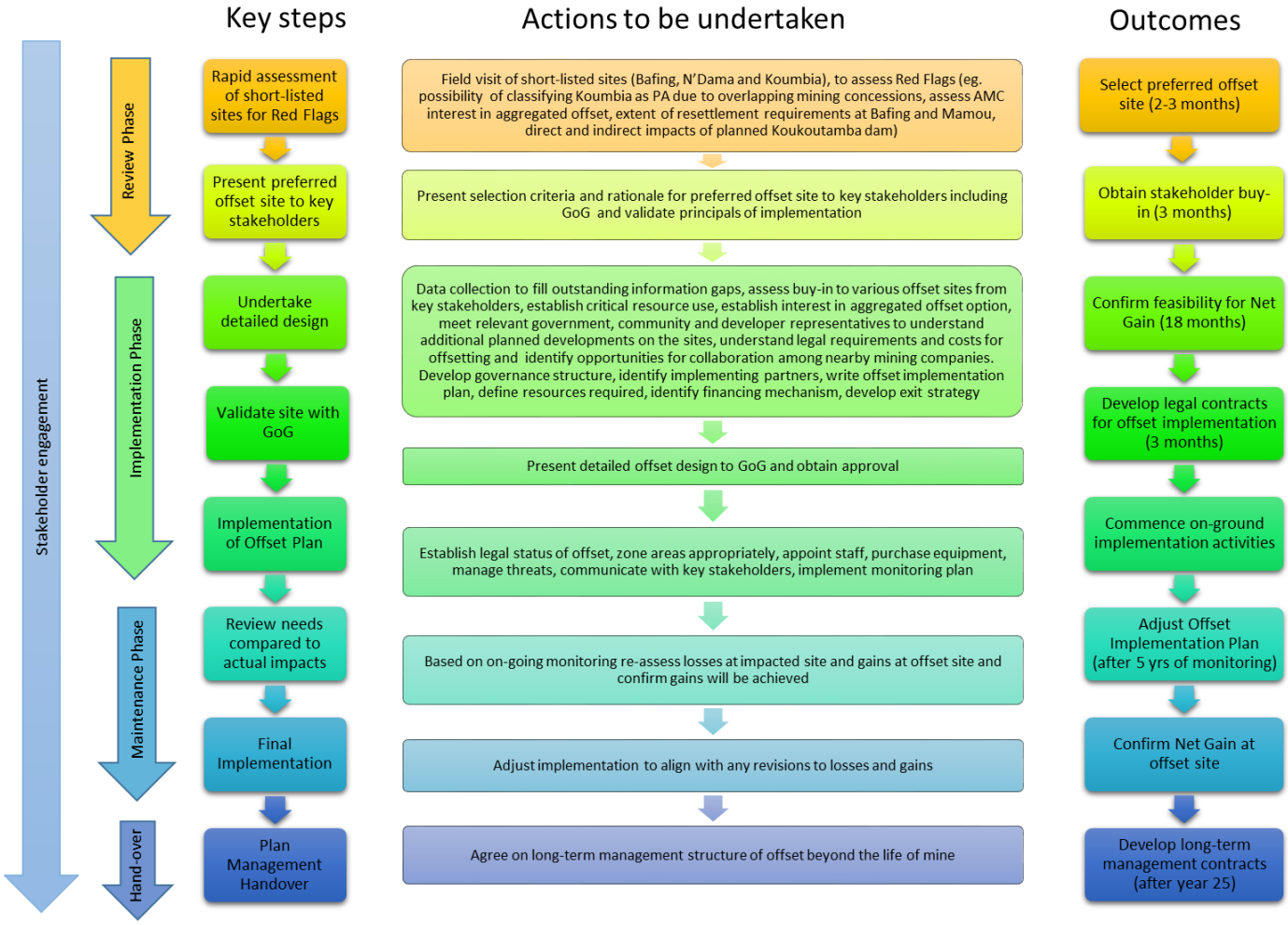


Figure 2 : Overview of process for offset implementation. The first step is to collect objective data to allow a decision to be made about the potential offset sites.

Challenges and risks for offset delivery

The inherent difficulty of trying to conserve a species that has very low reproductive rates is combined with a challenging socio-economic context for conservation in Guinea. This means that it will be challenging to deliver sufficient biodiversity gains at offset site(s) to reach a Net Gain for chimpanzee conservation.

GAC can lessen these risks by reducing residual impacts to as low as reasonably practicable and taking measures to improve the chances of offset success, including building strong political will for offsetting and local community support for offset site management. Involving suitably competent partners, and, ensuring transparent, regular and objective monitoring of outcomes will all be essential. An aggregated offset approach, that includes other companies (i.e. CBG) also seeking to achieve a Net Gain, may be the most effective since offset costs, design, implementation, management and stakeholder engagement requirements can potentially be shared among companies.

Stakeholder engagement

Given the unique status of chimpanzees, GAC should expect intense scrutiny of both on-site mitigation, offset scale, and offset delivery. Estimation of offset requirements is not an exact science and the key test is whether stakeholders consider the balance of gains versus losses to be a 'fair deal'. GAC could get a better understanding of stakeholder expectations and so mitigate risks associated with this scrutiny by:

- Committing to make the monitoring results of both impacts and offset gains publically available;
- Initiating early and on-going engagement with key ape conservation stakeholders such as the IUCN Primate Specialist Group's Section on Great Apes, the Great Ape Survival Partnership (GRASP) Scientific Committee, Guinean conservation NGOs (eg. Guinée Ecologie) and government (OGUIPAR, DNEF and BGEEE). This engagement could be on an ad-hoc basis or could be formalised via a 'Biodiversity Advisory Panel' or similar.

An opportunity to lead the way on biodiversity offsets in Guinea

Through its Bauxite Export Project, intended to be partially funded by the IFC, GAC has the opportunity to demonstrate practical application of the mitigation hierarchy and the implementation of an offset leading to a Net Gain for chimpanzees. Such an initiative would be pioneering for the mining sector in Guinea. The GoG recognises that biodiversity offsets need to be tacked at the national scale due to the likelihood that numerous bauxite projects, located in close proximity of each other, will commence simultaneously. To this end changes in policy are being investigated and the timing may be suitable for interested parties to collaborate and work towards shared biodiversity conservation objectives. A final choice of offset site is required prior to commencement of the Feasibility Study. Success of the offset would require further targeted research, stakeholder support (from e.g. government, NGOs, recognised chimpanzee experts, local villagers in both the concession and at the offset site), finance and where possible collaboration between neighbouring mining companies. Three alternative sites (or combination of sites) have been short-listed for further investigation and the northern part of the proposed Haut-Bafing National Park appears to be the

most favourable option, primarily because it holds the largest number of chimpanzees required to achieve a Net Gain.

1 Introduction

1.1 Overview and objectives

Guinea Alumina Corporation S.A. (GAC)[1] intends to mine and export bauxite from the southern portion of its concession (Lease 149) located in the préfecture of Boké in north-western Guinea (**Error! Reference source not found.**).

GAC is seeking finance from a consortium of lenders including the International Finance Corporation (IFC) and the African Development Bank (AfDB) for the Bauxite Export Project ('the Project'). GAC therefore seeks to align its operations with the IFC's Performance Standard 6 (PS6), as well as the requirements of other lenders.

The Project is situated in Critical Habitat (as per IFC PS6) due to the presence of West African chimpanzee (*Pan troglodytes verus*)[2]. The Project therefore aims to align with the requirements of PS6 paragraph 17, by demonstrating that all feasible avoidance and minimisation actions have been implemented and that the Project will lead to an overall Net Gain for Critical Habitat-qualifying features[3] predicted to have measurable adverse impacts. Since residual impacts on chimpanzees and their habitat are expected, after avoidance, mitigation and restoration, delivering a Net Gain will require the implementation of biodiversity offsets.

The primary objectives of this chimpanzee offset pre-feasibility study and strategy are therefore to:

- Assess the need for offsets to account for residual impacts on chimpanzees;
- Plan for the design and implementation of potentially viable on- and off-site offsets;

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[1] GAC holds a 50-plus year mining concession for Lease 149 in the prefecture of Boké, in north-western Guinea. The lease holds 0.8 to 1.7 billion tonnes of bauxite mineral. A Bankable Feasibility Study was completed between 2005-2008 to mine bauxite resources, build and operate an alumina refiney and associated infrastructure. The global financial crisis in 2008-9 impacted the ability and interest of some of the partners to fund their share. In 2013 two of the shareholders (Mubadala and DUBAL) acquired 100% shareholding of the Project and transferred the ownership of GAC to the newly formed EGA entity. EGA proceeded to restructure the Project with a phased development plan targeting bauxite production from 2017 and postponing construction of the alumina refinery to a subsequent phase of development (ERM 2015).

2 This report follows the nomenclature of IUCN (IUCN 2015) for *Pan troglodytes verus*. The subspecies of chimpanzee in Guinea is also commonly referred to as Western Chimpanzee (e.g., Kormos & Boesch 2003). In this document 'Chimpanzee' refers to *Pan troglodytes verus* unless otherwise specified.

3 Although other Critical Habitat qualifying features have been identified for the GAC concession they are not covered in this report which focuses only on chimpanzees.

- Outline the steps required for the design of a monitoring framework to assess the success of on and off-site offsets;
- Outline the next steps required to assess financial and operational feasibility of the offset strategy.

Figure 3: Location of GAC Export Bauxite Project ('the Project') concession in Guinea

This report is an input into GAC's decision-making process. The chosen approach will be integrated into GAC's Biodiversity Mangement System (BMS) comprising part of its Environmental Management System (EMS).

1.2 Project overview

Guinea is one of the main sources of global bauxite production, used to produce Alumina. It currently produces less than 7% of global bauxite productions, although it holds approximately 52% of the world's resources. The demand for bauxite is likely to continue to increase (ERM 2015).

GAC plans to export 8 Mtpa of dry bauxite from Q2, 2018, ramping up to 17 Mtpa from 2020 for at least 20 years. Over the first 20 years of the 'Project Life' (Refinery Production Period) bauxite will be sourced from ten plateaus () (Figure 5) located in the south of its 690 km^2 concession. During any given year, between one (e.g. year 1-2 of operations) and five plateaus (e.g. year 16 of operations) will be actively mined

simultaneously (Figure 5). Expansion into the north of the concession may follow this plan, depending on future bauxite prices and demand for alumina.

The Project infrastructure is shown in Figure 4. Project activities and infrastructure will include:

- Mining of pits on bauxite plateaus 20, 24, 26, 27, 31, 32, 33, 34, 36 and 37 in the southern portion of the concession between 2018 to 2036 (18-20 year Project Life)
- Hauling of bauxite ore (using 90 to 150 tonne dump trucks) along haul roads constructed along the plateaus to a stockpiling facility at the processing facility;
- Surface infrastructure associated with mining of the abovementioned plateaus including: processing plant, crusher (for crushing and blending of mined bauxite to achieve the export grade), crushed ore stockpiles, refinery grade ore stockpiles, overburden stockpiles, staff housing for expat employees;
- In-pit stockpiling in separate piles will be carried out for refinery grade material (i.e. below export grade ore for later processing at the Refinery), overburden (expected to be minimal), topsoil (where available) and waste. As mining progresses on a plateau, that plateau's overburden and waste will be used to rehabilitate the plateau.
- Off-plateau stockpiling on the run-of-mine pad and adjacent to the rail loading position;
- Rail transport of the bauxite ore to a new export terminal at Kamsar; including: the construction of two rail spurs and sidings to connect the mining site at Tinguilita to the existing ANAIM railway (operated by CBG) and another in Kamsar to connect the main railway to the GAC port terminal;
- Shipment of export grade ore to buyers in United Arab Emirates (UAE) and around the world depending on demand.

Power generation will be from 10 MW diesel-fuelled generators and water supply from the Tinguilinta River will be supplemented by the creation of a water supply reservoir NNE of Tinguilinta town and the existing railway line. Labour force for construction (c.2,200 jobs) and operation (c.700 permanent jobs during operations with an estimated 1,500 indirect jobs) will be sourced locally as far as possible, and local workforce will be bussed in and out of the mine site (ERM 2015).

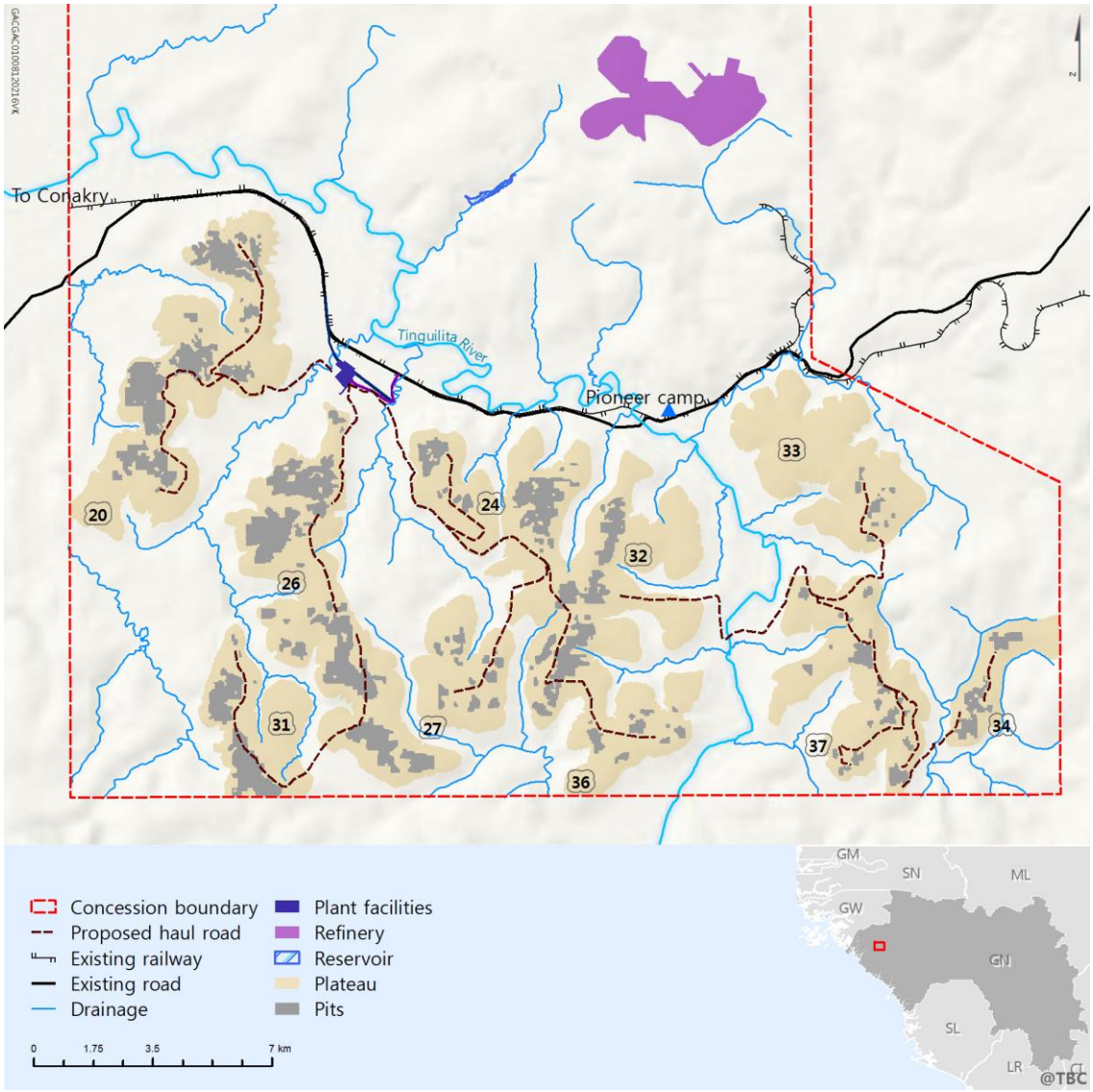


Figure 4: GAC Export Bauxite Project surface infrastructure layout

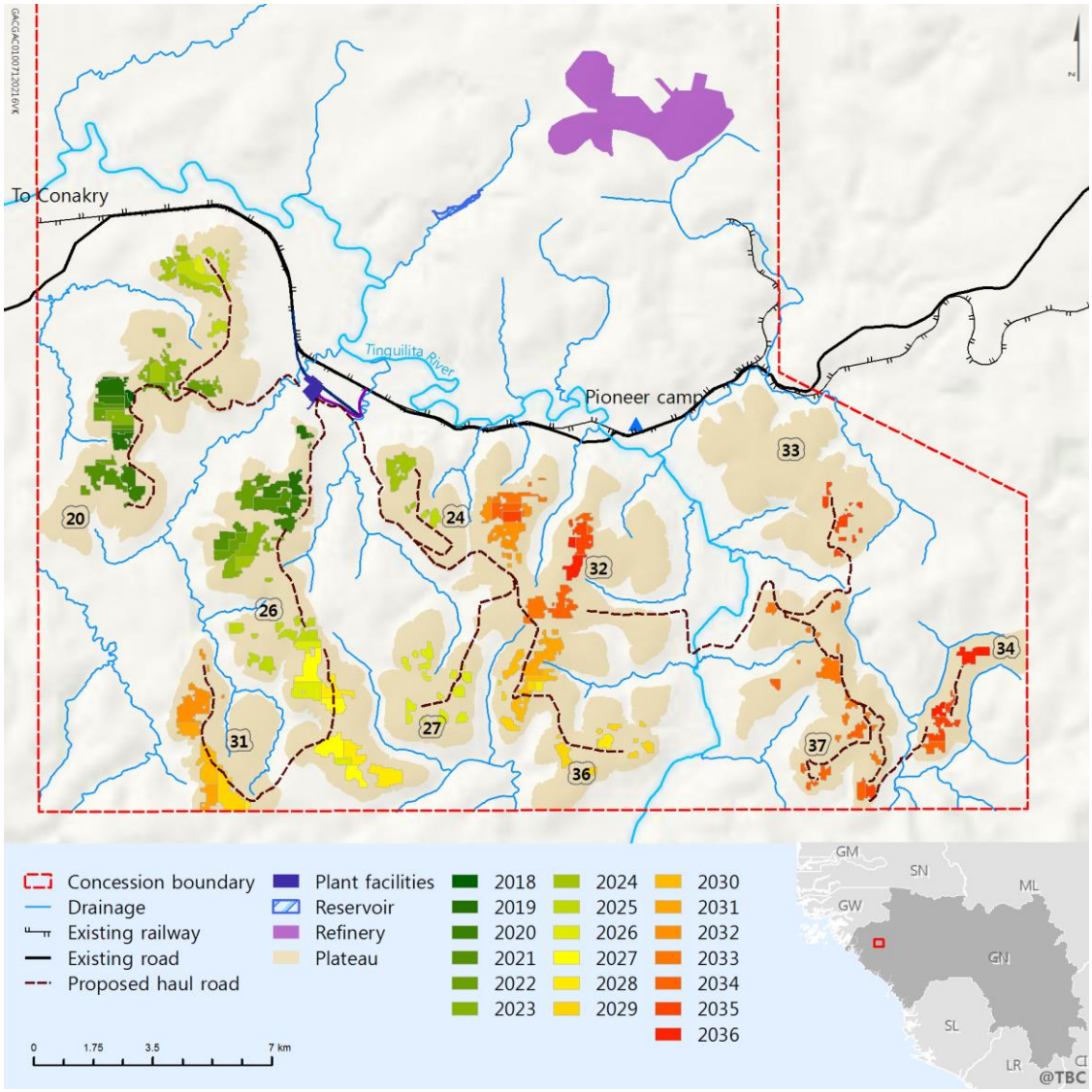


Figure 5: GAC Mining Plan (2018 to 2036) for the Project Life

GAC expects to have operations at facilities in the south of the concession for a much longer time scale than the Project Life, as ore extracted in future from the northern part of the concession will be transported using existing infrastructure. Thus chimpanzee habitat in the south of the concession will still be impacted on after the 20 year Project Life.

1.3 Regulatory and Lender Requirements

The government of Guinea (GoG) is reviewing options for integrating offsetting into national environmental policy (Arcus Foundation 2014). In addition, other mining operators in Guinea (e.g. Compagnie des Bauxites de Guinée (CBG)) are developing offset plans for their projects. However, offsets are not yet legally required in Guinea and no national guidance exists. The Project requirement for offsetting is therefore principally

driven by the requirements of IFC's Performance Standard 6 and associated guidance (IFC 2012a, 2012b) and other potential project financiers (e.g. African Development Bank).

1.3.1 IFC Performance Standard 6 requirements

For the Project to align with IFC Performance Standard 6 (PS6) for operating in Critical Habitat, it will need to meet the requirements outlined in Paragraph 17 of the standard (IFC 2012a):

- 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;
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

PS6 requires Project proponents to 'fully exercise the mitigation hierarchy', with an emphasis on avoiding and minimising potential impacts. For Critical Habitat, an overall Net Gain of Critical Habitat-qualifying biodiversity is required. In most circumstances achieving a Net Gain requiresimplementation of biodiversity offsets.

For Critical Habitat-qualifying biodiversity, robust demonstration will be needed that avoidance and mitigation measures have reduced residual impacts as far as feasibly possible, and that Net Gain can feasibly be achieved. Further information on Critical Habitat is available in (TBC 2012).

The Project's approach to mitigating impacts and achieving a Net Gain for Critical Habitat-qualifying biodiversity will need documentation in its Biodiversity Management System (BMS), with specific actions presented in the Project's Biodiversity Action Plan (BAP). In order to respond to changing conditions and ensure gains are realised, a flexible approach. supported by a Biodiversity Monitoring and Evaluation Programme (BMEP), will be required to enable adaptive management of mitigation measures throughout the Project Life.

1.3.2 African Development Bank requirements

The African Development Bank's Operational Standard (OS) 3 (AfDB 2013) deals with conservation of biodiversity, renewable resources and ecosystem services.

The specific objectives of OS3 are to:

- Conserve biological diversity and ecosystem integrity by avoiding or, if avoidance is not possible, reducing and minimising potentially harmful impacts on biodiversity;

- Endeavour to reinstate or restore biodiversity, including, where some impacts are unavoidable, **through implementing biodiversity offsets to achieve "not Net Loss but Net Gain" of biodiversity**;
- Protect natural, modified, and Critical Habitats; and
- Sustain the availability and productivity of priority ecosystem services to maintain benefits to the affected communities and sustain project performance.

- Projects located in Critical Habitat (CH) will be financed if the borrower or client can demonstrate:
  - Implementation of the mitigation hierarchy;
  - Clear benefits and positive outcome for biodiversity and ecosystem services from the Project;
  - Project-related activities will not have adverse effects (direct, indirect, or cumulative) on the criteria for which the CH was designated;
  - Project will not have any negative effects on Critically Endangered or Endangered species;
  - The project will achieve the previous two points without offsets or a "Net Gain" analysis; and
  - Integration of a robust, appropriately designed and funded, long-term biodiversity monitoring and evaluation programme
- GAC also needs to meet the following conditions with regards to CH:
  - Demonstrate it has incorporated relevant government, regional and international conservation plans;
  - Undertake a landscape/seascape analysis;
  - Explore possibilities for positive conservation outcomes including consultations with local stakeholders and conservation officials
  - Develop and implement a biodiversity action plan (BAP) and ensure sufficient organisational capacity for implementation throughout the project cycle.

1.4 Business case for offsetting

The principal business case for offsetting is to secure access to finance for the Project and maintain the option of securing further finance in the future. However, the business case for achieving a Net Gain for chimpanzees also includes:

- **Maintaining a social licence to operate**: chimpanzee conservation is an extremely sensitive topic. By GAC demonstrating a Net Gain it will build confidence in the national and international NGO community and gain support from chimpanzee experts who might otherwise lobby the government or financiers against this project proceeding. Local communities and civil society also hold value and rights over biodiversity and natural resources. GAC's current and future social 'licence to operate' will partly depend on the sound stewardship of biodiversity, ecosystems and their human-derived services;
- **Maintaining GAC's reputation and competitive edge**: in Guinea and with its joint-venture partners and other project stakeholders. Application of the mitigation hierarchy, including offsets, forms part of the new Aluminium Stewardship Initiative standards (ASI 2014); implementing offsets and reaching a Net Gain would help GAC develop and demonstrate a reputation for implementing Good International Industry Practice (GIIP);

- **Alignment with national offsetting initiatives and pre-empting alignment with likely future regulatory requirements**: Biodiversity offsetting in Guinea is gathering momentum due to numerous projects that require offsets (e.g. Simandou and CBG) and discussions that have taken place between NGOs and government over recent years. Bureau Guinéen d'Etudes et d'Evaluations Environnementales (BGEEE) is involved with Guinee Ecologie on the national ecological compensation project and is driving changes in policy to include biodiversity offsetting for future mining developments in Guinea. A new Fauna and Forest Code will soon be submitted to the Guinean Assembly and BGEEE wishes to see biodiversity offsets addressed in this (S.B. Sidibe, pers comm. 19 January 2016). By demonstrating a Net Gain for chimpanzees GAC will ensure that it is aligned with changes in regulatory requirements likely to be implemented within the next couple of years;
- **Contributing to national protected area targets for Guinea**: OGUIPAR is required to extend the existing protected area network in Guinea to reach a national target of 25% protected areas by 2020 (M.B.Keita, pers.comm. 19 January 2016); and
- **Additional benefits**: associated with the biodiversity offsets such as increased non-mining job creation, capacity building, and improved community and government relations.

1.5 Scope, exclusions and assumptions

This report is intended primarily for GAC, including its potential financiers and Project stakeholders. The study focuses on assessing the necessity for on- and off-site offsets and describes the steps required to assess offset feasibility, plans for offset design, implementation, financing and monitoring of the achievement of Net Gains for chimpanzees.

This pre-feasibility study is concerned only with infrastructure construction and associated mining activities on the southern portion of the GAC concession and focuses specifically on impacts associated with the mine only (as described in Section 1.2) and not the rail and port:

- Mining of all ten bauxite plateaus (Figure 5)
- New haul roads constructed to the mined pits;
- Surface infrastructure at the plant complex
- The disturbed footprint of the supply water dam north of the railway line;
- The disturbed footprint due to initial clearance of habitat for construction of the Refineryin the north of the concession
- Indirect impacts associated with noise disturbance caused by mining of pits and operation of the plant, assessed at 500 m, 1000 m, 1500 m and 2000 m from the source of disturbance.

The study assesses the feasibility of achieving Net Gain for chimpanzees only and does not cover other species that qualify the Project as Critical Habitat, nor Project impacts on Natural Habitat which may also require offsets.

Field data was collected by Sylvatrop Consulting at the short-listed offset sites Koumbia and Badiar and the Haut-Bafing proposed National Park.

The pre-feasibility study excludes impacts associated with:

- Linear infrastructure (railway line and road) development associated with transport of bauxite to Kamsar for direct shipment;
- Expansion of the port at Kamsar;
- Noise impacts associated with historic construction activities at the Refinery and future noise impacts associated with operations of the Refinery;
- Noise impacts associated with transport of ore along the haul roads;
- The disturbed footprint due to initial construction of the rail spur to the Refinery in the north of the concession
- Any additional disturbance on the concession due to adjacent mining operations and/or changes in the mine plan; and
- Historic activities on the concession such as drilling, bulk sampling, construction activities at the Refinery site, growth in size of Tinguilinta village, and existing infrastructure (e.g. staff camp)
- The mining of additional plateaus north of the railway line.

Regarding the offset site investigations:

- The study did not include field data collection at the potential offset site Mamou;
- The duration of the offset will need to extend for at least as long at the 'Project Life' namely 18-20 years, although the IFC is currently only anticipated to finance the mining of plateaus over the initial seven years (numbers (20, 24, 26 and 27); and
- The offset will not cover any impacts associated with future mining north of the railway line which will require further investigation and planning in future.

This report is based on available data which was limited, especially concerning chimpanzee population size, distribution and potential impacts; direct impacts due to noise; and, indirect (or 'induced') impacts.

This report is based on the mine plan provided to TBC in January 2016. The mine plan is regularly adapted based on updated resource and reserve information and the current state of the bauxite market. Re-assessment of impacts and mitigation would be appropriate if there are significant changes in the mine plan.

Cumulative impacts have been superficially covered in this pre-feasibility study (see Section 3.6). TBC understands that a cumulative impact assessment on chimpanzees for the mining sector is planned for Guinea in 2016 to assess the impacts of the numerous potential mining projects in the vicinity of this Project.

Only preliminary engagement of key stakeholders was undertaken during the pre-feasibility study. A comprehensive Stakeholder Engagement Plan and stakeholder consultations will be undertaken as part of the Feasibility Study which will follow the pre-feasibility study. Consultations included discussions with GoG including Bureau Guinéen d'Etudes et d'Evaluations Environnementales (BGEEE), Office Guinéen des Parcs et Réserves (OGUIPAR) and National Directorate for Water and Forest (DNEF) and conservation NGOs (e.g. Guinée Ecologie). Effective consultation with GoG, local communities, the wider ape conservation community

and other stakeholders, as part of detailed feasibility planning, will be critical to ensuring offset success. Stakeholder engagement is discussed in more detail in Section 6.1.2.

In addition to the above consultations, TBC also recommends GAC:

- Seek input to the pre-feasibility study approach and review of the draft report from other primatologists and/or offset experts (e.g.: member(s) of the IUCN SGA, Ray Victurine, Director, Business & Conservation Initiative at Wildlife Conservation Society), and
- Organize a workshop to consult stakeholders widely during the Feasibility Study.

Related documents

This document draws on the assessments conducted for GAC's Bauxite Export Project ESIA (ERM 2015) and subsequent studies (WCF 2015c) (WCF 2015b) (WCF 2015a) (Sylvatrop 2016) focusing on chimpanzees on GACs concession.

2 Methodological approach

2.1 Key challenges

There are a number of challenges to developing offsets for chimpanzees in Guinea. These are identified and discussed in the sections below.

2.1.1 Lack of national offsetting requirements in Guinea

The primary driver of this prefeasibility assessment is GAC's aim to align with good international industry practice (GIIP) and PS6 requirements to achieve a Net Gain for chimpanzees and their habitat. While IFC PS6 and broader industry guidance set out guidelines and principles for how a Net Gain may be defined and achieved, these require interpretation to be operationalised for specific countries and socio-ecological contexts. This is particularly relevant for countries like Guinea that do not yet have national policies and guidance on application of the mitigation hierarchy and offsetting and where there are no examples of working offsets that can provide a model.

However, interest in biodiversity offsetting in Guinea is gathering momentum due to:

- A National Offsets Commission, which was set-up in 2012 and has started regular meetings since February 2016;
- An on-going project funded by Agence Francaise de Developpement (AFD)/Fonds Francaise Environnemental Mondiale (FFEM) to establish a national offsetting framework in four African countries including Guinea;
- The recently established (formalised in January 2016) and officially endorsed, Biodiversity Offsets Commission for Simandou; and

- A Strategic Environmental Assessment currently being undertaken by Egis (a French consulting firm) for reform of the mining sector in Guinea and application of the PS6 (hence offsets). Although the report does not appear to include reference to biodiversity offsets.

2.1.2 Chimpanzee ecology and status

This study was required to address specific concerns relating to chimpanzees including:

- Ecological: relating to their very low intrinsic rates of population growth; chimpanzees have long lifespans, low reproductive rates, are late-maturing and involve high parental investment;
- Behavioural aspects related to sensitivity to disturbance, adaptability and territoriality; Chimpanzees have complex social structure and each community possess a territory that they actively defend against intruders;
- Stakeholder concerns regarding conservation and ethical status perspectives: chimpanzees are Endangered and an iconic species, which is closely related to humans and thus gather much attention from the public (See Section 2.7 for further discussion on the importance of stakeholder engagement for this study).

2.1.3 Limitations associated with stage of GAC's Project engineering design and availability of Project and chimpanzee data

GAC is still in the early stages of its Project design and this has implications for the study:

- The final GAC Project design (FEL3) is not yet completed. Therefore the infrastructure layout and/or mine plan will likely be updated and the residual impact assessment which draws on this may need to be revised.
- GAC has incorporated some of the mitigation measures proposed by WCF (WCF 2015a). However the additional mitigation measures proposed by TBC (in this report) have not yet been incorporated. If these are incorporated in later iterations of the mine plan and/or engineering design the residual impact assessment may need to be revised.
- Noise data used in the ESIA was not available at the time of writing this report, therefore the indirect impact may be over-or under-estimated and may need to be revised.

GAC has been collecting data on chimpanzees in its concession for five years (2010 to 2014) (WCF 2015a). The number of chimpanzees varies considerably (by as much as 107 total individuals for weaned chimpanzees and 125 for all chimpanzee individuals over the four year period). Therefore there is significant uncertainty in key input data, including:

- The population size of chimpanzees found on the GAC concession;
- The number of groups on the concession and their location in relation to the proposed mine infrastructure;
- The sensitivity of chimpanzees in the concession to mining activities and the associated potential direct and indirect impacts
- Baseline scenarios at offset sites since limited data on chimpanzee numbers exists;

- Realistic estimates of the potential to generate conservation gains at offset sites.

To address these challenges, we have based our methodological approach on widely-agreed (but still evolving) GIIP principles for offset design, notably:

- PS6 requirements (IFC 2012a, 2012b);
- AfDB OS3 requirements;
- The BBOP offset design principles (BBOP 2012a);
- Guinea- and chimpanzee-specific discussions about offsetting (Kormos *et al.* 2014);
- The broader technical and academic literature on offsetting (eg., Pilgrim *et al.* 2013; Bull *et al.* 2014, 2015; Pilgrim & Ekstrom 2014).

This chapter describes how these principles and design criteria have been interpreted for this assessment (Section 2.2), discusses specific additional requirements that may be appropriate for chimpanzees (Section 2.4), reviews appropriate approaches to dealing with uncertainty (Section 2.4.3.1) and then describes the process by which this has been applied in this specific context (Section 2.5.3).

We emphasise that this is a pre-feasibility assessment which aims to help identify whether there are realistic options for reaching a Net Gain for chimpanzees and if so to narrow down the range of potential options. Many aspects remain to be clarified during a full feasibility assessment before a final approach to reaching a Net Gain is selected (see Section 6).

2.2 Offset design principles informing this assessment

The general offset design principles used for this assessment are based on those developed by the multi-stakeholder Business and Biodiversity Offsets Programme (BBOP 2012a), informed by other industry guidance (ICMM & IUCN 2013; CSBI & TBC 2015) and those set out in the terms of reference for this study. The principles are listed in Table 3 with a summary description of how they have been integrated into the assessment. These principles incorporate the general requirements for use of offsets as part of the mitigation hierarchy under PS6 which can be summarised as:

- Offsets may only be considered as a means for mitigating impacts after all appropriate avoidance, minimization and restoration measures have been considered.
- Projects operating within Critical Habitat can only implement offsets if it can be demonstrated that (i) no other viable development alternatives exist, (ii) the Project does not lead to measurable adverse impacts (accounting for the use of offsets) upon those species for which Critical Habitat was designated (iii) there is no net reduction in the population of any Critically Endangered or Endangered species (iv) a long-term and robust monitoring and evaluation programme is developed.
- Offsets should involve measurable outcomes that can be reasonably expected to result in a Net Gain of biodiversity (for Critical Habitat) or no net loss of biodiversity (for Natural Habitat).
- Offsets should involve biodiversity gains that are of the same type as losses, or of higher conservation value (i.e. like for like or better).
- Offsets should prevent an overall loss in ecosystem function as well as specific biodiversity values so as to ensure long-term resilience of any conservation measures.
- Offsets should be designed in conjunction with experts in offset design and implementation.

Table 3 : Outline of how key good international industry practice design principles for offsets have been interpreted and used to guide the assessment process.

No.	Principle	Description	Interpretation and application for this assessment
1	Adherence to the mitigation hierarchy	All appropriate avoidance, minimization and on-site restoration measures will be implemented or explored and reasonably ruled out.	A fundamental principle that is particularly important given the ethical and moral considerations surrounding chimpanzees as well as their conservation status. A review of planned and possible mitigation options was conducted to verify that appropriate avoidance and minimisation measures have been identified and are implemented (Section 0) before an estimation of residual impacts was made.
2	Equivalence:	Biodiversity gains from offsets must be 'like for like or better'.	This assessment focuses specifically on chimpanzees. There is no prospect of 'trading-up' to a different kind of biodiversity and so offsetting must focus on chimpanzees.
3	Limits to what can be offset	There are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected.	This is interpreted in line with PS6 para 17 requirement that a project in Critical Habitat does not cause a "measurable adverse impact on the species" for which Critical Habitat was designated. In line with GN101, this is interpreted as meaning that a residual impact that could significantly and irreversibly impair the viability of the Critical Habitat qualifying feature at a landscape-level (rather than group- or individual-level) residual impact might not be offsetable. It is recognised that some stakeholders may consider that even smaller impacts on chimpanzees are beyond the limits of offsetability; a stakeholder review process is proposed to ensure that such views are considered and to try to ensure that the overall offset package is generally considered a 'fair deal' for chimpanzee conservation (Section 2.7 and Section 6). This is a critical aspect of ensuring widespread acceptance of the approach to offsetting.
4	Landscape context:	Offsets will be designed accounting for connectivity across the landscape, avoiding fragmentation, and maintaining flows of ecosystem services.	Consideration of the landscape context and long-term viability of offset sites included in screening criteria (e.g.: availability of a large chimpanzee population in the potential site, contribution to connectivity, cultural attitudes towards chimpanzees in the region) (Section 5.2).
5	Net gain	A biodiversity offset should be designed and implemented to achieve in situ, measurable conservation outcomes that can reasonably be expected to result in a Net Gain of biodiversity.	The assessment aims to identify sites where gains from conservation interventions could clearly and substantially exceed potential negative impacts (Section 5.2), taking appropriate consideration of uncertainties in estimates of impacts and gains, and risks of failure of offset delivery (Section 2.6).

No.	Principle	Description	Interpretation and application for this assessment
			Only scenarios that are expected to deliver an increasing chimpanzee population (and thus improve population viability in the long-term) at offset sites are acceptable (i.e. averted loss offsets that only slow the rate of decline are not considered appropriate) (see Section 2.4.2.1).
6	Additionality	Conservation gains will be clearly attributable to the Project's actions and will demonstrably be above and beyond results that would have occurred if the offset had not taken place.	Consideration of additionality included in screening criteria, by considering the adequacy of current conservation interventions at possible sites, for example as reported though METT assessments (eg., UICN-PAPACO 2008), presence of other possible donors and the potential additional contribution of an offset (Section 5.2.2).
7	Precautionary approach	Estimates of gains and losses will be conservative and include a margin of precaution proportional to the risks involved in offset delivery.	A range of scenarios are used to take into account the level of uncertainty in estimates of losses (Section 2.4.3.1) and gains (Sections 2.4.1 and Appendix 1); use of multipliers and bet-hedging (insurance sites) is also proposed where appropriate (Section 2.5.2)
8	Long-term outcomes	Biodiversity offsets will use an adaptive management approach, incorporating monitoring and evaluation, to secure outcomes that last at least as long as the Project impacts. Securing long-term finance is essential to ensuring permanence of the offset.	An adaptive approach to the development of a final offset site or portfolio is proposed (Section 2.4.3.1). Provision for monitoring, evaluation and adaptive management is built into the proposed monitoring and evaluation framework (Section 7) and implementation plan (Section 6). The implementation plan recommends that financing of mitigation is continued beyond life of mine (Section 6.3.3). It may be possible to improve long-term outcomes by focusing off-site interventions on areas that are a higher priority for chimpanzee conservation than the impact site. This was factored into offset site screening by assigning a higher weighting to sites that are considered (or likely to be considered) regional priorities for chimpanzee conservation. Recommendations are made to engage and develop effective partnerships with stakeholders (GoG, chimpanzee conservation groups, local community) as this is key to ensuring longevity of gains (Section 6).
9	Stakeholder participation	Offsets will be based upon appropriate, extensive and transparent stakeholder consultation.	Some informal consultation of stakeholders has been undertaken as part of this pre-feasibility assessment including recognised chimpanzees experts, conservation NGOs and government (see Section 6.1.2, Table 15and Appendix 3). Provision for a full stakeholder engagement process is included in the implementation plan set out in Section 6.
10	Transparency	The design, implementation and monitored outcomes of biodiversity offsets will be transparent, and communicated in the public domain.	A monitoring framework is proposed that would allow tracking of offset design, implementation and monitoring (Section 7). A stakeholder engagement and review process is also proposed (Section 2.5.3 and Section 6). This report is expected to be disclosed publically.

2.3 Estimating potential impacts

Despite the level of interest and concern around chimpanzees, there are few studies clearly showing how they are impacted by mining. Potential impacts were therefore assessed on a precautionary basis using available information, scientific literature and expert consultation. Given the levels of uncertainty a range of scenarios are presented. Where feasible, a range of estimated impacts was quantified using GIS analysis.

2.4 Estimating offset requirements

2.4.1 Gain mechanism

There are two broad classes of biodiversity offset that for chimpanzees could be described as follows:

- **Restoration offsets**: where a population of chimpanzees that has suffered significant non-Project related impacts in the past (i.e. a population that is at greatly reduced density compared to previous levels) is protected or its habitat restored,' and thereby allowed to recover. Restoration offsets have the advantage of delivering a clearly tangible gain and avoiding issues of predicting potential future losses.
- **Averted loss offsets**: where enhanced protection of an existing but threatened chimpanzee population avoids predicted future losses of chimpanzees that would otherwise have occurred due to threats unrelated to the Projects activities. An example of averted loss offset in Guinea would be the implementation of conservation actions in a site where a large population of chimpanzees is known to be threatened by hunting/capture and clearance of habitat for agriculture or charcoal, in order to reduce these threats as much as possible. The gains made would be the 'averted loss', i.e. the difference between the predicted loss under a counterfactual scenario and the actual loss under an offset scenario.

The two classes may be combined in a mixed model, and this may be the approach most appropriate for GAC

There are several reasons why 'pure' restoration offsets are likely not to be appropriate in the case of GAC:

- Chimpanzee populations grow very slowly, even in ideal conditions, so the time to deliver gains entirely through restoration may be very long. For example, a model by Walsh et al. (2003) estimated that it could take 60-100 years for chimpanzee populations to recover from a population crash, with a very wide range of variation in this estimate;
- When chimpanzee populations are at a low level (often likely for a restoration offset), they are very vulnerable to chance events that can either greatly increase the time required to generate gains, or lead to complete failure of the offset;
- On the other hand, where chimpanzee populations are close to carrying capacity, a restoration offset would require active improvement of habitat, which is uncertain to succeed and may require many years to show effects;
- If chimpanzees are directly threatened by hunting/capture and indirectly by habitat loss, it is likely more cost effective to be reducing these threats to avert predicted losses rather than restoring habitat.

Chimpanzees face external threats (and predicted losses) nearly everywhere, so some element of management to avert loss is a practical necessity. ;

Compared to restoration offsets, averted loss offsets can deliver substantial, immediate results if significant non-project threats to chimpanzees can be quickly and effectively reduced. Averted loss offsets can be controversial, as the level of expected gains is very sensitive to assumptions about the future (ICMM & IUCN 2013; Maron et al. 2013; Bull et al. 2014). However, in the context of widespread and sometimes rapid declines of West African chimpanzee habitat and populations (Kormos et al. 2003; Junker et al. 2012; Tranquilli et al. 2012) it is clear that averted loss is likely to be an important element of any offset and could deliver tangible gains.

In practice, a hybrid of restoration and averted loss offsets is appropriate to achieve a species recovery goal (see Section above). Conservation actions would aim at reducing existing threats to chimpanzee and their habitat (averted loss offset component), and would combine with restoration of the existing habitat, resulting in an improved carrying capacity (restoration offset component). Following Kormos et al. (2014) we term this a 'species recovery offset', In the short-term such an offset will generate most gains from averted loss, but should result in a stable or increasing population (i.e. a restoration element) that demonstrably contributes to long-term conservation of chimpanzees at a landscape or regional scale.

2.4.2 Specific considerations for offsets compensating for impacts on chimpanzees

Given the special status of chimpanzees, specific considerations for offset design may be appropriate in addition to the general design principles listed above. Three issues (reviewed by Kormos *et al.* 2014) deserve additional consideration:

- Offsets need to be aimed at species recovery;
- The timing of delivery of offset gains needs to relate to the duration of the impact; and
- Offset sites need to insure against catastrophic events.

2.4.2.1 Offsets aimed at species recovery

'Averted loss' offsets that only slow (but do not halt) the predicted rate of decline of target biodiversity have been widely criticised as 'locking in decline' (Maron *et al.* 2015). Also based on inherently unreliable assumptions about how current trends continue into the future such offsets may be unconvincing to stakeholders, who do not see tangible evidence that Net Gain has been achieved for great apes. This is a particularly significant consideration. Kormos *et al.* (2014) thus recommend adopting a 'species recovery goal' for offsets for EN or CR species of great apes This is the option recommended for GAC.

In other words, the objective of any offset site should be to end up with a population of chimpanzees that is at least stable and preferably able to increase. This is illustrated in *Figure 6* below.

In practice, adopting a species recovery requirement means that 1) offset sites should only be considered where conservation interventions can plausibly halt declines and result in a growing chimpanzee population 2) offset site management will require relatively intense effort to ensure that declines are halted and, ideally, reversed.

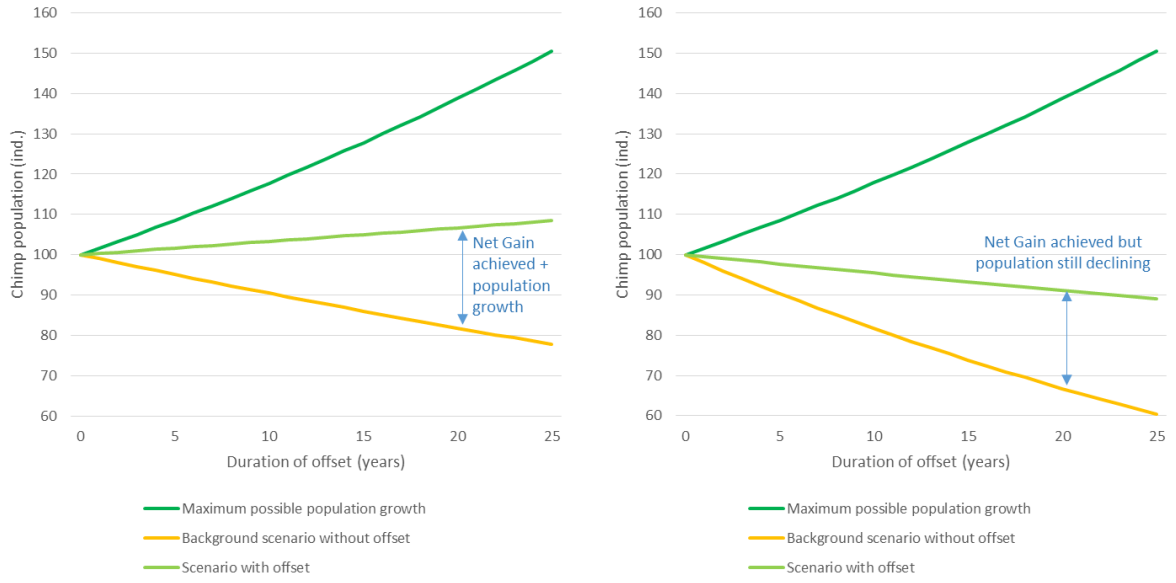


Figure 6 : Adopting a 'species recovery' criterion for offsets targeted at chimpanzees. An offset that results in a stable or increasing population (left) is appropriate, in contrast to one that only slows the rate of decline (right).

2.4.2.2 Timing of delivery of offset gains

Kormos *et al.* (2014) recommend that for impacts on chimpanzees offset gains should be delivered *prior* to impacts occurring (eg.: by starting offset activities prior to the development of the Project). This eliminates uncertainties around predicted offset gains. This principle is a 'gold standard' for offsetting generally, and is particularly appropriate for impacts on species where conservation concern is greatest (Pilgrim *et al.* 2013). For this Project it is proposed simply to ensure that offset activities and gains start the earliest possible and last at least as long as potential impacts; this is likely to be considerably longer than the duration of the Project (see Section 3.5).

2.4.2.3 Insurance against catastrophic events

The slow reproductive rate of chimpanzees means that a single catastrophic event (see Section 3.2.7) could undo years or decades of conservation gains (see for example Goodall 1986). External risks that could cause offset site failure could include disease, extreme weather, fire or unplanned and unpredicted development. Two approaches are possible to reduce the risk of overall offset failure:

1. The offset site and chimpanzee population are sufficiently large that it is unlikely that a catastrophic event could affect the entire chimpanzee population at the site; or
2. More than one offset site is adopted, each with potential for generating sufficient biodiversity gains to reach a Net Gain independently of the other. This is the 'insurance sites' approach recommended by Kormos *et al.* (2014).

These options have been factored into the offset site selection process described in Section 5. However, managing more than one site could be logistically more difficult for GAC to manage.

2.4.3 Estimating offset requirements and potential gains

For the purpose of this pre-feasibility study it is necessary to demonstrate that conservation interventions at potential offset sites could feasibly be expected to generate gains that would outweigh potential project impacts on chimpanzees. To do this, it is necessary to identify potential scenarios for:

- The expected future change in the population of chimpanzees at the chosen site *without* offset activities (the 'counterfactual' scenario);
- The expected future change in the population of chimpanzees at the chosen site *with* offset activities, i.e. through protecting the site from existing and anticipated future pressuressuch as poaching and habitat loss (the with-offset scenario).

Possible offset gains are estimated as the difference between the two scenarios. This is illustrated in Figure 7 below. The gains are estimated by comparing forecast changes in the population size at the background rate of loss (orange line) with the forecast changes in the population size with reduced threats achieved through the offset protection activities (light green line).

As shown in Figure 7, the potential gains at a given site depend on:

- Initial population of chimpanzees;
- Maximum possible population growth;
- Without-offset (counterfactual) scenario;
- With-offset scenario – i.e. the effectiveness of conservation interventions at reducing pre-existing threats at the offset site;
- Offset duration.

For the purposes of this assessment, a number of assumptions have been developed to estimate the minimum population size required to achieve a Net Gain and inform offset site selection. These assumptions are discussed in the following sections.

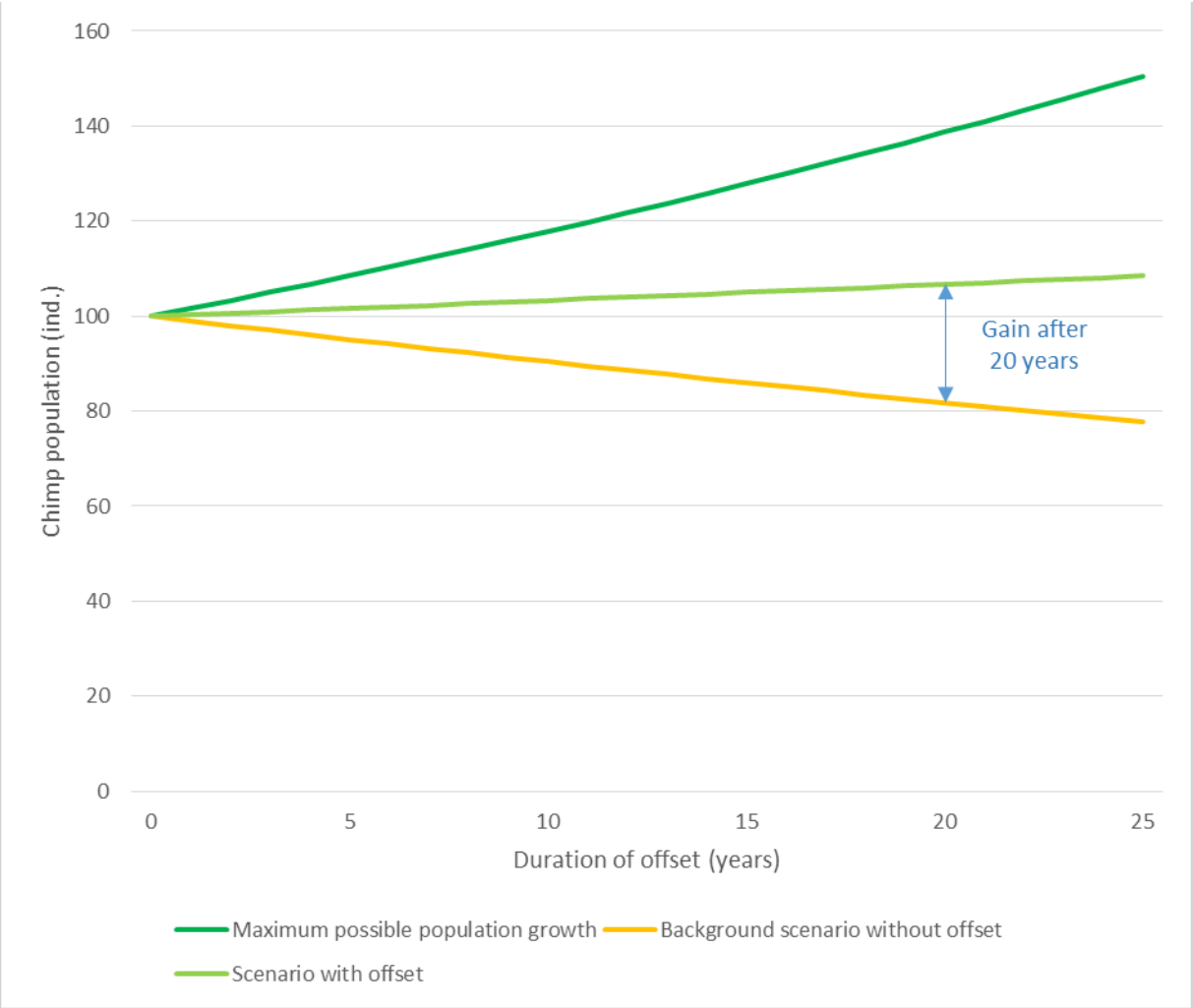


Figure 7: Example of gain forecast over offset duration for an initial population of 100 chimpanzees with a net background rate of loss of 1%/year. If offsetting actions can halve threats and intrinsic rates of population increase without threats are incorporated, a gain of about 25 chimpanzees would be possible after 20 years. This is a simplistic model for rapid assessment only.

2.4.3.1 Maximum possible increase of the population

For this assessment we ensured that estimates of potential chimpanzee population growth were bounded by the 'maximum possible increase of the population' (dark green line). We used the figure of 1.65%/year estimated by Walsh *et al.* (2003) as the possible density-independent rate of growth of chimpanzee populations (i.e. in the absence of external threats). We note that this may be an optimistic estimate of natural growth rate and that in reality chance events and natural variability mean that chimpanzee populations are unlikely to grow steadily; and at some density-dependence will limit further growth. These risks are addressed using multipliers as discussed in Section 2.4.3.1 below. The same maximum possible increase of the population was used for all the sites considered in the assessment, as no data enable site-specific estimates.

2.4.3.2 Without offset scenario (or 'counterfactual' scenario) at offset sites

There is no reliable quantitative information on rates of loss of chimpanzees in Guinea, though hunting for bushmeat and habitat loss are considered significant threats at a national scale (e.g., Kormos *et al.* 2003). Although most offset sites have been surveyed once, these surveys are in most cases partial, and with the exception of part of Haut Niger National Park (Humle 2009), there are no trend data to illustrate actual counterfactual scenarios at any sites.

For the estimation of offset requirements, we therefore used the hypothesis of a net background loss rate (due to hunting, habitat loss, degradation not associated with the mine) of about 1%/year at potential offset sites. This is the *net* rate of loss over and above chimpanzees' potential capacity for natural population growth. Several arguments indicate that an initial estimate of net background rate of loss of about 1%/year is plausible:

- A recent study by Junker et al. (2012) showed an 11% decline in 'suitable environmental conditions' for West African chimpanzee in 15 years, or slightly less than 1%/year;
- The average rate of deforestation in Guinea has been about 0.5%/year for the last twenty years (FAO 2010) and so the combined impact of habitat loss and hunting is very likely to be >0.5%.
- West African chimpanzees are currently considered Endangered based on an estimated decline of >50 % over 3 generations or 60 years (Humle et al. 2008). This implies a minimum average rate of decline of slightly over 1%/year on average across West Africa;

Clearly the actual rate of loss is likely to be site-specific and is likely to vary over time (for example forest degradation rates varied significantly over very small distances and time scales in and around Nialama Classified Forest the Fouta Djallon (Sunderland-Groves *et al.* 2011)).

A cross-check was therefore conducted using a scenario of a stable population at offset sites (note that a stable population does not imply no human pressure, but that human pressure is about equal to the chimpanzees' rate of natural population increase, assuming that chimpanzee populations are not at population levels where density-dependence is significant). At this stage of the offset design process, uncertainty in the level of background loss rates is best dealt with using multipliers for uncertainty (see Section 2.4.3.1), whereas at the detailed feasibility stage a site-specific assessment would enable these assumptions to be validated.

2.4.3.3 With-project scenarios

We assumed that offset actions could halve the rate of loss of chimpanzees / chimpanzee habitat and result in a net chimpanzee population growth rate of 0.3%/year at offset sites (see Appendix 1 for details). This equates to halving the impacts of human activities on chimp populations. Given the challenges to achieving conservation in Guinea (see for example UICN-PAPACO 2008) we did not consider that complete elimination of threats at an offset site would be a realistic scenario, but that halving threats and delivering a small positive growth rate is an optimistic but feasible assumption.

We note that this assumes that chimpanzee populations at offset sites are not already at 'carrying capacity' and experiencing density-dependent growth. Given the level of threats to chimpanzees from hunting this is a plausible assumption but one that should be validated as part of a detailed feasibility study.

2.4.3.4 Duration of offset

Where it is not possible to deliver gains in advance of impacts, project closure is commonly used as a target date to achieve a Net Gain in the extractive industry. The Project has a short life of only 18 years-20 years and is planned to start in 2018. Achieving a Net Gain before the Project ends in 2036 was considered challenging, but feasible with the appropriate size of chimpanzee population at offset site and the appropriate level of effort in conservation activities.

Conservation projects deliver outcomes over the long term, especially when reducing threats requires patient engagement and trust building with local communities. This is particularly the case for chimpanzees which have a generation length of almost 20 years.

2.5 Dealing with uncertainty and time-lags

All offset design processes are inevitably constrained by the quality and reliability of available data (BBOP 2012b). The resolution of existing data on chimpanzee population numbers, and distribution and dynamics is insufficient to quantify impacts or gains precisely.

A precautionary and adaptive approach is therefore required to acknowledge this uncertainty and ensure that an offset succeeds in achieving a Net Gain for chimpanzees. This involves:

- Assessing the potential range and sources of uncertainty in potential gains (Table 4) and addressing these using a multiplier (i.e. a gain:loss ratio of greater than 1:1).
- Ongoing monitoring of both losses and gains throughout the life of the offset to update initial estimates as a more accurate assessment of actual losses and gains is determined. This information will then help adapt the management of offset actions to ensure it meets Net Gain requirements for chimpanzees. It is unlikely that monitoring will completely eliminate uncertainty, so the required offset ratio will always be greater than 1:1.

2.5.1 Offset multipliers

Offset multipliers adjust the ratio of gains to losses that is required in order to achieve a precautionary offset design commensurate with the sensitivity of the biodiversity, uncertainty in design parameters and risk of lower offset intervention success (though not of complete failure which is better addressed through insurance). Multipliers can be used to account for the uncertainty related to impact magnitude and in whether conservation actions at the offset site can deliver necessary gains (Moilanen *et al.* 2009; Bull *et al.* 2013).

Offset multipliers can be used to address the lack of precision in available data (e.g. extrapolating from no. of chimpanzee nests to no. of individual chimpanzees on the concession) or uncertainty in the predicted impacts (e.g. no. of chimpanzees impacted by loss and/or fragmentation of habitats or disturbance such as

noise) and/or effectiveness of offset measures (e.g. effectiveness in reducing hunting pressure at the offset site)[4].

Offset multipliers, that reflect uncertainties about magnitude of gains, are particularly relevant in a Guinean context where conservation is very challenging and where few successful conservation projects exist (UICN-PAPACO 2008).

Determination of an appropriate offset multiplier can be inherently challenging given that it is based on the level of uncertainty that it is trying to address. While some 'unknown unknowns' will always exist, estimation of the 'known unknowns' will help in determining an appropriate multiplier that provides a reasonable reflection of the level of uncertainty associated with poor/incomplete data, predicted impacts and/or offset effectiveness. Where uncertainty is particularly high, multiplier ratios can become impracticably high (e.g. >100:1) (Moilanen *et al.* 2009; Pickett *et al.* 2013). This is a reflection of the likelihood of potential losses and gains and underlines the importance of taking all practicable steps to mitigate impacts through on-site avoidance, minimisation and restoration.

To assess the level of multiplier that might be appropriate, we used our simple model to predict possible gains at offset sites to explore the effects of plausible variations in different parameters linked to offset success (Table 4). This analysis showed that even quite minor variations in the parameters could have significant impacts on the required offset size to reach a Net Gain. The parameters are independent and it is possible that more than one of these scenarios could apply (i.e. the appropriate overall multiplier would be the product of the individual multipliers) leading to a multiplier of up to 8x in the worst case scenario. It is less likely that all the uncertainty would be in the same direction. We therefore conclude that an appropriate initial multiplier for offset planning would be in the range of 2–5x the offset requirement and that the final multiplier used should be at least 2x.

In recognition of the high uncertainty for the magnitude of impacts and potential rate of gains at offset sites, a multiplier of x3 has been suggested by WCF (WCF 2015d) and discussed with IFC and GAC. Our analysis suggests that this multiplier falls within the appropriate range and therefore can be used as a basis for offset planning at the prefeasibility level of this assessment.

- [4] Offset multipliers are however unsuitable as a means to address (i) external (outside of proponent control) risks to offset delivery (e.g. where there is a chance that a protected area will fail to be designated), (ii) to compensate for inadequate currencies (e.g. where there is uncertainty about the quality of "quality hectares") or (iii) to address raised extinction risks from temporal losses (unlikely to be an issue for chimpanzees at the global scale but local extinction of a sub-population/group is not entirely improbable).

Table 4 : Examples of multipliers required to meet a Net Gain given different potential variations in key parameters (see Appendix 1 for technical details).

Source of uncertainty	Effective multiplier required
Threats at offset site are only reduced to 25% instead of 50% of existing rate	x 2.1
It takes 5 years before conservation actions reach expected effectiveness	x 1.2 – x 1.1
Background scenario is of a stable population rather than a net 1% decline/year	x 1.4
Actual intrinsic rate of population growth is 1%/year rather than 1.65%/year	x 1.4
Actual chimpanzee population size at offset site is 1 standard deviation below the mean estimate (assuming a 33% co-efficient of variation)	x 1.4

2.5.2 External risks to offset delivery

If the worst case risk is realised (i.e. offset activities do not deliver expected gains, for example due to disease or other external threats), a multiplier will not solve the problem. It will make little difference whether the offset is the same, twice or five times the size of the impacted site, if the offset fails to deliver any gains. Such risks are best dealt with through 'insurance sites' or 'bet-hedging'.

Bet-hedging is the approach of selecting two or more offset sites to account for the uncertainty related to offset success (Moilanen *et al.* 2009). The two sites should be independent, so that a factor that might prevent success at one site is very unlikely to affect both sites. Bet-hedging reduces the chances of a complete failure of the offset portfolio where one of the sites turns out to be unfeasible. Given the high uncertainty in offset feasibility in a Guinean context, bet-hedging is a sensible approach to reducing Project risks, and as discussed above it is has been specifically recommended for offsets involving great apes (Kormos *et al.* 2014). TBC recognises that establishing more than one site simultaneously could be complicated from a legal and governance perspective and may be more costly and time-consuming to implement. These considerations have not been investigated in this pre-feasibility study.

Use of multiple sites may not be necessary if a chosen offset site is so large that it is implausible that low success of offset implementation or external risks could eliminate offset gains across the whole site[5].

2.5.3 Time discounting

In this assessment, the offset are preliminarily anticipated to deliver a Net Gain in 18 years (see Section 2.4.3.4). This means that there will be a significant time-lag between potential impacts occurring and gains being fully delivered (BBOP 2012a; ICMM & IUCN 2013). In most cases, requiring production of gains before impacts (by implementing offsets before the impacts occur) is the best way to avoid or reduce temporal loss (Quétier & Lavorel 2011; BBOP 2012c; Pilgrim & Ekstrom 2014). However, this is not feasible for GAC where construction is imminent and operations planned from 2018. In this case, good practice is to discount future gains (in the same way that future income might be discounted in an assessment of Net Present Value of a company) (Overton et al. 2013; Gibbons et al. 2015). For a discount rate of 1%/yr, the

[5] In other words the offset site can be considered for more than one threat-based location for Chimpanzees by the definition of IUCN (2012).

multiplier is of about 1.2 in 20 years and for a discount rate of 3%/yr, the multiplier is of about 1.8 in 20 years.

Appropriate rates depend on the level of time preference but commonly used discount rates are around 3% (DEFRA 2012; Gibbons *et al.* 2015). An assessment of the impact of factoring temporal losses in the definition of GAC offset requirements (minimum size of the population in the offset site) is given in Appendix 1.

2.6 The importance of stakeholder engagement

Stakeholder engagement is a core good practice principle for offsetting. Chimpanzees are iconic animals that share a close evolutionary heritage with humans. As one of the highly threatened great apes, chimpanzees are a species of great international concern. Any project that has the potential to threaten their populations is therefore likely to receive high stakeholder scrutiny.

Given the significant levels of uncertainty with the available chimpanzee data (see Section 3) it would be prudent for GAC to seek feedback on an offset strategy with key stakeholders. Experience from elsewhere has demonstrated that a proactive approach whereby a company engages with key environmental groups and NGOs is the best means to address stakeholder concerns and minimise project risk. Two key, highly-reputable international stakeholders concerned with chimpanzees are:

- The IUCN Species Survival Commissions (SSC) Primate Specialist Group (PSG). Within the PSG, the **Section on Great Apes (SGA)** is specifically concerned with great ape conservation. The SGA provides technical advice on chimpanzee survival through a group of leading great ape scientists and conservationists.
- **The Great Apes Survival Partnership (GRASP)**, a UNEP/UNESCO initiative focused on the survival of great apes including chimpanzees. GRASP has identified the Fouta Djallon as a priority site for Western chimpanzee populations in Guinea and will take a special interest in any development activities within or in proximity to this area.

Stakeholder engagement can be undertaken through specific engagement with groups and/or through a Biodiversity Advisory Panel consisting of independent experts who can advise GAC on specific biodiversity related issues and provide ongoing support, review and input towards the implementation of its mitigation activities including offsets[6]. An independent specialist Panel has the advantage that it provides GAC with expert and open advice on managing risks and finding practical solutions, away from direct stakeholder scrutiny. It also has the added advantage of providing a means to engage a wider stakeholder community through the networks of those on board. Stakeholder engagement activities that have commenced during the pre-feasibility study are described in Section 6.1.2.

[6] For example, a similar panel was established for the Sakhalin Energy as a response to significant stakeholder concern associated with the impact of its operations on Western Gray Whales off Sakhalin Island in the North Pacific.

2.7 Assessment process

This assessment followed a 7-step process as shown in Table 5 below.

Table 5 : Outline of the process applied

Step		Approach	Outputs
1	Initial estimate of residual impacts on chimpanzees	• Review of WCF data • Consultations with WCF • Identify plausible without-Project (counterfactual) scenarios for chimpanzees, review with WCF and GAC team; • Review ESIA impact assessment on chimpanzees and identify impact scenarios (high, medium, low) for priority impacts (direct + indirect) • Map potential impact (buffers) and overlay impact maps with vegetation maps	Clarification of scale of risk for the project, based on estimate of impacts with existing (ESIA) mitigation measures, noting extent and principal sources of uncertainty
2	Assess feasibility of further on-site mitigation + offsets	• Brainstorm potential mitigation options with-Project team (inc. mine design team and communities team as well as environment team) and technical partners (esp. WCF and the Direction Nationale des Eaux et Forêts, DNEF). • Screen list of potential mitigation measures against feasibility criteria.	Set potential on-site mitigation measures, including potential on-site offsets, ranked by potential impact and feasibility
3	Evaluate residual impacts after on-site mitigation	• Update estimates of residual impacts based on most feasible on-site mitigation options • Include assessment of main sources of uncertainty and range of estimates	Assessment of requirement for off-site offsets and estimate of scale of net gains required
4	Screen potential off-site offset sites in region	• Develop short-list of potential off-site offsets, based on criteria set out in GAC's RFP and offsetting good practice, based on literature and input from key technical stakeholders (WCF, Sylvatrop, Guinée Ecologie); • Potential sites screened against ecological, technical, political and social criteria • Consideration of external risks (e.g. other ore deposits, planned dams or other major infrastructure development)	Ranking of potential offset sites, identifying the most promising options (preferred potential offset site(s))
5	Assess feasibility for preferred off-site offset site(s)	• Field visit to assess key threats and social and governance issues • Meeting with government and informed stakeholders to assess technical/political/legal feasibility (see Appendix for list of people consulted). • Assess sufficiency of potential order of magnitude of gains for chimpanzee conservation at each short-listed site.	Short-list of potential offset sites with reasoning for assessment of their feasibility
6	Plan implementation	• Map out main actions required for technical/ecological, social/governance, legal, financial, human resources, partnerships, stakeholders and communications aspects • Identify actions that are on critical path • Indicative calendar and estimate of resources required to bring to the implementation stage	Key actions identified Indicative timeline Estimate of resources required for implementation Main risks to implementation identified

Step		Approach	Outputs
		• Broad-scale risk assessment	
7	Develop monitoring and evaluation framework	• Define suitable types of indicators	M&E framework defined with indicative indicators

3 Baseline, additional mitigation and residual impacts

3.1 Baseline status of chimpanzees on the GAC concession

3.1.1 Population size

Chimpanzees are confirmed present on the GAC concession (WCF 2015c) (WCF 2015a). The population is likely to be contiguous with those in the CBG and RUSAL concessions (WCF 2015b) and chimpanzees almost certainly move across concession boundaries. This means it is more appropriate to talk about 'the chimpanzee population *using* the GAC concession' rather than 'the chimpanzee population *of* the GAC concession'.

WCF transect surveys estimated a population of 173 chimpanzees (143 weaned) using the GAC concession averaged over the 2010 to 2014 study period and using a 95% confidence interval (estimated number of weaned individuals ranged between 129 to 236 and estimated number of total adults ranged from 152 to 277 over the 4 years of data collection) (WCF 2015e). The confidence interval represents an estimate of the inherent variability in the data due to chance that is a feature of any sample-based counting process. However, there are potentially other sources of uncertainty and therefore reasons to be cautious about relying on the accuracy of these figures:

- The estimate is based on an non-stratified design that under-sampled key chimpanzee habitats, so the actual population may be greater (WCF 2015a).
- The considerable variation shown in annual population size estimates on the GAC concession may potentially be due to a) chimpanzee movements into and out of the concession, b) random variation or changes in observers, c) variations in annual timing of the sampling period (C.Boesch, *pers.comm*, February 2016).
- When properly implemented, the statistical method used (Distance sampling) is well-tested and reliable for estimating the numbers of signs counted (in this case chimpanzee nests) (Kühl *et al.* 2008; Buckland *et al.* 2010). However, there is significant uncertainty and potential for bias in converting estimates of nest density into a number of individuals. For example, key parameters are nest production and nest decay rates which may vary significantly between sites and between species of trees. As an example, about 1/3 of nests recorded by WCF on the GAC concession were in oil palm trees (WCF 2015d). There is some evidence that nests in oil palms may have quite different decay and reuse rates compared to nests in other trees, which could bias analyses that adopt production and decay rates from other sites (Sousa *et al.* 2011).

The point is not to criticise the WCF survey, which used an appropriate sampling technique, but rather to highlight that there remain many sources of uncertainty in the estimates of chimpanzee population size which are not necessarily reflected in the 95% confidence interval of the WCF estimate.

For the purpose of this assessment we have used the mean, upper and lower bounds of the WCF population estimate as a guide, but given the above caveats we caution against too much emphasis on exact numbers and suggest that planning for mitigation and offsets should proceed based on an estimate of 'several hundred' chimpanzees regularly using the GAC concession.

3.1.2 Habitat use and distribution

Chimpanzees are present across the concession, but almost all nesting and most feeding signs are in areas with large trees (WCF 2015c). For the purposes of this pre-feasibility study we described important chimpanzee habitat as gallery forest, wooded savannah and isolated forest patches. Two tree species (*Parinari excelsa* and *Erythropleum guineense)* were the most used, belonging to over 20% of nests surveyed on the concession between 2010 - 2014, but a further six tree species were also preferred for nesting. Forty different plant species were eaten according to food remains analysed and four of the most common trees in the concession represent 54% of species consumed during 2011-2012 study. *Daniellia oliveri* and *Parkia biglobosa* are mostly found in woody savannahs, *Elaeis guineensis* exists in cultivated areas and around villages and *Dialium guineensis* is widespread in fallows (WCF 2015c).

Bowal, grassland, cultivated lands and younger fallow areas may be used by chimpanzees on an occasional basis for specific resources, or as transit routes, especially where they contain patches of larger trees. Figure 8 shows the location of different habitats on the concession. The number and exact location of chimpanzee groups are not yet known.

Chimpanzees can nest and feed close to villages when they are not hunted (N.Granier. *pers.comm.*, January 2016). The proximity of villages and chimpanzees in this part of Guinea seems to have existed since historical times and thus chimpanzees may be locally adapted to this anthropogenic habitat (Leblan 2014).

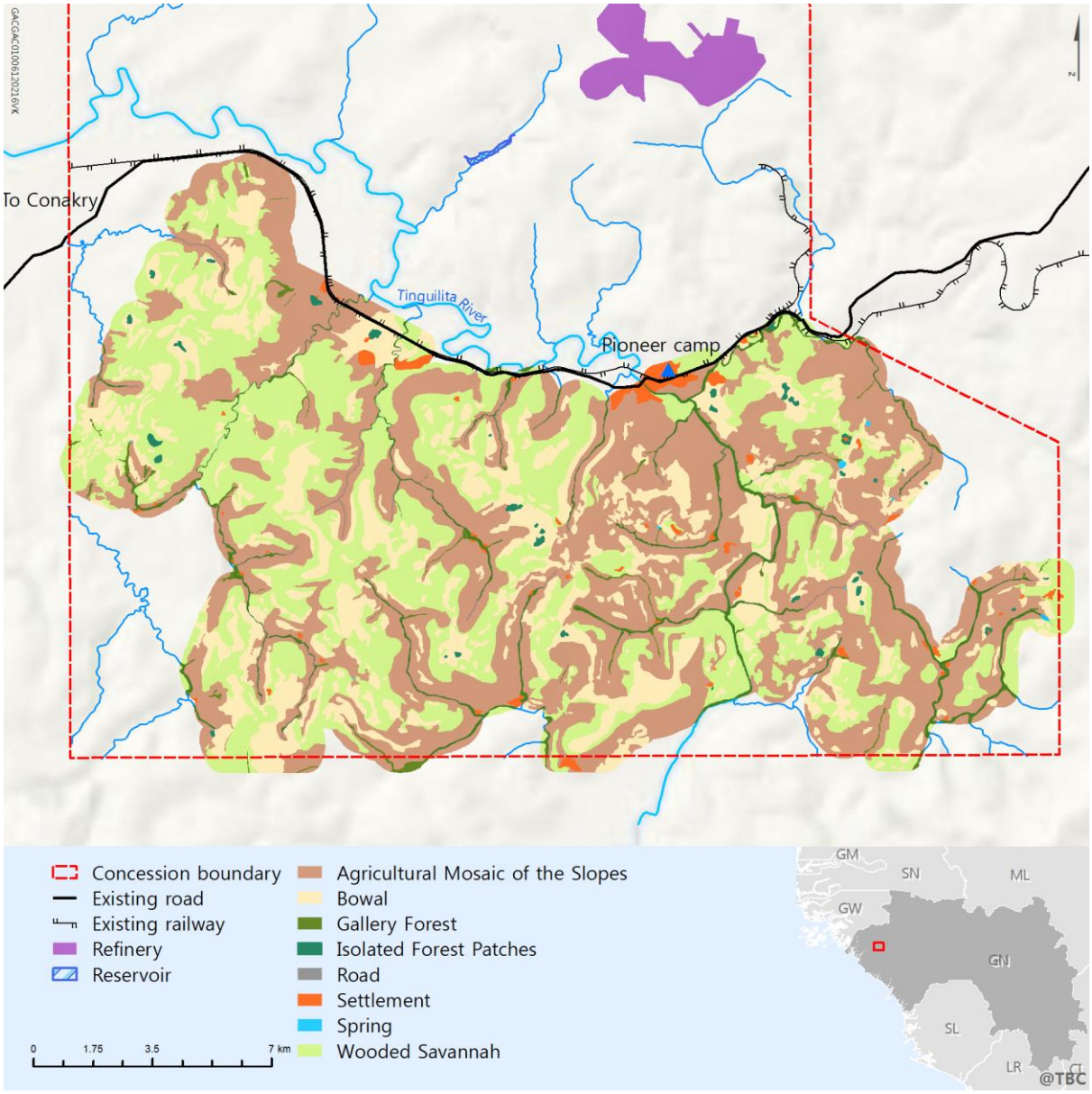


Figure 8 : Habitat types on the GAC concession

3.1.3 Current chimpanzee population trends

The population of chimpanzees on the GAC concession appears to have been largely stable over the period 2000-2014 (WCF 2015e). However, the confidence intervals of these surveys mean that it would be impossible to detect all but a very significant rate of change. Background scenarios of change rates of plus or minus several percent per year thus cannot be ruled out based on current data. The fact that chimpanzees seem to have been extirpated from areas in the wider landscape (Baarman *et al.* 2014) suggests that even if chimpanzee populations are stable in and around the GAC concession at present, declines may be probable in the near future even in the absence of the Project.

3.2 Potential impacts

The Project will have an impact on chimpanzees and their habitat (ERM 2015; WCF 2015a). The most significant potential impacts have been identified as:

- Habitat loss (directly due to Project footprint and indirectly (e.g. burning for agricultural activities);
- Habitat avoidance ('equivalent to loss/ degradation') due to disturbance;
- Habitat fragmentation;
- Increased hunting;
- Increased inter-group conflict; and
- Increased vulnerability to disease.

The potential scale of these impacts is reviewed briefly in the following sections, and an assessment of potential residual impacts is presented in Section 3.4.

3.2.1 Habitat loss

Habitat loss, either directly due to the disturbed footprint caused by the Project activities (mining or supporting infrastructure) or indirectly (e.g. due to an increase habitat destruction caused by agriculture expansion or fuelwood collection) will impact chimpanzees by depriving them of food, nesting sites or shelter, or routes between suitable habitat eventually leading to a population reduction. Direct habitat loss due to the Project activities can be assessed using an overlay of the planned Project infrastructure and vegetation mapping of the area. Indirect habitat loss is harder to predict either in quantity or location[7] but can be assessed qualitatively. An example of indirect habitat loss is from burning (burning for three different purposes were observed during a Project site visit: for grazing of livestock (cattle, goats and sheep); to clear the natural vegetation for agricultural activities; to facilitate hunting of birds and wild animals).

Chimpanzees' daily ranges vary widely within their territory[8] depending on seasonal food abundance, but a community tends to have a 'core area' (and sometimes multiple core areas) within their territory where they spend most of their time. Habitat loss within their core use areas can therefore be proportionally far more significant than the absolute amount of habitat lost would indicate (even where it does not result in inter-group conflict: Section 3.2.6). Conversely, if only a small portion (e.g. <5%) of non-core habitat is impacted, the actual effect on chimpanzees may be limited. In other words, % habitat lost may not be linearly related

[7] Modelling can yield quantitative estimates but they are highly dependent on the quality of input data and it was not feasible to develop such models for this assessment.

[8] Chimpanzee territories have been found to vary between 20 km^2 in dense, rich habitats to more than 100 km^2 in open habitats (WCF 2015c) and long term studies in Bossou in Guinea and Taï National Park in Côte d'Ivoire suggested territories of between 15-22$km^2$22 $km^2$22km^2 (WCF 2015c).

to % population lost. The consequences of this on habitat fragmentation and reproductive rates are discussed further in Sections 3.2.3 and 3.2.1 respectively.

3.2.2 Habitat avoidance due to disturbance

The most significant disturbance is likely to be noise, though light and dust may also have impacts. The predicted noise levels from general mine operations[9] (ERM 2015) are likely to exceed those that have been shown to have negative effects on many taxa (Shannon *et al.* 2015), while blasting noise and vibrations could even have a greater impact. Although studies that assess the noise impacts on chimpanzees have not been undertaken.

As chimpanzees have a long life expectancy, understanding long-term impacts from development activities such as mining is complex and challenging; there is limited information on long-term impacts available. It is difficult to predict how chimpanzees will respond to noise and other disturbances related to proposed mining activities in the GAC concession.

To assess the potential scale of disturbance impacts from noise, we therefore considered a range of scenarios of chimpanzee exclusion from habitat buffers of 0-500 m, 0-1000 m, 0-1500 m and 0-2000 m around noisy areas (mined pits and the plant area; roads were not included) (*Figure 9*). These are working hypotheses to estimate the potential scale of impact and only future monitoring will allow determination of the actual level of impact of noise from mining activities on chimpanzees. Although the GAC ESIA (ERM 2015) included noise modelling for the pits, roads and plant the data were not available at the time of compiling this report. This component of the assessment could be updated once data are made available; this would be most useful if accompanied by improved information on chimpanzee responses to noise.

[9] The main Project activities that will generate noise impacts (ERM 2015) (WCF 2015a) include:

- construction activities associated with process plant and road transportation, construction of water supply reservoir; general increased presence of humans;
- the processing plant, including crushing and screening, conveyor operation, train movement and loading, power generation;
- the operations at the mine pits, such as clearance of topsoil, blasting, excavation of bauxite and overburden, drilling, stockpiling and loading of ore onto haul trucks; and
- vehicle movements along haul roads from the mine sites to the processing plant.

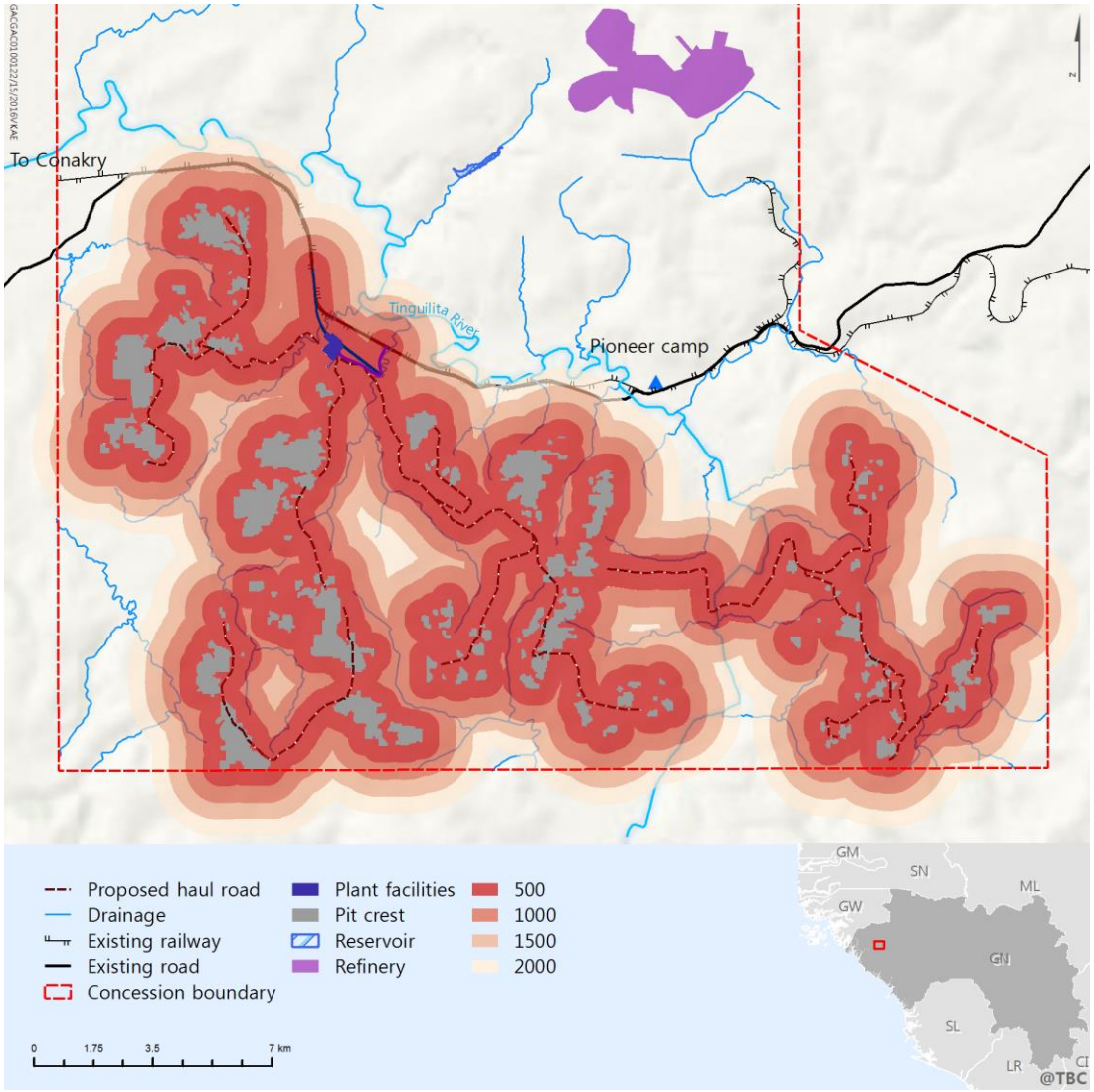
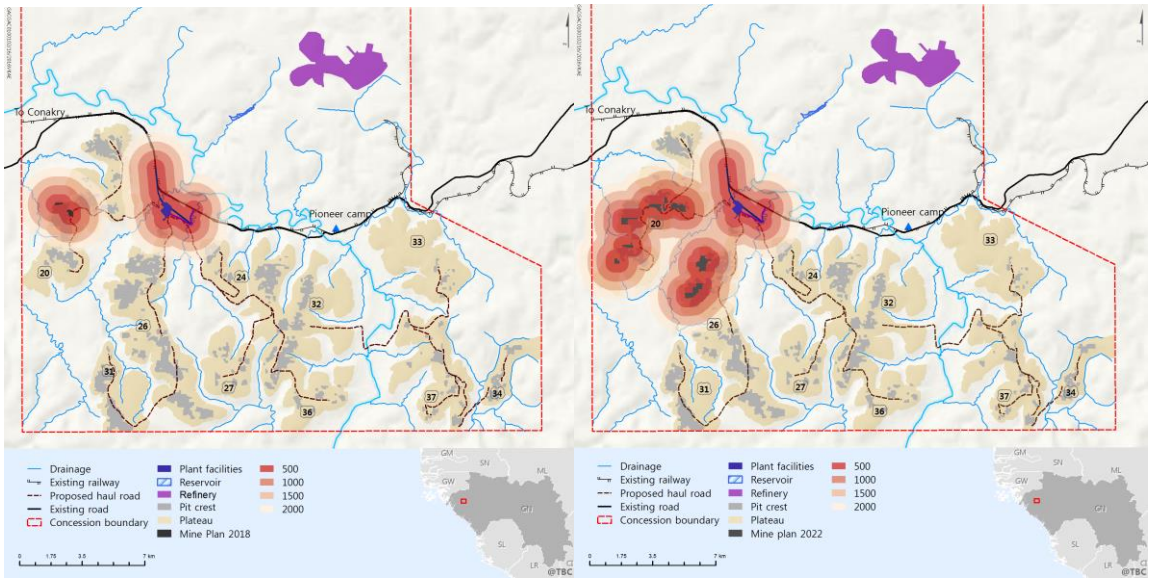
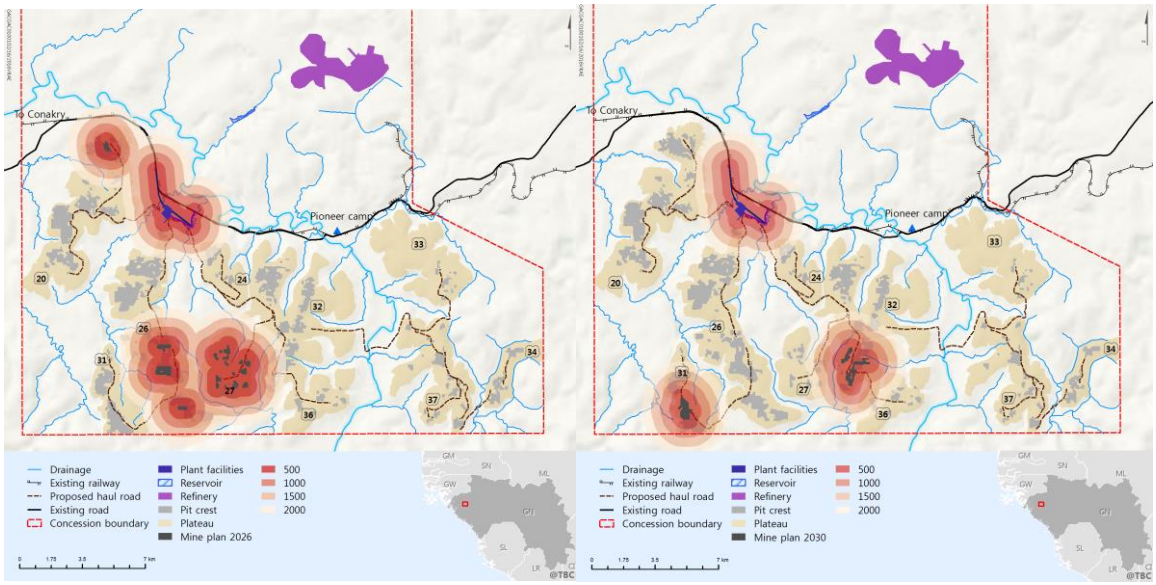


Figure 9 : Buffers of 500 m, 1000 m, 1500 m and 2000 m around planned mining areas over the 18 year Project Life used to assess potential indirect impacts of disturbance to chimpanzees due to noise. Mining areas will be operated in sequence and impacts were assessed according to planned activities at specific points in time (see Figure 10*)*


To Conakry
Pioneer camp
Drainage
Existing railway
Proposed haul road
Existing road
Concession boundary
Plant facilities
Reservoir
Refinery
Pit crest
Plateau
Mine Plan 2018
500
1000
1500
2000
To Conakry
Pioneer camp
Drainage
Existing railway
Proposed haul road
Existing road
Concession boundary
Plant facilities
Reservoir
Refinery
Pit crest
Plateau
Mine plan 2022
500
1000
1500
2000


To Conakry
Pioneer camp
Drainage
Existing railway
Proposed haul road
Existing road
Concession boundary
Plant facilities
Reservoir
Refinery
Pit crest
Plateau
Mine plan 2026
500
1000
1500
2000
To Conakry
Pioneer camp
Drainage
Existing railway
Proposed haul road
Existing road
Concession boundary
Plant facilities
Reservoir
Refinery
Pit crest
Plateau
Mine plan 2030
500
1000
1500
2000

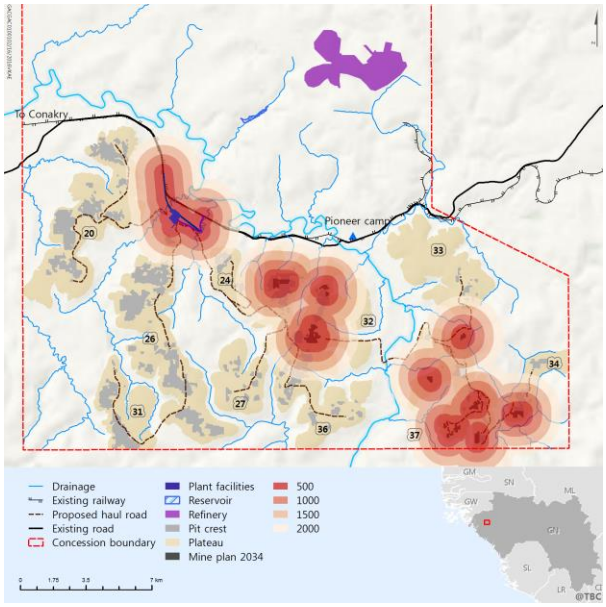


Figure 10: Buffers of 500 m, 1000 m, 1500 m and 2000 m around planned mining areas at years 2018, 2022, 2026, 2030 and 2034 used to illustrate potential indirect impacts of disturbance to chimpanzees due to noise at that particular point in time

3.2.3 Habitat fragmentation

Chimpanzee territories can vary from a few square kilometres to over 200 km^2 depending on the environment and distribution of resources (especially food, water and shelter). If chimpanzees are wary of crossing busy roads or large bare areas (such as a currently or recently mined zone) then they may not be able to access important resources within their territory (Nicolas Granier *pers. comm.* 2015). This can have a significant impact on their population size if it prevents them from accessing their core areas, where they spend the majority of their time. In such cases, the community may seek other suitable habitats (which may lead to damaging intergroup encounters, see section 3.2.6), and/or lack of access to important food resources may lead to starvation, a decrease in their reproductive success and eventually the death of some individuals. Over long timescales, it may also be possible that this community would become isolated, and that there would be no opportunities for female dispersal into neighbouring communities, leading to a decrease in genetic variability with possible consequences for individual and population health. Without a better understanding of how chimpanzees are currently using the landscape, this impact is best assessed qualitatively.

This impact is likely to be significant due to the cumulative impacts of numerous bauxite mining projects in the region (e.g. CBG and RUSAL) which may exacerbate disturbances and lead to greater loss of important chimpanzee habitat, potentially leading to greater inter-group conflict and higher residual impacts.

3.2.4 Increased hunting

Hunting and bushmeat consumption are common activities in Guinea (WCF 2015b). However, chimpanzees are less often hunted by local communities in the north and western parts of Guinea, compared to the southern forested portion of the country (Ham 1998). Religious beliefs in the predominantly Muslim north and west prohibit consumption of chimpanzees and other primates. However, chimpanzees are occasionally still hunted and can be sold as part of the international and Guinean pet trade. This trade usually involves targeting a female with a baby; it can have significant impacts on community size as several chimpanzees may die while trying to protect others in the group from hunters.

WCF's data collection on the GAC concession identified that primates represented only one tenth of hunted animals. The composition of species hunted reflected encounter rates, suggesting no particular targeting of primates or other groups. Based on the 16 hunters interviewed on the GAC concession it appears that hunting can earn an individual 2.5 times as much as the minimum wage. Although it seems that indigenous local communities in the Tinguilinta and the vicinity of the GAC concession do not often hunt and/or consume chimpanzees due to their local religious beliefs (WCF 2015b), there is evidence of a commercial bushmeat trade in and around Sangarédi and Boké (Ecology and Environment Inc & Kormos 2008; Manvell 2014). Even where chimpanzees are not specifically targeted by hunters, the use of wire snares can lead to significant levels of injuries or death. According to the ESIA (ERM 2015) bushmeat caught from within the GAC concession is mostly sold locally although 11% goes to Conakry.

Increased commercial hunting may be facilitated by the presence of mining since 1) in-migration of people from southern Guinea may create a larger local market due to an increase in people who are likely to eat primates, 2) mine infrastructure may increase access to previously remote areas and 3) increased local affluence might increase per capita consumption of bushmeat.

Anecdotal evidence suggests that human-wildlife conflict may increase when chimpanzee habitat is diminished and competition for food resources increases. In these circumstances chimpanzees may be forced into local villages, where they are sometimes killed if found repeatedly stealing food (e.g. bananas). An increase in job seekers may increase hunting pressure on chimpanzees remaining on the concession particularly if linkages with chimpanzee exporters for the pet trade are established.

3.2.5 Reduced reproductive success

Chimpanzees have a low intrinsic rate of population growth, even where it is not density-dependent. Average growth rate in the absence of human pressure is of the order of 1.65%/yr (Walsh *et al.* 2003)[10]. Since the rate of growth is so low, even small reductions can have a significant impact on population size over the long

[10] This figure was estimated in part from data from captive Chimpanzees and so may over-estimate the rate in wild Chimpanzees. Measured rates of reproductive success can vary significantly even between adjacent Chimpanzee groups at the same site.

term. For example, even within protected areas, chimpanzee reproductive rates have been shown to be sensitive to the quality of core areas of a group's range and groups with poorer-quality core areas may have a level of reproductive success that is below the replacement rate (Thompson *et al.* 2007).

Over the long term, reduced habitat quality (for example due to loss of access to food sources due to habitat clearance, fragmentation or disturbance) that results in a lower reproductive rate may therefore have impacts that are proportionally much greater than the proportion of available habitat impacted.

While there is some evidence that chimpanzees may be more adaptable to living in modified habitats than often supposed (e.g., Hockings *et al.* 2012; McCarthy *et al.* 2015) there is also strong evidence that even small scale habitat loss and degradation can have significant negative effects on chimpanzee populations over the long term (see the review by Muller & Wrangham 2014). This has significant implications for estimates of both impacts and of offset requirements since:

- Scale of impacts may not become apparent for a long time (one or more chimpanzee generations or 20+ years) after the proximal impact (habitat clearance, disturbance etc.) has occurred;
- Impacts could be very significant, especially over a time-scale of one or more generations;
- Impacts could last for a very long time, since chimpanzee populations cannot recover rapidly;
- Scale of impacts is extremely hard to predict, since they are very sensitive to even minor variations in the assumptions used.

3.2.6 Inter-group conflict

Significant mortality due to inter-group conflict is a natural part of chimpanzee behaviour (WCF 2015d; Wilson *et al.* 2014). In a natural setting, inter-group conflict is linked to territorial expansion and reproductive and survival strategies (Boesch *et al.* 2008; Wilson *et al.* 2012; Mitani *et al.* 2010) and in many cases interactions between groups are limited to acoustic encounters. However, where external disturbance forces a chimpanzee group to flee into the territory of another, significant mortality may result. This effect has most often been associated with industrial logging, resulting in population declines of 40-90% (White & Tutin 2001; Morgan & Sanz 2007). Inter-group conflict has not been studied in the context of mining, nor in the context of forest-savannah mosaic habitats like those on the GAC concession[11].

The probability of inter-group conflict occurring is hard to assess as it depends greatly on the extent to which chimpanzees are displaced from their current patterns of habitat use. However, the fact that it has occurred systematically in association with industrial logging implies that it is a real risk that should be considered. Inter-group conflict between chimpanzee populations inhabiting the northern parts of the GAC and CBG concessions may be exacerbated by the recently constructed RUSAL road (see also Section 3.6).

[11] Most studies showing population-level effects of increased mortality have been from continuous tropical forest habitats where Chimpanzees have smaller home ranges and the density of Chimpanzees can approach 1 individual/km^2, much higher than in Guinea. Whether this means that conflict may be less likely in lower density, wider-ranging populations in mosaic habitats is not known.

The population structure of chimpanzees on the concession is unknown; some WCF data indicates the presence of three distinct communities, however given chimpanzee fusion-fission community dynamics, whether these are distinct communities or temporal subgroups is unknown.

3.2.7 Vulnerability to stochastic events

Small populations are inherently more vulnerable to negative events, such as disease. This is particularly the case for species like chimpanzees with low population growth rates and so low capacity to recover from shocks. The longer time period for which populations remain small, the greater the risk. An anecdotal example in Guinea are the chimpanzees in Bossou who have seen their population decreasing from more than 60 to less than 10 individuals over a few decades despite not being hunted by the nearby human population (Mamadou Diallo *pers. comms.*, 18 January 2016). Smaller isolated chimpanzee communities are also more prone to a reduction of their genetic variability. This can lead to the expression of damaging recessive genes, as well as impair community-level resilience to environmental stress.

3.2.8 Increased spread of disease

Diseases can be transmitted from humans to chimpanzees and vice-versa. An increase in human activities related to the proposed mining activities can increase the chances of disease transmission. Chimpanzees are particularly sensitive to human respiratory diseases, such as the common cold, which can decimate populations (e.g. Tai NP). Chimpanzees can also be affected by naturally occurring diseases such as Ebola.

3.3 Potential mitigation actions

Given that potential impacts on chimpanzees have been identified, the first step of any offset plan is to verify that all feasible avoidance and minimisation actions have been implemented. We reviewed the actions planned in the ESIA (ERM 2015) and compared them with recommendations from WCF (WCF 2015a), other well-regarded ESIAs dealing with impacts on chimpanzees in Guinea (Rio Tinto Simfer S.A. 2012a, 2012b) and other guidelines for reducing impacts of industrial activities on chimpanzees (Morgan & Sanz 2007; Morgan *et al.* 2013; Arcus Foundation 2014). Potential additional mitigation actions were reviewed with the GAC teams to assess their feasibility and potential effectiveness. A summary of identified actions is listed in Table 6.

In addition to these actions, great ape specific guidelines developed for the Arcus Foundation (2014) recommend:

1. Making a specific public commitment to conserving apes and to transparent and regular evaluation of whether it is being achieved;
2. Designating a specific, named, individual as an 'ape champion' responsible for overseeing ape mitigation measures;
3. Ensuring broad awareness of ape conservation issues by integrating them into personnel inductions and training.

We recommend GAC implement these measures.

Table 6 : List of potential mitigation actions for chimpanzees, categorised by 1) ***actions that have been reviewed by GAC and accepted for implementation*** *2) actions that may be feasible and effective that GAC will investigate.*

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
1) Actions to be implemented				
Impact: Loss, degradation and/or fragmentation of important chimpanzee habitat Medium – area avoided is potentially a small % of overall chimpanzee habitat but may be critical to maintaining connectivity to other impartant chimpanzee habitat	Avoid any mining within 300 m of gallery forests, watercourses and headwater springs (WCF 2015a), and 500 m from the periphery of plateaus (ERM 2015).	Reduced loss and fragmentation of some important chimpanzee habitat. Maintenance of natural hydrology through preservation of headwater springs. Reduced disturbance by avoiding mining close to important chimpanzee habitat.	High – complete avoidance of important chimpanzee habitat and headwater springs is possible.	Some gallery forest exists on edges of plateaus where the plateau meets the gallery forest growing in 'valleys' and at the sources of streams on the plateaus. Although the direct gain in habitat through this avoidance measure will be relatively small (<1% of study area), the maintenance of chimpanzee corridors will facilitate continued access to the network of gallery forests on the concession resulting in a considerable overall gain. Further, preservation of the headwater springs is important for maintaining the hydrology of the watershed and associated habitats including gallery forest. In addition gallery forests are likely to contain key seasonal food sources.
Impact: Loss, degradation and/or fragmentation of 'important' chimpanzee habitat Low – area avoided is small % of overall chimpanzee habitat	Minimise by revegetating degraded areas of gallery forest and progressively restoring habitat on plateaus (e.g. wooded savannah decommissioned roads, around water supply	Reduced loss and fragmentation of important chimpanzee habitat by maintaining natural corridors for chimpanzees to move away from mining disturbance.	Low/Medium – Natural regeneration of degraded areas can be accelerated by planting native trees before commencing mining operations, providing important movement corridors for chimpanzees (WCF	Some gallery forests on the concession have been cleared for the planting of commercially viable trees and GAC plans to work with local community members to plant tree species, that were identified as eaten by chimpanzees, to restore natural vegetation (WCF 2015c). The chimpanzees are anticipated to benefit from the food source provided by these trees within 3-4 years however their utility value for nesting may only be appreciated by future generations of chimpanzees.

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
	reservoirs and burned areas (WCF 2015a)		2015a). The time taken for trees to reach fruit-bearing age and/or the appropriate height to enable their use for nesting will span chimpanzee generations.	WCF have already established a nursery of species used for chimpanzee feeding and nesting. Local community members will benefit from the reforestation projects An inititiave called Mise en Defence is active on the concession specifically in areas of slash and burn and have obtained commitment from community members not to go back and slash and burn. GAC plans to develop a 'Plateau Rehabilitation Plan', a 'Land Disturbance Procedure' and a 'Regional Sustainability Plan' (in collaboration with CBG and government) and will create seed funding and capital for the implementation of these plans. Commencing restoration of degraded forest corridors prior to mining operations may help retain movement corridors for the chimpanzees.
Impact: Loss, degradation and/or fragmentation of 'important' chimpanzee habitat Medium – area avoided is small % of overall chimpanzee habitat but may provide some key functions e.g. commectivity and/or nesting or food resources during dry season	Minimize new road construction and where possible realign new haul roads to avoid gallery forests, streams and preferred chimpanzee habitat (WCF 2015a). Develop a concept minimising access and extraction roads. Establish fauna valid corridors between	Reduced loss and fragmentation of preferred chimpanzee habitat including movement corridors.	Medium – Avoiding impacts to chimpanzee corridors is crucial for maintaining connectivity and access to habitat and food resources.	

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
	plateaus and along watercourses to allow chimpanzees displacements between plateaus, as presented in the ESIA (ERM 2015).			
Impact: Disturbance to chimpanzees due to noise and potentially inter-group conflict and stress and reduced reproductive rate Possibly high	Adapt the mining plan based on chimpanzee locations. Restrict blasting to afternoons only, once a day at same time. Follow IFC EHS guidelines for minimising noise levels	Potentially improve possibility for chimpanzees to become habituated to noise disturbance.	Unknown – untested for chimpanzees	The high density of chimpanzees in the vicinity of plateaus 20 and 26 suggests that noise activities may displace this chimpanzee 'group' for the duration of the mining activity (approximately 9 years). It is possible this 'group' may move /be temporarily displaced from its natural habitat either to the south or south east of the concession or south west outside the concession boundary. Predictable noises may cause less disturbance, though this is untested for blasting impacts on chimpanzees If successful could have a significant impact as could reduce the disturbance area and possibly reduce risks of pushing groups into each other's' territories. *Requires additional studies – modelling and field surveys*
Impact: Mortality of chimpanzees due to hunting Low – there is little evidence of chimpanzees currently being hunted, therefore this action is unlikely to make a major difference to the	Implement chimpanzee awareness and education programs and anti-poaching activities on concession. Establish and enforce no chimpanzee hunting	Reduce chimpanzee mortality due to influx of people and possible increase in hunting of chimpanzees	Medium – GAC can only enforce this on its own staff and contractors not all passers-by on its concession. The bus-in, bus-out of employees	Although the bushmeat survey on the GAC concession did identify that chimpanzees were hunted the quantities were minuscule (WCF 2015b). Therefore, the additional benefit, in terms of avoided chimpanzee mortality, is likely to be quite low. *Requires increased awareness and education of GAC staff.*

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
number of chimpanzees on the concession	ban by GAC staff and contractors. Forbid project workforce (including consultants) from hunting of bushmeat and purchase of bushmeat products (WCF 2015a).		may reduce the likelihood of this impact.	
Impact: Mortality of chimpanzees due to hunting Medium-High – hunting could be a significant impact over the long-term	Support control of illegal hunting and bushmeat trade within the concession via a public-private partnership	Reduced mortality from hunting	Medium-High - such projects can be highly effective but depend on significant political will	Current hunting threat low but an influx of non-indigenous communities may increase hunting pressure in the future. Public-private partnerships to control illegal hunting are becoming standard practice for certified logging in Central Africa and could offer a potential model (see Box 1), but are as yet un-tested in Guinea. Rio Tinto support for Pic de Fon Classified Forest is perhaps the closest model in Guinea.
Impact: Loss, degradation and/or fragmentation of 'principal' chimpanzee habitat Low over mine life as restoration will take very long. Potentially very important in the longer-term. Medium for improvement of connectivity	Progressive restoration of mined plateaus and roads including restoring indigenous tree species (preferably species used by chimpanzees) growing on undisturbed wooded savannahs	Minimise impacts on chimpanzee habitat by facilitating progressive rehabilitation and revegetation post-mining. Improve connectivity by restoring a continuous forest cover in valleys that	Low - over mine life as restoration will take a long time. The mined plateaus can only be revegetated once mining has been completed (5-7 years) and some pits may remain open due to in-pit storage of ore. Low for improvement of	It is thought that chimpanzees do not like to travel over open areas (Nicolas Granier, *pers.comm*s. 23 December 2015) therefore the mined-out bauxite pits may affect their movement across the area during the life of mine. If some of these mined pits can be rehabilitated and revegetated with preferred tree species this may encourage the chimpanzees to return to concession area post-mining. This could alter the accessibility of the entire concession post-mining. Removal of access/haul roads and restoration of a vegetation cover in key areas like gallery forests could

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
	Closure and rehabilitation of all roads and mine infrastructure following closure and decommissioning. Reinstate natural morphology and hydrology of landscape.	were crossed by roads.	connectivity as the establishment of a vegetation cover is only achieved in a few years and may only benefit future chimpanzee generations. High for Project decommissioning. ESIA says minor access roads to villages will remain open, to allow community access. If roads could be closed post mining this could potentially facilitate chimpanzee re-establishment on the concession.	improve significantly the connectivity of remnant of suitable habitat. Restoration of Bowal is not considered possible since Bowal habitat is directly linked to bauxite deposits (a topsoil layer often being virtually absent) therefore removal of the bauxite would remove the substrate on which the Bowal depends. *Requires understanding of chimpanzee movement patterns across* plateaus. *Requires understanding of use of chimpanzee resources (trees preferred for eating) and their location in vegetation mosaic on unmined plateaus. Requires revegetation trials.*
Impact: Indirect loss, degradation and/or fragmentation of 'principal' chimpanzee habitat	Ensure re-settlement and agricultural projects supported by GAC do not impact on preferred habitat for	Minimise impact on chimpanzee habitat caused by in-migration and clearing of land for	High – GAC can make this a condition of funding	The number of additional employees is considerable although GAC will bus the majority of its work force into the concession daily therefore the direct impact on chimpanzees and chimpanzee habitat caused by in-migration is likely to be low.

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
Probably low, but depends on scale of project envisaged.	chimpanzees. Control logging, particularly for charcoal. Support development of more efficient stoves (WCF 2015a) Implement a no wood cutting policy for all GAC staff and provide alternative/enhanced energy measures (WCF 2015a).	agriculture, cattle farming and charcoal production		
2) Actions to be studied				
Impact: Mortality of chimpanzees due to hunting Medium-High – hunting could be a significant impact over the long-term	Investigate: a) education outreach to communities to promote the conservation of chimpanzees. b) Organize the hunters under a regulation model (federation/ association, etc) (WCF 2015b). c) partnerships/support local and national	Reduce overall hunting activities on concession and lower likelihood of chimpanzees being hunted.	High – could eliminate chimpanzee hunting on concession	A distinction needs to be made between a) generic hunting (e.g. of cane rats) which is legal, has important social benefits, doesn't have huge ecological effects and is complicated to manage (due to the involvement of many people and vast areas making it harder to monitor) and b) illegal hunting of chimpanzees and other protected species which is of minor social/economic importance and can be managed through targeted enforcement. The priority for chimpanzees is intelligence-led enforcement with sufficient outreach and education. The purpose of the federation would be to ensure a profit for hunters, but to also ensure hunting is sustainable and does not target protected species. Quotas could be set and

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
	authorities (e.g. with OGUIPAR/Eaux et Forets) to improve law enforcement whereby controlling hunting and bushmeat trade (particularly for protected species). d) developing an eco-guard ranger program possibly also using trained community eco-guards			monitored for each species and hunting areas defined, allowing wildlife populations to recover on an annual basis, ensuring that wild meat is available the following year whereby reducing the impact on the wildlife.
Impact: Inter-group conflict + mortality Potentially High.	Adapt mining sequence over life of mine to avoid pushing chimpanzee groups together / restricting access to core habitat. Further investigate extent of on-site offset. Follow IFC EHS guidelines for minimizing noise levels (and as recommended in ESIA).	Minimize disturbance to chimpanzee groups, reducing inter-group mortality	Unknown – proposed as standard practice for certified logging, but has never been tested for mining	Adapting the sequence of mining over the Project Life to minimise pushing groups together and creating inter-group conflict. If mining can be in specified areas to avoid chimpanzee groups being pushed into each other's territories the overall impact of mining on chimpanzees could be considerably reduced. *Requires additional studies to determine location and use of space by chimpanzee groups which may take considerable time.*

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
	Limit traffic speeds to reduce noise.			
Impact: Disturbance due to noise Potentially High.	Investigate use of surface miners for pits near important chimpanzee habitat.	Reduced noise levels may reduce area from which chimpanzees are displaced by disturbance.	High – surface miners likely to significantly reduce peak noise levels	Surface miners avoid the need for blasting and may lower noise levels to within the normal operating range of other mining equipment. If blasts have biggest impacts on chimpanzees, this could significantly reduce area disturbed, particularly where mining in proximity to principal chimpanzee habitats.
Impact: Indirect loss, degradation and/or fragmentation of 'important' chimpanzee habitat Low-Medium. Reducing land clearing could have a positive impact on of 'important' chimpanzee habitat??	Establish alternative sustainable livelihoods	Minimise impact on chimpanzee habitat caused by in-migration and clearing of land for agriculture, cattle farming and charcoal production	Low – evidence is that such projects are rarely implemented with an appropriate design or at the requisite scale to significantly reduce hunting or agriculture	Although the number of additional employees will be considerable (Section 1.2) most of the workforce will be bused in daily. Therefore the direct impact on chimpanzees and chimpanzee habitat caused by in-migration is likely to be low. GAC would need to ensure that buses don't transport bushmeat and/or agricultural products.
	Compare habitat maps with lists of species used by chimpanzees for food and nesting. Refine map for habitat used by chimpanzees to highlight areas used for nesting ad feeding and overlay			Use the outcome of this assessment to re-establish food/tree sources based on the areas impacted and try to avoid these areas

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
	infrastructure map to establish areas of actual chimpanzee habitat lost			
Impact: Loss, degradation and/or fragmentation of 'important' chimpanzee habitat	Identify areas where people can farm off the concession as part of the Local Development Plan	Moving farming away from principal chimpanzee habitat will reduce direct habitat loss and associated impacts including disturbance and fragmentation.	Medium: Has the potential to significantly reduce overall impacts but social feasibility needs to be assessed further with communities and the government.	
Impact: Disturbance to chimpanzees due to noise and potentially inter-group conflict and stress and reduced reproductive rate Possibly high	Investigate use of surface miners	Surface miners can significantly reduce the noise associated with mining and thereby the overall disturbance area to chimpanzees.	Medium: magnitude of noise reduction needs to be assessed and quantified to determine the significance in disturbance reduction	
Impact: Loss, degradation and/or fragmentation of 'important' chimpanzee habitat	Establish chimpanzee crossings to maintain access between habitats, particularly galley forests (WCF 2015a).	Access between habitats can be maintained by creating natural corridors across roads, by creating overpasses at key sites along	Medium: effectiveness needs to be assessed but if successful, overpasses could help reduce fragmentation.	Effectiveness could be assess through camera traps to document which species are using them.

Impact addressed and potential benefit to chimpanzees/chimpanzee habitat over life of mine (High, Medium, Low)	Action (Avoidance or Minimisation Measure)	Potential benefit of action on chimpanzees	Potential effectiveness (High, Medium, Low)	Justification / notes
		chimpanzee movement routes.		

Box 1: Public private partnerships for reducing hunting impacts

Although poaching of chimpanzees is currently relatively rare within the GAC concession (WCF 2015b) (See Section 3.2.4) it has the potential to pose a significant threat to remaining chimpanzees in the future due to the potential expansion of the nearby Tinguilinta town associated with the influx of job seekers and possible increase in the number of non-Muslim residents and Guinea Forestière. Anecdotal evidence in Guinea suggests chimpanzees are sometimes killed by villagers when they compete for food resources or by hunters from other region of Guinea. There is also an existing market for the export of baby chimpanzees (c. USD 25,000). The likely increase in-migration associated with the Project and start-up of other nearby projects (eg CBG and RUSAL, east and north of GAC) may result in an increase in hunting pressure.

To minimise the impacts of chimpanzee hunting, GAC could catalyse the implementation of tighter controls on poaching by facilitating a partnership between mining companies, government agencies (e.g. OGUIPAR) and NGOs. GAC could provide logistical and financial support (including in-kind) in return for the assurance that a certain level of anti-poaching effort is conducted in their concession. Trained personnel to undertake anti-poaching patrols and road-checks would be provided by government agencies while NGOs such as WCS or WCF provided technical expertise and support in planning, implementing and evaluating anti-poaching.

Such public-private partnerships can be an effective means to help extend strong poaching controls across the landscape. Activities could include:

- *Surveillance of hunting activities through mobile patrols and at fixed access points along roads;*
- *Local educational activities to increase awareness on national laws on hunting and environmental issues and build community support for chimpanzee conservation;*
- *Monitoring and evaluation of changes in the distribution and abundance of hunted animals and the effectiveness of protection activities and awareness-raising activities.*

Similar partnerships for wildlife management are already in place elsewhere in Africa. In Gabon, a three-part collaboration was created in 2008 between a forestry company, the Ministry of Forest and Water and WWF in a partnership called PROLAB (Programme de Lutte Anti-braconnage et de Gestion de la Faune). The objective of the partnership is to fight poaching and protect wildlife in the periphery of two national parks, mainly consisting of several oil exploration permits and forestry concessions. In 2015 the partnership was expanded to include five oil producing companies and tackle illegal hunting at a landscape scale.

In Congo, the PROGEPP (Projet de Gestion des Ecosystémes Péripheriques du Parc) partnership has been operating since 1993 to undertake research and help reduce poaching within a buffer zone around the Nouabalé-Ndoki National Park. This is also a public-private partnership involving WCS, a forest company and the Ministry of Forest Economy and Sustainable Development.

In both these two examples, the SMART Spatial Monitoring and Reporting Tool software package http://www.smartconservationsoftware.org/ is used to plan and track effort and ensure accountability.

Such public-private partnerships typically receive wide stakeholder support and buy-in so can be an effective means for a company to stay engaged with regional conservation initiatives and reduce project risk.

A project in Guinea could start at the scale of the GAC concession, and later expand to neighbouring concessions such as CBG and RUSAL as and when those projects are ready to do so. The lessons learned from PROGEP in Congo show that landscape level expansion would allow significant mutualisation of efforts, improve effectiveness and create an economy of scale for costs. Government support and active participation would facilitate a region-wide initiative. In the absence of a regional initiative the positive actions undertaken by one company may be undermined by the actions of neighbouring mining companies.

3.4 Residual impacts

The estimated residual impact of the Project on chimpanzees and their habitat was calculated, taking into account mitigation actions (avoidance, minimisation and restoration). Table 7 provides a summary of expected residual impacts. Where possible, the magnitude of the impacts is provided as an estimated percentage of loss of important chimpanzee habitat'[12] in the southern portion of the concession or total population within the entire GAC concession (as population size estimates were only available for the entire concession). The scale of the residual impact was assessed either through a GIS-based impact analysis or using information from existing studies from the Project. The analysis shows that there are currently limited additional mitigation measures that could reduce residual impacts further.

Where there is no clear evidence to support a quantified impact assessment, the impact scale is presented on a scale from 'low' to 'medium' to 'high'. Where impacts are perceived to be 'low', ongoing monitoring and evaluation will help confirm whether planned mitigation actions are effective and whether additional mitigation actions are required. Impacts assessed as 'medium' or 'high' will require further assessment, as they could potentially influence the scale of chimpanzee losses and therefore the gains required through the offset.

Additional reasons for taking a precautionary approach to the scale of residual impacts include:

- The number of communities (groups) is unknown;
- The territory size of a community is unknown;
- Location of core areas within the territory is unknown; and
- Chimpanzee population size estimates vary substantially between years.

The estimates of residual impacts from each source presented in Table 7 below are not necessarily additive (e.g. most habitat clearance is likely to fall within an area likely to also be disturbed by other impacts), but may in some cases combine additively or even multiplicatively where, for example disturbance results in inter-group conflict **and** reduced reproductive rates. In this context, using a single estimate of residual impact is not appropriate. Instead we use a range of scenarios of 50-70% loss of population, which we consider to be 1) consistent with the available data and 2) likely to be considered reasonable by informed expert stakeholders. A lower scenario for impacts is also possible if it turns out that chimpanzees adapt more quickly to noise disturbance than anticipated, but given the possibility that inter-group conflict and reduced

[12] 'Important' chimpanzee habitats were considered to be: all forested habitats including galley forest, isolated forest patches and Wooded Savanna using the vegetation type categories established by the GAC ESIA (ERM 2015). Bowal was not considered 'important' chimpanzee habitat for nesting and/or feeding although it is recognised that by excluding Bowal we may be underestimating the impact since this habitat is still used tfor crossing between forest patches on the plateaus and therefore the loss of Bowal due to mining of the pits may cause other impacts such as reduced access to important habitats, which in the long-term could reduce reproductive success.

reproductive success could have very significant impacts, we feel that such a scenario would not be considered appropriately precautionary by stakeholders.

We note that while there are some studies that indicate that chimpanzees can adapt to anthropogenic disturbances (Hockings & McLennan 2012; Hockings *et al.* 2015; McCarthy *et al.* 2015), there remains a possibility that impacts could lead to a complete loss of the viability of the chimpanzee population(s) on the GAC concession.

Table 7 : Summary of potential residual impacts on chimpanzees

Impact type	Potential scale of residual impact	Source / Justification	Potential for further mitigation
Direct loss of habitat	c.7% of important habitats	GIS overlay of planned mining footprint (inc. haul roads, pits and plant)[13] with vegetation-type map. GAC has already taken into consideration the 300 m buffer proposed by WCF (WCF 2015a). The Project ESIA recommends a minimum "buffer" of 300 m to protect headwaters and springs feeding gallery forest, as well as 500 m from the periphery of the plateaus (ERM 2015). GAC have committed to a 50 m "no go area" for head waters, and 100 m for ecologically sensitive zones. The mining plan and infrastructure layout design have attempted to avoid and minimise surface disturbance on the 300 m buffer zone. However due to resource requirements it is not considered feasible to sterilize any ore currently identified in the mining plan. The infrastructure layout currently has a direct impact on: 2 ha of galley forest and 74 ha of wooded savannah inside the 300 m buffer; and 4 ha of isolated forest patches and 1554 ha of wooded savannah outside the 300 m buffer. This equates to 0.2% of galley forest, 5% of isolated forest patches and 16% of wooded savannah habitats on the concession.	TBC have made reccommendations for further avoidance and minimisation of direct disturbance (for example by realigninging haul roads so that they do not impact gallery forest and isolated forest patches). GAC will work with their mine planning and engineering teams to incorporate, where feasible, these additional recommended mitigation measures into future iterations of the infrastructure layout and mining plan. This may reduce the direct impacts on important chimpanzee habitat to negligible within the 300 m buffer.
Loss of habitat due to disturbance	c.45-82% of important habitats in the southern part of the concession. These	GIS overlay of noise buffers (500 m, 1000 m, 1500 m and 2000 m) with habitat map. At the lower limit e.g. for the 500 m 'noise buffer': 28% of gallery forest, 62% of isolated forest patches and 44% of wooded savannah (on average 45% of important chimpanzee habitat) may be 'lost' (avoided by chimpanzees due to noise disturbance) for the southern portion of the concession over the 20 year Project Life. Similarly at the upper limit of the 2000m 'noise' buffer: 88% of galley forest,	Incorporating the data from ESIA noise modelling may result in a reduction in the estimated indirect impact on important chimpanzee habitat. GAC intends to investigate noise mitigation measures e.g. use of surface miners.

[13] Disturbed footprints of infrastructure components: plant – 33ha, pits – 2826ha over 20 year Project Life, haul roads (25m wide) – 228ha, plant access roads (25 m) – 9ha, plant access railway line (15 m) – 9ha.

Impact type	Potential scale of residual impact	Source / Justification	Potential for further mitigation
	percentages may not relate directly to the proportion of chimpanzee population loss.	79% of isolated forest patches and 79% of wooded savannah (on average 82% of important chimpanzee habitat) may be 'lost'. This does not take into consideration 'real noise impacts that were modelled in the ESIA since this data was not available at the time of writing this report. The assessment also does not take into consideration the timing of noise disturbances which will be staggered in both time and space as the the 10 pits are mined over the 20 year period. Early evidence from camera trap data collected by Sylvatrop on CBG's South Cogon concession indicates some chimpanzee presence at <1000 m of mined areas, possibly suggests some degree of tolerance to mining by chimpanzees. However, there is limited evidence on the distance of noise disturbance experienced by chimpanzees. Some evidence exists that chimpanzee vocalizations and drumming, which serve to communicate within and between communities, can be heard up to 1 km away within a forest environment (Crockford & Boesch 2005), but this distance can be up to 2 km in a more open environment (Piel 2014) like Guinea (although this is also influenced by topography). The upper limit for noise disturbance has therefore been selected as 2000 m. It is not known how much disturbances from noise the chimpanzee population will incur. However, it is assumed that the disturbances in important chimpanzee habitat will be reduced as the distance from the noise source increases. It is therefore assumed that chimpanzees could be less affected in the furthest buffer (1500 m-2000 m), and thus these percentages are not directly related to percentage loss of the chimpanzee population.	Data collection on real chimpanzee responses to noise impacts on plateau 20 in the first two years of mining could assist in refining the estimated disturbance on important chimpanzee habitat.
Inter-group conflict + mortality	25-75% population loss	The number of chimpanzee groups and their locations on the GAC concession has not yet been established. The current territory size of chimpanzee groups on the GAC concession and in relation to mining activities also still needs to be determined. It is however, well known that chimpanzees aggressively defend their territories; if a group or some individuals are forced into the territory of a neighbouring group (e.g. by mining disturbance) significant mortality may result.	Careful mapping and planning of operations, in collaboration with a chimpanzee expert, to avoid pushing chimpanzee groups together might significantly reduce the risks. Such planning would require extremely detailed surveys to understand group use of the area, combined with an extremely flexible approach to planning and implementing mining activities.

Impact type	Potential scale of residual impact	Source / Justification	Potential for further mitigation
		Although there is currently no data available on impacts of mining; population-level estimates for logging suggest 40-80% loss of an entire population. Early evidence of camera trap data from CBG's South Cogon concession indicates chimpanzee presence at <1000 m of currently mined areas and some chimpanzee nests occur <500 m (Nicolas Garnier. *pers. comms*, 28 December 2015). Sylvatrop's surveys on CBG's concession possibly suggest noise disturbance may not always force chimpanzee groups to displace however this would require further investigation.	
Indirect loss/degradation of habitat (agriculture)	Medium	An influx of the Project workers and opportunistic migrant workers will likely coincide with increased agricultural activity, leading to habitat loss and degradation. Increased agricultural activity has already been taking place by c.0.6%-0.9% per year within the GAC concession (WCF 2015a). It should be noted that current agricultural practices rarely completely remove forest and can occasionally provide food trees (e.g. oil palm) in gallery forest and older fallows.	Implement policies to ensure the Project workforce is not cultivating on important chimpanzee habitat. Ensure all staff and families are aware of policies and monitor adherence. Ensure that agricultural (i.e. livelihood restoration/compensation/resettlement) initaitives GAC is supporting are not impacting on important chimpanzee habitat. These measures need to be fully integrated into the Project's in-migration management and Local Development Plans.
Indirect loss/degradation of habitat (fuelwood)	Medium	Surveys indicate the demand for charcoal is increasing (WCF 2015a). The Project is expected to bring in between 2,000-3,000 migrant workers and their families (WCF 2015a). Without adequate mitigation measures in place, this influx of people could significantly increase demand for fuelwood, resulting in habitat loss and degradation.	Implement measures to mitigate increased demand for firewood by the Project workforce. Measures include improved, efficient stoves, solar stoves, and alternative wood sources. Promotion of improved stoves for cooking and of community management of forest could possibly reduce the local demand in the long run. Creation of woodlots for communities away from 'principal' chimpanzee habitats is another option that may be worth investigating. These measures need to be fully integrated into the Project's In-Migration Management and Local Development Plans. Both these options are likely to require much more than 10 years to deliver significant changes so are unlikely to reduce impacts.
Habitat fragmentation	Medium	Small isolated forest patches (of for example galley forest and or wooded savannah) in mined areas may serve as 'stepping stones' between larger habitat patches. Existing or new roads across these isolated forest patches may reduce the connectivity through these movement corridors across the landscape and/or	Limited. Progressive rehabilitation of mined areas to restore patches and of access/haul roads where crossing gallery forest is a potential long-term strategy but unlikely to reduce impacts significantly before end of mine life.

Impact type	Potential scale of residual impact	Source / Justification	Potential for further mitigation
		eliminate access to key and perhaps scarce resources. The importance of connecting habitat such as Bowal has not yet been assessed.	Revegetate previously forested areas and already degraded areas (prior to mining) as part of community development initiatives.
Increased hunting	Medium	Chimpanzees are rarely hunted by indigenous communities in this part of Guinea and nests can be found close to villages. However, there have been reports of hunting by people coming from Guinée Forestière, and killing of chimpanzees by villagers can occur where limited resources forces chimpanzees to steal fruits (e.g. bananas). An existing export market exists for the sale of baby chimpanzees (for ~US$ 25,000 to China). A bushmeat commodity chain exists in Sangarédi and Boke, supplying areas further afield and GAC roads may increase access to currently quite isolated areas. Further, the increase in people seeking employment opportunities who have no source of income may see hunting as a quick way of making money.	According to the GAC ESIA (ERM 2015): a) bushmeat hunting and purchase of bushmeat products by the Project workforce will be forbidden; b) GAC's code of conduct will require workers to refrain from purchasing sensitive species of bushmeat from third parties; c) workers employed for the Project and local communities will be made aware of the implications of hunting sensitive bushmeat species through GAC's community engagement program. In addition the implementation of a successful public-private partnership to prevent hunting could reduce impacts significantly especially if done in conjunction with neighbouring concessions (See Box 1).
Stress and reduced reproductive rate	Unknown, possibly highly significant (>50% population decline) over a longer time-scale (e.g. 35-40 years or 2 chimpanzee generations)	Studies of habituated chimpanzees show lower reproductive rates in poorer-quality core areas or in times of stress (e.g. due to noise or due to inter-group conflict). Given low initial rate for chimpanzees, reproductive rates can fall to well below replacement rate when they are stressed.	As for inter-group conflict and habitat loss due to disturbance above.

3.5 Duration of impacts

Best practice is to ensure a Net Gain is achieved and maintained for as long as the impacts occur. Irreversible impacts would mean an offset in perpetuity. As a preliminary reference for GAC about how long an offset would need to be maintained, the time necessary for the remaining population of chimpanzees to recover at the level pre-Project in the concession was estimated.

An indicative period of 35-40 years was estimated (see Figure 11) on the basis of the 'Conservative' 'scenario of impact' (see Table 9) and using assumptions listed below:

- Initial estimated population on the concession of 217 chimpanzees;
- 45% of initial population is impacted by the mine (i.e. 98 chimpanzees) leaving a remaining population of 119 chimpanzees on the GAC concession;
- Population recovery at maximum natural growth (estimated at 1.65%/yr), i.e. no threats on chimpanzees after operations,
- No discounting for time preference.

We note that *maintaining* a Net Gain theoretically requires a much lower conservation effort at the offset site than progressing towards a Net Gain, especially since residual losses should decline over time given the assumptions above.

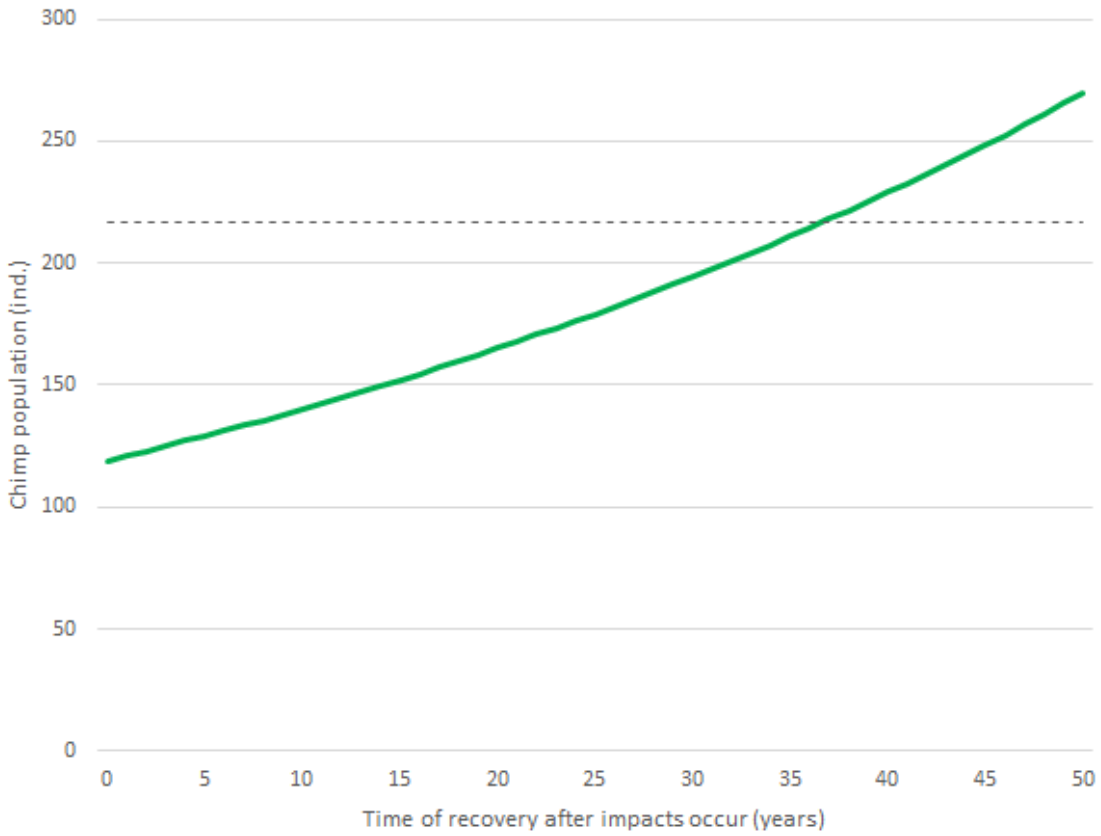


Figure 11: Population recovery at natural growth rate from remaining population after operations. Even in the absence of external pressures (e.g. hunting), it would take more than 35-40 years for a population of 119 chimpanzees that was reduced by half to recover to its initial size. The actual time is likely to be much greater due to stochastic fluctuations in population size and there would be a significant possibility of a population crash that might prevent recovery at all.

3.6 Cumulative impacts

The GAC concession is almost completely surrounded by other potential bauxite mining projects (Figure 12).

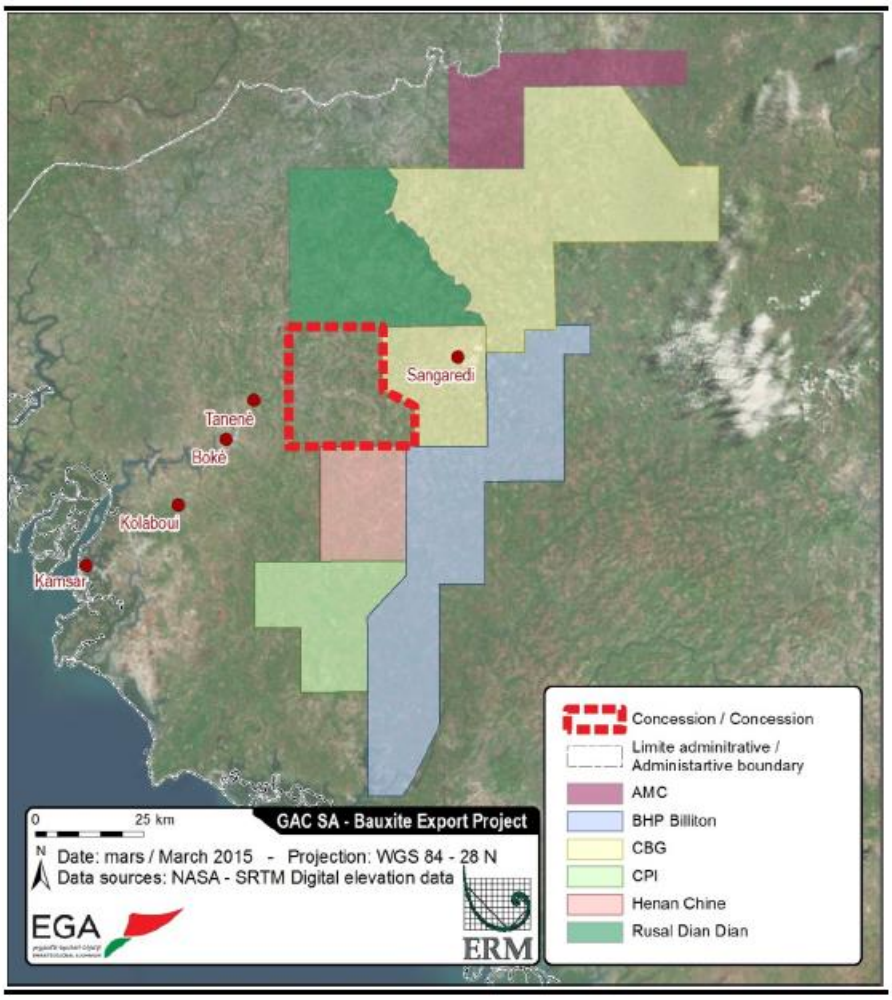


Figure 12: Bauxite mining concessions adjacent to the GAC concession (sourced from GAC ESIA, (ERM 2015)

The GAC ESIA (ERM 2015) included a brief cumulative impact assessment of adjacent mining concessions: Compagnie des Bauxites de Guinée (CBG), Compagnie des Bauxites de Dian Dian (COBAD, a subsidiary of RUSAL), China Henan International Cooperation Group (Hereafter Henan) Boke permit area (future project), China Power Investment Corporation (CPI), Kabata – Alcoa/Rio Tinto Alcan, BHP Billiton and Koumbia-AMC Although CBG (located immediately east of GAC) is the only active mining project RUSAL, located north of GAC, is in the process of developing a road through the CBG concession to transport its ore to Conakry. Most of the other concessions are between 3-8 times larger than the GAC concession. Since the majority of these projects are still in the concept stage, coupled with the current global economic down-turn, it is unlikely that they will all proceed simultaneously within the 20 year Project life. However, even if one goes ahead the impacts identified for GAC could be greatly exacerbated.

The ESIA (ERM 2015) highlights some potential cumulative impacts on chimpanzees and suggests recommendations of how these could be addressed:

- **Increased intergroup conflict**: due to the high territoriality of chimpanzees groups' interactions are expected to be significantly affected by cumulative impacts potentially leading to intraspecific territorial disputes and direct loss of individuals. For example the construction of haul roads and/or other infrastructure, such as the RUSAL road that is in the process of being constructed in the Boulléré area, is likely to fragment chimpanzee habitat and have both direct and indirect impacts on the population thought to inhabit this portion of the concession. The road may split this chimpanzee population and could have numerous knock-on effects including possible increased inter-group conflict between populations in the north of GAC and CBG concessions, reduced access to chimpanzee food resources and nesting sites causing possible lowered reproductive success leading to population decline. In addition the road may increase access for hunters.
- **Habitat loss and fragmentation of wooded savannah**: is considered a moderately significant cumulative impact and the influx of people to the area caused by the various mining projects is likely to exacerbate this impact due to clearing (burning) of land for agricultural activities, livestock grazing and hunting activities. These nearby concessions will likely limit the future availability of natural habitat for chimpanzees to access should they be forced off the southern portion of the GAC concession by direct and indirect impacts associated with the Project.
- **Applying the mitigation hierarchy**: GAC should liaise with concerned operators and appropriate Guinean authorities to address these impacts in an integrated manner as noted in its mitigation strategy for biodiversity impacts and in the Social and Environmental Management Plan (SEMP).
- **Aggregated offsets**: to limit these impacts other mining projects should implement similar mitigation measures to GAC including offsetting schemes.

These cumulative impacts have a number of implications for the GAC Project:

- Since the chimpanzees that use the GAC concession almost certainly also use areas outside the concession (WCF 2015b), they could decline even if the concession area is well-managed for chimpanzees by GAC, potentially leading to GAC being associated with impacts that are not of its causing;
- GAC cannot rely on supposedly suitable habitat surrounding its concession to provide refuge for chimpanzees that are displaced due to habitat loss, fragmentation and /or disturbance, aside from possibly the area to the south-west which does not currently comprise a mining concession and potentially contains suitable chimpanzee habitat.
- Development of any of the neighbouring bauxite projects may create access routes allowing easy access to areas that are difficult to access via GAC's road network, so increasing the risk of hunting;
- The construction of haul roads and/or other infrastructure on CBG's South Cogon concession, such as the RUSAL road currently being constructed in the Boulléré area, is likely to fragment the population thought to inhabit this portion of the concession. This may have numerous knock-on effects including possible increased inter-group conflict between populations in the north of GAC, CBG and RUSAL concessions, reduced access to chimpanzee food resources and reduced access to nesting sites, causing possible lowered reproductive success leading to population decline. In addition the road may increase access for hunters.

- Mining in proximity to GAC's concession may displace chimpanzee groups onto GAC's concession, further exacerbating the impacts identified for the Project and perhaps adding additional unforeseen impacts.

In summary this means that the overall success of on-site mitigation efforts will depend in large part on whether cumulative impacts can also be reduced.

This does however also create opportunities for GAC:

- Public-private partnerships to reduce hunting are most often effective when implemented at a landscape scale (see Box 1);
- Land use planning (focused on protecting most-used chimpanzee habitats) and education and awareness initiatives (highlighting the value of natural habitat to chimpanzee survival) could be undertaken in collaboration with neighbouring project developers to facilitate effectiveness and prevent negative unforeseen impacts from neighbouring concessions.
- Any of the neighbouring bauxite projects may also need to invest in chimpanzee offsets so there may be a potential for aggregated offsets that may have advantages in terms of effectiveness and economies of scale. Although TBC understands that neighbouring projects are generally in competition with each other there are opportunities for cost-savings and technical learning if these companies collaborate.

While GAC cannot depend on the actions of other companies, being aware of their potential needs when considering mitigation and offset options may be appropriate to ensure opportunities are not excluded.

3.7 Conclusion and summary offset requirements

Chimpanzees are confirmed present on the GAC concession, with chimpanzee presence signs having been recorded throughout the entire concession (WCF 2015a). Although GAC has identified a number of further potential mitigation measures, measurable adverse residual impacts are likely. Specific features of chimpanzee ecology (low population growth rate) and behaviour (inter-group conflict) could mean that relatively small absolute residual impacts could result in very significant impacts over the long-term. These impacts are impossible to predict with any certainty, so we therefore use three scenarios (defined as 'optimistic', 'conservative' and 'worst-case' scenarios) to assess offset requirements (Table 8). Population loss varies from an estimated 30% to 60% (equivalent to an estimated 50 to 160 individual chimpanzees) for the 'optimistic' to 'worst-case' scenarios respectively.

Table 8 : High, medium and low scenarios for impacts on chimpanzees on the GAC concession.

Assumptions (Scenarios)	'Optimistic'	'Conservative'	'Worst-case'
Initial population size in the concession (all ind.)[114]	173	217	277
Proportion of population impacted (%)[15]	31	45	58%
Impacted population (all ind.)	**54**	**98**	**161**

Based on this assessment of potential residual impact, we estimated the offset requirements as being the minimum chimpanzee population required at the offset site(s) to generate enough gains to achieve a Net Gain under the set of assumptions discussed in Section 2.4 and summarised in Table 9. Estimated offset requirements vary according to the three scenarios of impacted population detailed in Table 8. Additional details on the calculations are given in Appendix 1.

Assumptions used for calculations were based on the literature and as much as the present study enabled, on expert opinion. Ultimately, the calculations, and more generally the exchange proposed by GAC, should be validated with relevant stakeholders to check the offset is deemed fair and to limit the risk of criticism that could undermine the effort made by GAC to conserve chimpanzees.

Given the sensitive nature of chimpanzees and the uncertainty in the size of the affected population (Section 3.1) andthe scale of impacts (Sections 3.2-3.4) we propose that GAC continue offset planning based on the 'conservative' scenario. Factoring in uncertainty in the effectiveness of offset delivery and requirements for time-discounting (Section 2.6) this leads to a requirement to protect a population of at least c.1130 - 3615 chimpanzees (Table 9). This can then be scaled down as and when monitoring confirms that impacts are less than expected OR scaled up if impacts turn out to be worse than expected.

[14] Initial population size estimates are taken from WCF as follows: 'Optimistic' scenario is mean estimated number of individuals (2010-2014), 'Conservative' scenario is the mean upper limit to the 95% confidence interval (2010-2014), and the 'Worst-case' scenario is the population size estimate for 2014.

[15] The proportion of the population impacted on the concession was calculated by estimating % of population impacted in the north of the concession (for the 'Optimistic':20%, 'Conservative':25% and 'Worst-case': 30% scenarios) and south of the concession ('Optimistic':40%, 'Conservative':60%, 'Worst-case':80% scenarios) and then weighting these impacts in accordance with area in the north which covers 44% of the concession and the area in the south which covers 56% of the concession. Impacts in the north took cognisance of the water supply dam and Refinery footprint and indirect impacts associated with movement of chimpanzees nothwards leading to possible inter-group conflict, increased hunting and impacts extending beyond the concession boundaries. Impacts in the south took cognisance of the upper and lower limits of the potential disturbance impacts and other direct and indirect impacts.

Table 9 : Estimation of offset requirements

Assumptions (Scenarios)	'Optimistic'	'Conservative'	'Worst-case'
Losses (all ind.)	54 **(31% impact on population of 173)**	98 **(45% impact on population of 217)**	161 **(58% loss of population of 277)**
Natural population growth without threats (%/yr)	1.65		
Net population growth with existing threats WITHOUT offset (%/yr)	-1.00		
Effectiveness of conservation actions to reduce threats (%)	50		
Net growth rate WITH offset (%/yr)	0.3		
Recovering population?	Yes		
Duration to achieve a NG (year)	20		
Minimum starting population required at offset site to achieve NG within 20 years WITHOUT uncertainty multiplier (ind.)	**208**	**392**	**667**
Multiplier to account for uncertainty of estimated losses and gains	**3**	3	**3**
Minimum starting population required at offset site to achieve NG within 20 years WITH uncertainty multiplier (ind.)	**625**	**1176**	**2001**
Multiplier to account for time lag between impacts and gains based on discount rate of 3%/yr over 20 years	1.8		
Minimum starting population required at offset site to achieve NG within 20 years WITH uncertainty and time lag multipliers (ind.)	**1129**	**2124**	**3615**

4 Options for on-site offsets and set asides

4.1 On-site offsets

Options for on-site offset opportunities (to offset residual impacts through conservation activities within the concession), were explored but not considered appropriate for GAC.

On-site offsets occur when active management of an area under the Project control is implemented to conserve or enhance the status of an identified biodiversity feature(s) by reducing threats to that feature that are in no way linked to Project impacts (e.g. proactive management of burning activities by local communities on the GAC concession to reduce chimpanzee habitat degradation in an area not impacted by GAC activities).

Although GAC will only mine the southern portion of the concession for the first 18 years of operations (The Bauxite Export Project) it intends to mine the northern part and construct the Refinery for on-site Alumina production within the next two to three decades. Therefore there is currently no sizable portion of the

concession that could comprise a permanent on-site offset, i.e. that has both signs of chimpanzee inhabitation and is simultaneously not planned to be significantly impacted by the Export Project or its next phases.

It is worth mentioning that GAC is already working with WCF and communities to conserve chimpanzee habitat in the North of the concession in areas that will not be mined as part of the Export Project but potentially impacted by indirect impacts (Projet de mise en defence des tetes de sources, Club Pan, etc). This creates an opportunity for GAC to demonstrate positive conservation outcomes through active management across its concession on the areas that will not be mined in the near future but are important for chimpanzee conservation.

The implementation of such conservation actions in the north of the concession do not qualify as offsets and will not reduce the residual impacts. However, positive outcomes could include:

- Contribute to maintaining chimpanzee populations and other biodiversity within an impacted landscape, potentially avoiding extirpation of chimpanzees from the southern portion of the GAC concession;
- Facilitate post-closure chimpanzee re-colonisation of impacted and rehabilitated areas over the very long-term - over multiple chimpanzee generations, or, 40+ years;
- Serve as a reference site for better understanding the impacts in the portions of the concession that are mined.

4.2 Set-asides

In recognition of the high value of certain key natural features (such as galley forests, headwaters and springs) for chimpanzees and local communities on or close to the bauxite plateaus, GAC has committed to the following "no go areas" (buffers) in the ESIA (ERM 2015):

- 50 m from any waters
- 100 m buffer from any sensitive ecological site and from the Tinguilinta River
- 250 m from water abstraction/wells
- 300 m along headwaters feeding gallery forests
- 500 m from the periphery of plateaus
- temporary buffer zone of up to 800 m from blasted areas during blasting operations depending on specific blasting parameters.

The final version of the mine plan will have no direct impact on these no go areas and the corresponding profitable ore will be set aside. This represents a cost for GAC of c.1% of the foregone total profitable resources. Further set-asides of the bauxite plateaus identified in the current mining plan is considered not to be financially viable under current scenarios.

Set aside of a portion of the resource to protect biodiversity has precedents among the project leading biodiversity conservation around the world (for example the Rio Tinto QMM project has set aside about 8%

of the deposit to protect highest-value areas of littoral forest in Madagascar (Temple *et al.* 2012)) and in Guinea, where the Simandou project has sterilised a portion of ore under forest used by chimpanzees (Rio Tinto Simfer S.A. 2012a). This is in keeping with the spirit of the IFC PS6 paragraph 7 requirement to demonstrate that avoidance and minimisation have been appropriately prioritised.

In consideration of the special conservation status of chimpanzees, it would be appropriate for GAC to ensure that opportunities for set-asides on its concession are fully explored and incorporated as further information on the grade of bauxite deposits becomes available and when the mining plan is periodically updated. This includes for example the temporary set aside proposed by WCF (WCF 2015e) in the northern part of the concession (covering either sections of or the entire areas of plateaus 1, 2, 3, 14 and 19) as shown by the 'green hatched area' in Figure 13: Proposed set aside in northern part of GAC concession (covering plateaus 1, 2, 3, 14, and 19)

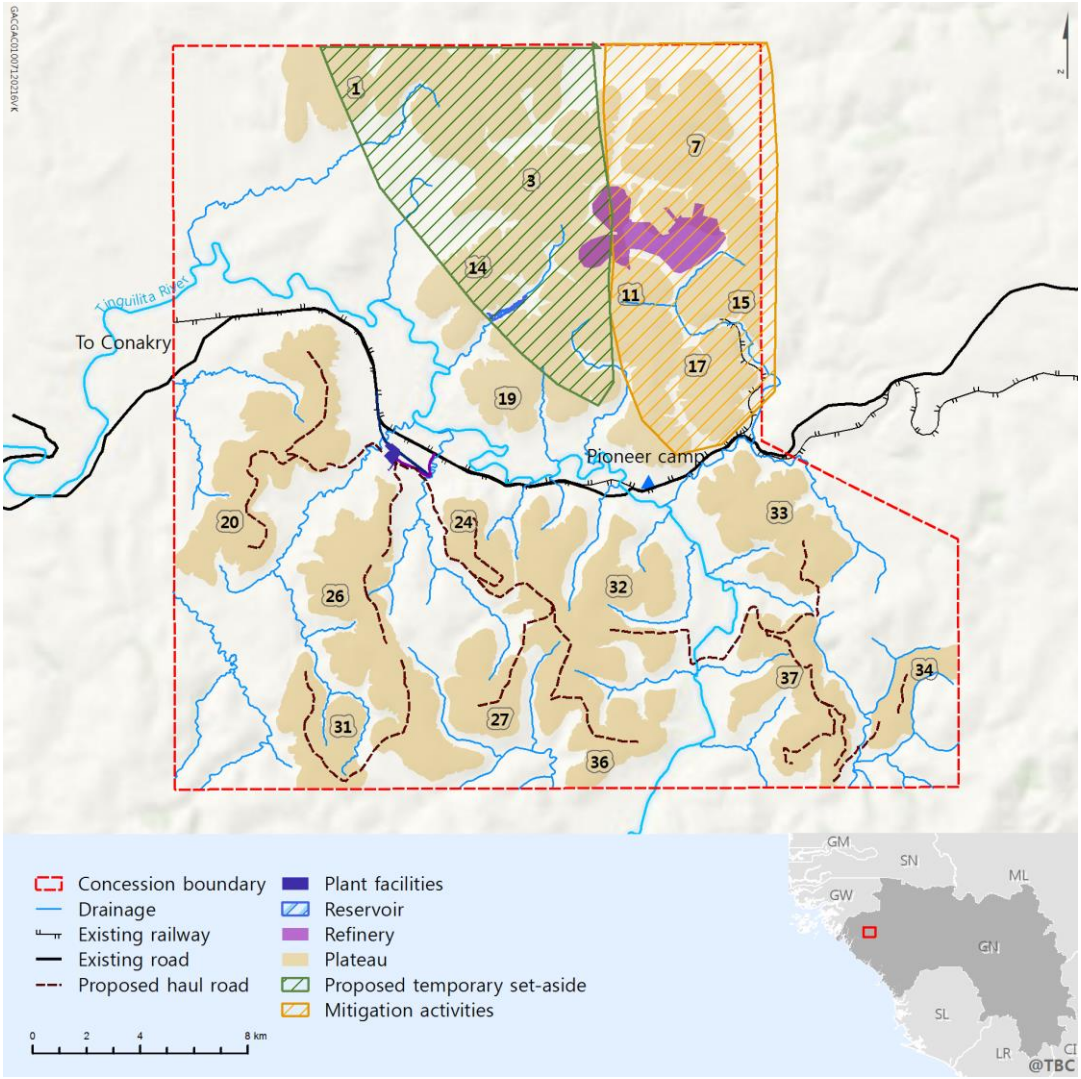


Figure 13: : Proposed temporary (for the 18-20 year Project Life) set aside in northern part of GAC concession (covering plateaus 1, 2, 3, 14, and 19) as suggested by WCF (WCF 2015a)

5 Identifying and assessing off-site offset options

5.1 Methodology

Given the scope of this study, only a site-based approach to offsets was considered. Site-based offsets have the advantage of having the clearest link between offset investment and biodiversity outcomes, which can improve transparency and thereby stakeholder confidence that the offset really is delivering appropriate biodiversity gains.

Offset site selection involved a stepped approach Figure 14:

1. Develop a 'long-list' of potential off-site offset sites based on basic equivalence criteria, ie the expected number of chimpanzees from literature;
2. Screen the long list to identify a 'short-list' of offset sites based on the analysis of social/political criteria (included collection of information from primatologists and literature);
3. Rank the short-listed sites to identify preferred sites based on consultation with the Guinean administration and conservation NGOs.

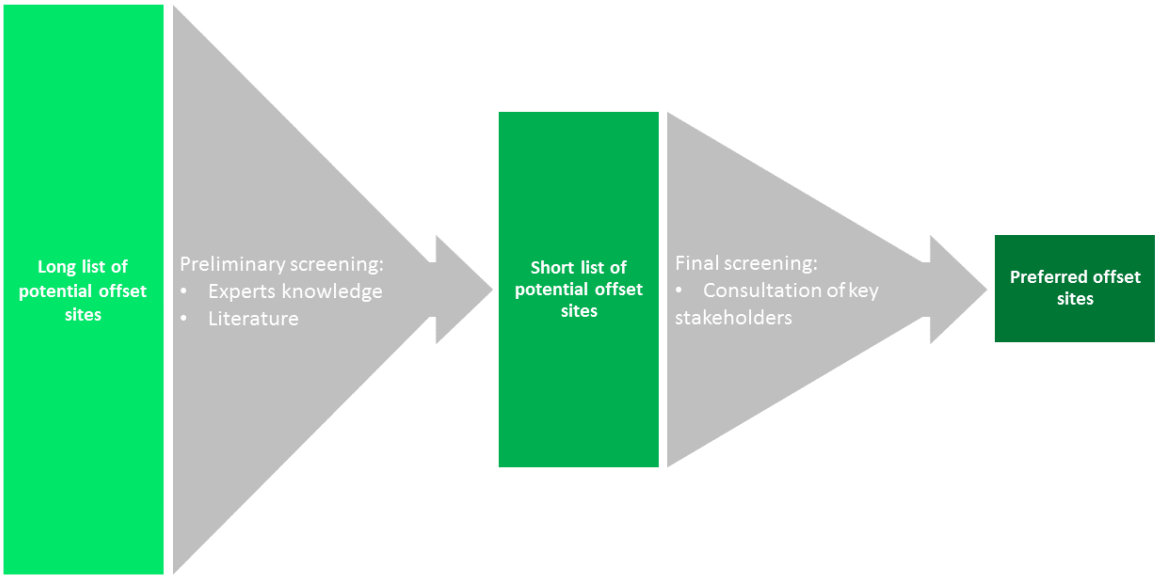


Figure 14: Three-step screening process involved in offset site selection

5.2 Offset site screening

5.2.1 Long list of potential off-site offset sites

Sites in Guinea complying with the following criteria were pulled together in a long list of potential like-for-like off-site offset sites:

- Sites within the current range of the West African chimpanzee;
- Sites within the Guinean Forest-Savannah Mosaic ecoregion as defined in (Olson et al. 2001);
- Sites with either an estimated chimpanzee population > 250 individuals according to WCF data or available literature, or confirmed chimpanzee presence and area > 500 km^2

The threshold >250 individual threshold for chimpanzee populations was to ensure a certain level of population viability and because offset population needs to be higher than impacted population to achieve the required gains (see Section 3.7 for further information about this threshold).

The following management entities were considered as "sites" for the initial screening:

- Existing legally protected areas (PA)[16], and proposed new PAs;
- Internationally Recognized Areas sensu IFC (UNSECO Natural World Heritage Sites, UNSECO Man and Biosphere Reserves, Key Biodiversity Areas, Ramsar Sites),
- Sites identified by the conservation community (e.g. those identified in the Regional Action Plan for the conservation of chimpanzees in West Africa (Kormos & Boesch 2003), see Figure 15) for their importance for West African chimpanzee conservation;
- Sites identified in the WCF report screening offset options for chimpanzee in Guinea (as summarized in WCF 2015e).

Data was collated from available literature (Ham 1998; Kormos & Boesch 2003; Kormos *et al.* 2003; Brugière & Kormos 2008; Fleury-Brugière & Brugière 2010) as well as through direct consultation with primatologists including Christophe Boesch, Virgine Vergnes and Nicolas Granier.

Table 10 provides the long list of potential off-site offset sites as well as the evaluated qualifying criteria; Figure 16 illustrates their location and extent.

The list of sites discarded because they did not comply with the criteria is given in Appendix 2.

[16] Classified Forests are protected in Guinea but legally recognized as areas with a regulated use of natural resources acting de facto as conservation areas in some cases.

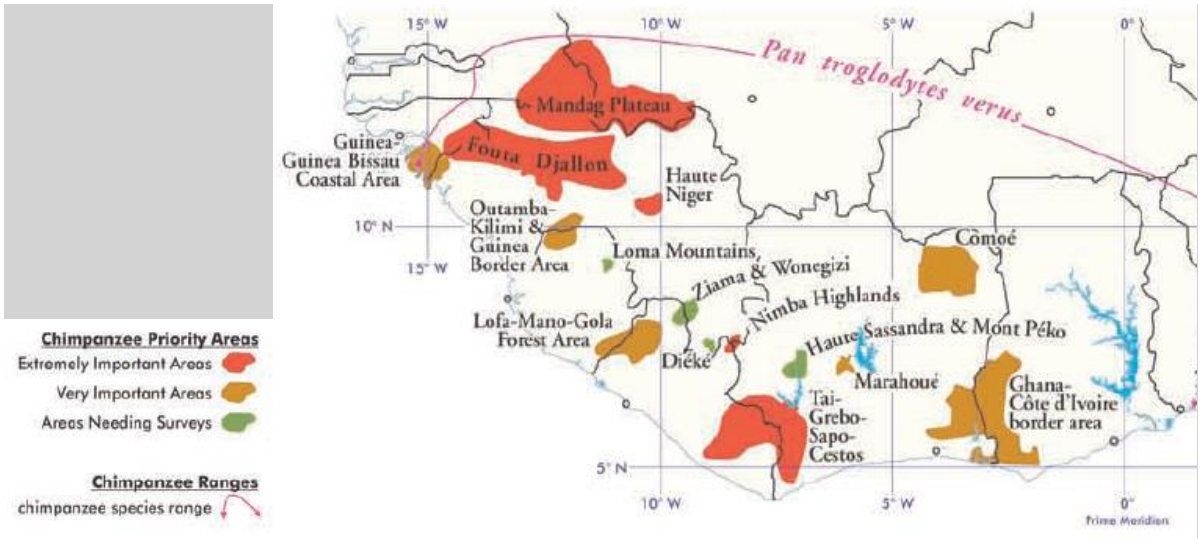


Figure 15: Map of Chimpanzee Priority Area from the Regional Action Plan for West African Chimpanzees (Kormos & Boesch 2003)

Table 10: Long list of potential off-site offset sites (see accompanying text for data sources)

N.	Name	Status	Area (km^2)	Approx. chimpanzee population (ind.)
1	**Badiar N'Dama Reserve** (incl. Badiar NP, Badiar Sud CF, N'Dama CF)	Partially a National Park since 1985, Biosphere Reserve (2002), project for a "Réserve Naturelle Gérée" (2005)	2,843	?
2	**Haut-Bafing proposed National Park** (incl. Bakoun CF, Sobory CF, Dar es Salam CF, Bani CF, Dokoro CF, Boula CF)	Ungazetted, proposed new NP	8,280	5, 542 (4,700 weaned, *C.Boesch, pers.comm, 23 Jan 2016*)
3	**Haut Niger National Park** (include Kouya CF and Mafou CF)	Classified Forest that is considered a core area of a National Park; Biosphere Reserve	1,230	420
4	**Koumbia**	Ungazetted, proposed NP in 1933	800	296
5	**Mafou CF** (core area of Haut-Niger NP)	Classified Forest, Core Area of the Haut Niger NP	675	288
6	**Mamou - Western Transboundary Area** (includes Pinselli CF and Soyah CF)	Includes Pinselli and Soyah CFs, but majority of area is ungazetted. Proposed as transboundary-protected areas	2,600	?
7	**Mamou – East** (incl. Oure Kaba)	Ungazetted, proposed as transboundary-protected areas	1,650	> 250 (Oure Kaba – 86 C.Boesch *pers. Comm., 23* Jan 2016)
8	**N'Dama CF**	Classified Forest + core area of the Badiar N'Dama Reserve	670	?

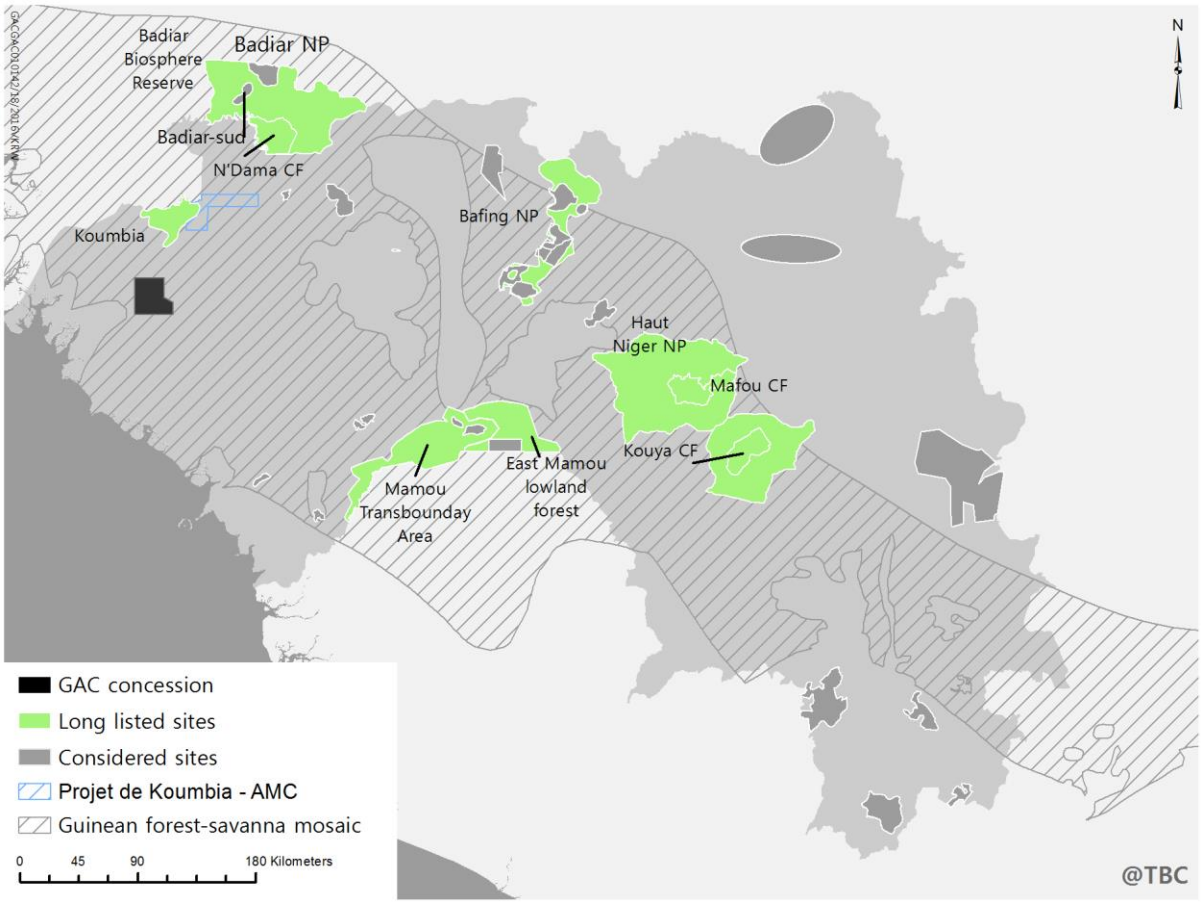


Figure 16: Map of the long list of potential off-site offset sites; only sites within the Guinean forest savannah mosaic ecoregion were included in the long-list.

5.2.2 Short list of potential off-site offset sites

Additional information was collected from literature and experts for each of the long list of potential off-site offset sites. These were then screened using the criteria listed hereafter and detailed in Table 11:

- Ecological equivalence
- Technical feasibility of gains
- Social feasibility of gains
- Alignment with GoG and other stakeholders
- Additionality
- Opportunities for scaled offset and/or aggregated offset
- Possibility of other Conservation Outcomes

Information was gathered from available literature and consultation of key stakeholders like the Guinean administration (e.g: Office Guinéen des Parcs et Réserves (OGUIPAR)), conservation NGOs (e.g: Guinee Ecologie, WCS), recognized chimpanzee experts (e.g: WCF, Sylvatrop) or the private sector (e.g: Alliance Mining Commodities). The list of stakeholders consulted as part of the present study is given in Appendix 3.

Two alternative potential off-site offset sites were short-listed for being the most promising on the basis of the screening against specified criteria:

1. Haut-Bafing proposed National Park,
2. Badiar N'Dama Reserve and Koumbia,

Table 12 provides details of the assessment and Figure 17 is a map to illustrate the sites. Details on the sites of the long list which were not short listed are given in Appendix 3.

Table 11: Description of offset screening criteria

Criteria	Description of criteria	Description of classes	Source of information (*additional information requirements*)
Ecological equivalence	Is chimpanzee population large enough to deliver the required gains? Presence of similar habitats and likely presence of other Critical Habitat and/or species of conservation value also considered as a plus.	**High:** sufficient chimpanzees for 'Worst-case' scenario – c.3615 chimpanzees (secondary consideration is availability of similar habitats for other CH species) **Medium:** insufficient chimpanzees for 'Worst-case' scenario but large area of suitable good quality habitat for chimpanzees meeting the 'conservative' scenario (c.2124 chimpanzees) and to a lesser extent availability of distinct habitats for other CH species **Low:** insufficient chimpanzees for 'conservative' scenario (< c.2124) and/or distinct habitats for other CH species	Literature + consultation of recognised experts or institutions (e.g. WCF, Guinée Ecologie, N. Granier). *Further studies required to improve population estimate and availability of suitable habitat at all short-listed offset sites.*
Technical feasibility of gains	Are chimpanzees threatened by existing threats? Are threats manageable with sufficient technical and financial support? Is density below carrying capacity to enable the population to grow? Proximity to GAC concession for ease of management also considered a plus.	**High:** Population possibly declining/unstable and potential to grow, sufficient suitable habitat, threats exist but these could be managed **Medium:** Stable population, threats exist but difficult to manage **Low:** Population at carrying capacity, limited threats and/or very challenging to manage	Literature + consultation of recognised experts or institutions (WCF, Guinée Ecologie, N. Granier, OGUIPAR, DNEF). Brief site visit to potential short-listed offset sites to gather preliminary information on chimpanzee population status and threats (Sylvatrop 2016) (See Appendix 3.2 for full report). *Further detailed studies are required to understand threats at sites, existing management and specific needs, potential conservation actions, assess carrying capacity.*
Social feasibility of gains	Are local communities likely to support the offset project? What is their expected attitude towards a conservation project? Is density of population high in the area or is the area subject to migrating population? Are there social conflicts likely to challenge conservation efforts?	**High:** The area is sparsely populated and/or not extensively used by local inhabitants, communities are in support of conservation objectives and perceive benefits **Medium:** The area is populated/used by local people but they are not against converting it to conservation and interested to work together to achieve mutual benefits. **Low:** The area is densely populated and/or extensively used by local people and they are antagonistic towards the area being used for conservation. People may need to be relocated	Literature + consultation of recognised experts or institutions (WCF, Guinée Ecologie, N. Granier, OGUIPAR, DNEF). Brief site visit to potential short-listed offset sites to assess social feasibility (Sylvatrop 2016) (See Appendix 3.2 for full report). *Further more detailed studies are required to understand threats at sites, existing management and specific needs, potential conservation actions, assess carrying capacity.* *Further studies required to understand demographics, economic activities, migrating flux, etc.*

Criteria	Description of criteria	Description of classes	Source of information (*additional information requirements*)
Additionality	Can additional conservation gains be achieved by investing in the site?	**High**: Evidence that site is very poorly funded and/or managed and could benefit substantially from conservation intervention **Medium:** Site is reasonably funded and/or managed but intervention could lead to additional conservation gains **Low:** Site is well funded and managed and conservation intervention/investment is unlikely to lead to additional conservation gains.	Literature + consultation of recognised institutions (OGUIPAR and DNEF in particular). *Further consultation of institutions supporting the establishment of new protected areas will be necessary.*
Alignment with GoG and other stakeholder objective	Is the site aligned with regional and/or national conservation initiatives? Is the site part of the national biodiversity strategic action plan (NBSAP) and/or regional conservation plan designed by GRASP? Does the site currently have some form of protected status?	**High:** Conservation of this site is strongly supported by GoG and/or other key stakeholders (e.g. national or International Conservation NGOs) and/or other regional or national conservation planning initiatives. **Medium:** Site is recognized for conservation value but not necessarily a first priority for GoG and/or other key stakeholders **Low:** Site not supported by any conservation planning initiatives or conservation organisations/agencies	Literature + consultation of recognised institutions and conservation NGOs (OGUIPAR and DNEF in particular, WCF, Guinee Ecologie). *Further consultation of institutions supporting the establishments of new protected areas will be necessary.*
Opportunities for scaled offset and/or aggregated offset	Would the site support numbers of chimpanzees to enable achievement of additional conservation gains if required? Would it be possible for other mining companies to participate in an offset at this site?	**High:** The site supports large numbers of chimpanzees which would enable gains beyond the current requirement (possibly by orders of magnitude). A number of other mining companies could participate in offset initiatives (depending on the scale of their required gain). **Medium:** The site supports marginally more chimpanzees than that required for the current estimated gains. Another company could possibly participate in the offset. **Low:** The no. of chimpanzees will not enable scaling up of the offset gains and it is unlikely another company could also participate in the offset site.	As for ecological equivalence.
Possibility of additional	Does the site support additional conservation objectives beyond chimpanzees that might gain widespread	**High:** The site contains many other species of conservation value.	Review of IUCN range maps (IUCN 2015) for GAC Critical Habitat species (TBC 2015); Guinea KBA assessment (Brugière &

Criteria	Description of criteria	Description of classes	Source of information (*additional information requirements*)
conservation outcomes	conservation support? The study did not assess the presence of other CH qualifying species found on this site that may offer a comparative advantage however some reference was included where other charismatic conservation species occur.	**Medium:** The site contains a few species of conservation value aside from chimpanzees. **Low**: The site does not contain any additional species of conservation value aside from chimpanzees	Kormos 2008), site specific reports (e.g. Camara *et al.* 2005; Pellegrini & Ghiurghi 2005) other available literature.

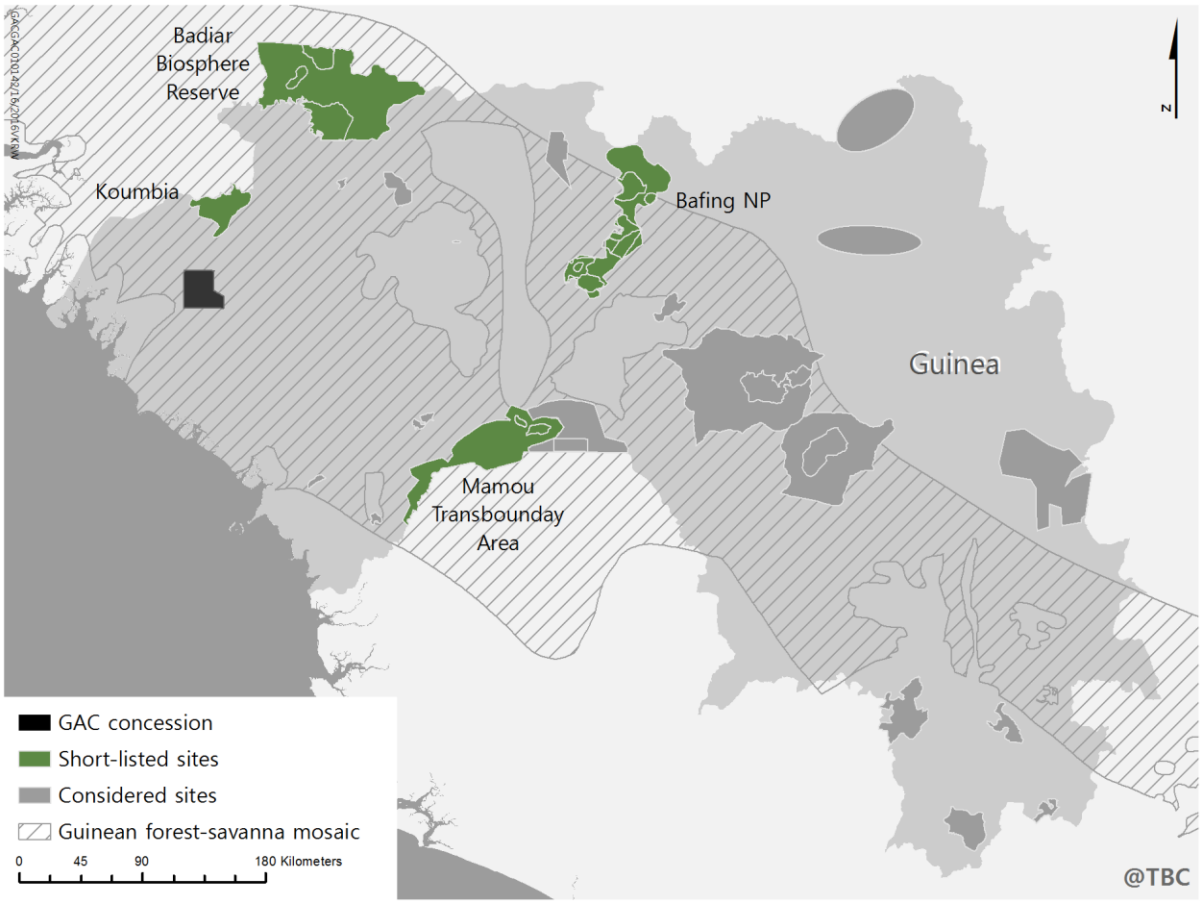


Figure 17: Map of the short listed potential off-site offset sites for the GAC Project

Table 12: Justification for the choice of the four sites short-listed as potential off-site offset sites for the GAC Project

Site name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
Badiar N'Dama Reserve (BNR) (incl. Badiar NP, Badiar Sud CF, N'Dama CF)	**Low**: Chimpanzees present, especially in N'Dama CF (Pellegrini & Ghiurghi 2005) but current population status is unknown and very unlikely to be sufficient for either the 'Optimistic' or 'Worst-case' scenarios.	**High:** Threats include: Agriculture encroachment, poaching, bushfire (PAPACO 2009) so potential for gains.	**Low:** Site already known by population as a NP/CF. Very low density of population within the core areas of the BNR. WCF reports a hostility of communities for conservation (WCF 2012). Chimpanzees not hunted for meat in the region (Kormos & Boesch 2003; Direction Nationale des Eaux et Forêts 2005; Sylvatrop 2016).	**Medium:** Includes one of the few NP in Guinea (managed by OGUIPAR). Previous projects implemented there: Regional Watershed Management project and AGIR (Regional Integrated Natural Resources Management Programme). Not mentioned in the National Action Plan for chimpanzee (Direction Nationale des Eaux et Forêts 2005) Not a priority area (Kormos & Boesch, 2003). Proposition to extend the NP to a wider Badiar N'Dama Reserve but	**High:** Although Badiar NP is already a designated protected area it comprises only c. 15% of the total reserve area. Implementation of park management activities and law enforcement reportedly non-existent or extremely limited and no monitoring and evaluation is in place (PAPACO 2009). Management Plan for 2006-2010 develop by AGIR project but no funding for implementation since end of AGIR project in 2005. Contiguous with the	**Low:** Chimpanzeepopulation unlikely to cover even the minimu population requirements for the GAC Project and therefore highly unlikely to cover the additional needs of other mining projects	**High:** Includes other IUCN Red List species such as Hippopotamus and *Procolobus badius.* N'Dama CF (core area of the BNR) is recognized as KBA (Brugière & Kormos 2008) Part of the wider Niokolo-Badiar Ecological complex with the Niokolo-Koba NP in Senegal.

Site name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
				never happened. OGUIPAR's less preferable option as Badiar NP will make a smaller contribution to the 25% national PA target by 2020 than Haut-Bafing (M.S. Keita, *pers comm*. 19 January 2016).	Parc National Niokolo-Koba (faunal reserve) situated across the border from Badiar North in Senegal (See Figure 19).		
Haut-Bafing proposed NP (incl. Bakoun CF, Sobory CF, Dar Saloum CF, Bani CF, Dokoro CF, Boula CF)	**High:** Meets minimum population requirements of offset site. Chimpanzee population reportedly 1.5 to 2x larger than 'Worst-case' scenario (c.3615). Same ecoregions but habitats quite different to GAC concession.	**High:** Stable population of chimpanzees (WCF 2015e). Threats include: habitat loss and fragmentation, hunting, In the southern portion of the area proposed Koukoutamba dam is likely to flood ~6 400 ha in Bani and Dar Saloum CFs in the southern part and may involve possible	**Medium:** Core areas of the proposed NP are known to be CF by local communities. However, up to an estimated 40 named places (villages, hamlets) are estimated to be found within the vicinity of these CF and may need to be resettled if converted into strict conservation areas (C. Boesch pers.	**High:** Within the Fouta Djallon Extremely Important Area of the Regional Action Plan (Kormos & Boesch 2003). Proposition validated by the DNEF with a mandate for WCF and OGUIPAR to implement the plan towards the park creation. OGUIPAR's preferred option as the creation of a new PA will make a	**High:** Project for a new protected area but lacking funding to progress. Area is difficult to access and therefore poaching has not been managed. Suspected existence of other large predators such as lions and hyenas and the area is on the migration route of the Western Giant Eland, a highly threatened and	**High:** Chimpanzee population likely to exceed the need of the GAC Project by 1.5 or 2x so potential for aggregated offsets. In addition, the site presents 3 proposed core areas that could be developed sequentially as offsets if needs were demonstrated to be higher than expected.	**High:** Bakoun and Bani-Dar Saloum CFs are 2 core areas also recognized as KBA (Kormos & Brugiere, 2009). Still quite a lot of large mammals (Sylvain Dufour pers. com.). Partially overlapping with the Guinean component of a larger transboundary PA with Mali.

Site name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
		resettlement of at least several thousand people + induced access due to an upgraded international road from Conakry that will connect Mali, Guinea and Senegal (funded by AfDB) and bridge over the Bafing River, (Tractebel Engineering 2012) Potential second dam in long-term; existence of Dabola-Tongue mining concession overlapping with the south of the proposed NP where exploration activities are resuming. The northern portion of Haut Bafing has less potential infrastructure	comm, 2015). WCF is undertaking a socio-economic survey to obtain a better understanding of existing settlements. Chimpanzees not hunted for meat in the area (Kormos & Boesch 2003; Direction Nationale des Eaux et Forêts 2005). Local beliefs forbid the hunting or eating of chimpanzees (Kormos & Boesch, 2003).	greater contribution to 25% national PA target by 2020 as well as the recognised importance of the area for chimpanzees and suspected existence of other large predators (M.S.Keita, *pers comm*. 19 January 2016). Area already strongly supported by WCF. OGUIPAR do not view the Koukoutamba dam or other dam developments as a threat to chimpanzee conservation and view it as a wetland conservation opportunity. (M.S.	iconic species in Guinea (M.S.Keita, *pers comm*. 19 January 2016).		

Site name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
		development threats		Keita, *pers comm*. 19 January 2016).			
Koumbia	**Low:** Chimpanzees present but population unknown and very unlikely to be sufficient for even the 'Optimistic' scenario minimum population requirement on its own. Similar habitat to GAC, great equivalence for habitats.	**Medium:** Stable population of chimpanzees (WCF 2015e). No hunting of chimpanzee by local communities but increasing commercial hunting by non-local hunters (WCF 2012). Also high deforestation evident in some areas as observed during short site visit undertaken by IFC and GAC.	**High:** Local beliefs forbid the hunting or eating of chimpanzees (Kormos & Boesch, 2003).	**Medium:** Project for a National Park in 1933, never gazetted. In the proposed Transboundary Protected Area des Rio Kogon, Korubal et Nunez. AMC have completed an ESIA (S.B. Sidibé, BGEEE, *pers. comm*. 19 January 2016) AMC's mining project (already in construction) has its concession overlapping with c.15% of the area as defined by WCF.	**High:** no funding for conservation intervention since the end of the AGIR project in 2005 (WCF 2012), conservation activities extremely limited since then (UICN-PAPACO 2008)	**Low:** Chimpanzee population very unlikely to cover the 'Optimistic' scenario requirements for GAC unless combined with other sites	**High:** Potential for improvement of connectivity with existing PAs in Guinea Bissau. Highest density of large mammals within the sites studied by WCF in 2012.
Mamou - Western Transboundary Area (includes Pinselli CF and Soyah CF)	**High:** High densities of chimpanzees found during EIA for the Simandou project (Campbell	**High:** Threats exist but with appropriate zoning and focus are feasible to manage with a	**High:** Area is large and a zoning approach likely to identify areas where conservation will	**Medium:** Within the Outamba-Kilimi Guinea Border Very Important Area of the Regional Action	**High:** Little management at Pinselli and Soyah. Donor programmes exist for creating	**Medium**: Chimpanzee population likely to exceed the need of the Project.	**High:** Would extend the footprint and enhance connectivity of existing PAs in Sierra-Leone where

Site name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
	2013a; SNC Lavalin 2013). Up to 2,000 chimpanzees in the entire transboundary landscape (WCF 2012) Same ecoregions but habitats quite different from GAC concession.	realistic level of expertise and investment. Important immigration in the area possible linked to building of a railway line the Simandou project which crosses the landscape. Likely increasing pressure on natural resources (Sylvain Dufour pers. com.).	have local support. Low human pop density (i.e. 8/km^2). Challenging social context due to immigration associated to the Simandou project.	Plan (Kormos & Boesch, 2003) Pinselli CF and Soyah CF are priority sites in the National Action Plan for Chimpanzee(Kormos & Boesch 2003; Direction Nationale des Eaux et Forêts 2005) Government has other projects in the area (including dams and agricultural development), but has supported the idea of transboundary protection of portions of the zone. Simandou Rail crosses the offset site. Also one of OGUIPAR's preferred options as the creation of a new PA will make a greater	trans-boundary protected areas, including USAID/USFS funding and a GEF project is being developed. However, no-long-term funding is secured.	Potential for aggregated offset with the Simandou project which has identified this site as potentially supporting a large population of chimpanzees. However, questionable as to whether the site can support the requirements of both GAC and Simandou may get first choice – unless the Simandou project doesn't proceed.	there is a significant chimpanzee population (Brncic *et al.* 2015). Pinselli CF and Soyah CF also recognized as KBA (Kormos & Brugiere, 2009). Very interesting area for fauna (also encompasses the Thie Pond).

Site name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
				contribution to 25% national PA target by 2020 M.S.Keita, *pers comm*. 19 January 2016).			

5.2.3 Preferred off-site offset site options

The screening led to the identification of four potential offset sites that each present some opportunities and challenges. It should be noted that very limited information is available on these sites and due to time constraints, it was only possible to gather preliminary information on the social context and social feasibility of two of the proposed offset site options (i.e. Badiar N'Dama Reserve with Koumbia, and Haut-Bafing). This is a recognised limitation of this study which is planned to be addressed in the first stages of full feasibility assessment (Section 6).

Table 13 provides a summary of pros and cons of the short-listed sites (with Badiar N'Dama Reserve and Koumbia considered as a single site). It should be noted that very limited information is available on these sites and due to time constraints, it was only possible to gather preliminary information on the social context and social feasibility of two of the proposed offset site options (i.e. Badiar N'Dama Reserve with Koumbia, and Haut-Bafing). This is a recognised limitation of this study which is planned to be addressed in the first stages of full feasibility assessment (Section 6).

Table 13: Summary of pros and cons of the four short-listed sites (with Badiar N'Dama Reserve and Koumbia pooled)

Short-listed site	Pros	Cons
Haut-Bafing proposed National Park	• The large number of chimpanzees enables a 'scaled offset' (i.e. if the number of chimpanzees required for Net Gain is found to be greater than anticipated this requirement could still be met by the site); • High additionality as much of the area is not effectively protected or managed and there are demonstrated threats; • Strong government support as contributes to the national target of 25% protected areas by 2020; • Extremely important area for chimpanzee conservation so likely very high stakeholder support (e.g. WCF); • Strongly supported by OGUIPAR, DNEF and Ministry of Environment; • Additional conservation gains as accommodates many threatened species; • Could form part of a transboundary park with Mali; • Possibility of an aggregated offset.	• Requires additional funding beyond GAC; • Possible resettlement issues; • Potentially significant direct and indirect impacts of the planned Koukoutamba dam in the medium term and potentially the Boureya dam in the long-term; • The Société des Bauxites de Dabola-Tougué (SBDT) concession (5684 km^2) overlaps with the southern part of Haut-Bafing NP; • Does not address the risk of external failure of offset site; • Poaching in the north is a concern; • May require collaboration with neighbouring countries.

Badiar N'Dama Reserve + Koumbia	• Close to the impacted site, i.e. similar habitat; • Existing project to convert N'Dama CF into a core area of the Badiar N'Dama Reserve; • Limited human population in N'Dama - resettlement and compensation have already been agreed on (Sylvatrop 2016) (See Appendix 3.2 for full report); • A combination of sites provides a potential buffer against the risks of external failure of offset due to factors associated with a single site; • Although Badiar is already under some level of protection, there is good additionality for the combination of sites as Koumbia is not currently protected at all.	• Number of chimpanzees potentially limited to cover the 'conservative' scenario which is likely to require a longer time to achieve Net Gain objective; • No legal status or pending project for Koumbia; • Concession of the forthcoming AMC mining project overlaps with c.15% of the Koumbia area. • The Koumbia area is characterised by bauxite deposits therefore it is likely that the area will be mined even if the AMC project does not proceed (Mr Diallo, *pers. comm.*, 20 January 2016); • A major road passes through Koumbia connecting Guinea to Senegal; • Large portions of Koumbia have already been deforested; • If CBG proceeds with mining on its North Cogon concession the likely influx of people is anticipated to lead to further habitat degradation in Koumbia; • The complexities associated with managing more than one site have not been investigated as part of the pre-feasibility assessment;

5.2.3.1 Haut-Bafing proposed National Park

Description of the potential offset in the Haut-Bafing proposed National Park

The Haut-Bafing NP has been designed and proposed by WCF to create a protected area in the heart of the Foutah Djallon, a landscape thought to harbour most of the West African chimpanzee population in Guinea (Ham 1998; WCF 2012). A large chimpanzee population apparently still inhabits this area possibly as a result of a relatively low human population density combined with a low hunting pressure due to local traditional beliefs that prohibit the consumption of chimpanzee meat.

WCF suggests an integrated landscape conservation project around seven Classified Forests that already exist along the Bafing River. These Classified Forests would comprise the majority of a fully protected area (probably a National Park) dedicated to the conservation of chimpanzees (see Figure 18) whereas two buffer areas are proposed in the National Park with objectives of "sustainable economic development" and "development" respectively.

WCF has developed a draft conservation strategy for the Haut-Bafing proposed National Park but there is no management plan ready yet and this would have to be developed during the creation process of the new protected area. This is likely to take time but it does offer the opportunity to design the Project in order to meet GACs needs, for example by enabling the scalability of the Project development to fit with potential growing needs, or ensure the monitoring and evaluation programme is suited to demonstrate gains with the necessary scientific rigor.

WCF estimated that to conserve a population of 2,000 chimpanzees (about a third of the Haut-Bafing proposed National Park population):

- Yearly running costs to implement conservation activities would be in the order of USD 685,000 per year,
- Assuming an interest rate of 3% for an endowment trust fund, the running cost would be covered "in perpetuity" by an endowment of USD 23 million.

These figures were estimated by applying a unit cost based on area (see WCF 2015b for more details) and are considered to be an order of magnitude estimate.

The Haut-Bafing proposed NP recently received some support from the government. In November 2015, the Minister of Environment Director in place signed a letter addressed to WCF and the Protected Areas Agency in Guinea (OGUIPAR) to support the development of the Haut-Bafing NP. In the letter, the Minister recalls the alignment of the development of this new protected area with the objectives of the GoG to protect 25% of the national territory by 2020. Haut-Bafing NP is also considered to be on the migration route of the Western Giant Eland, a highly threatened and iconic species in Guinea and the area apparently still has large predators such as lions and leopards (M. S. Keita, *pers.comm.* 19 January 2016).

Although the Minister has expressed his support to the development of this new national park, it is not funded and does not have human resources allocated to it either. GAC support to its creation and management would likely be fully additional.

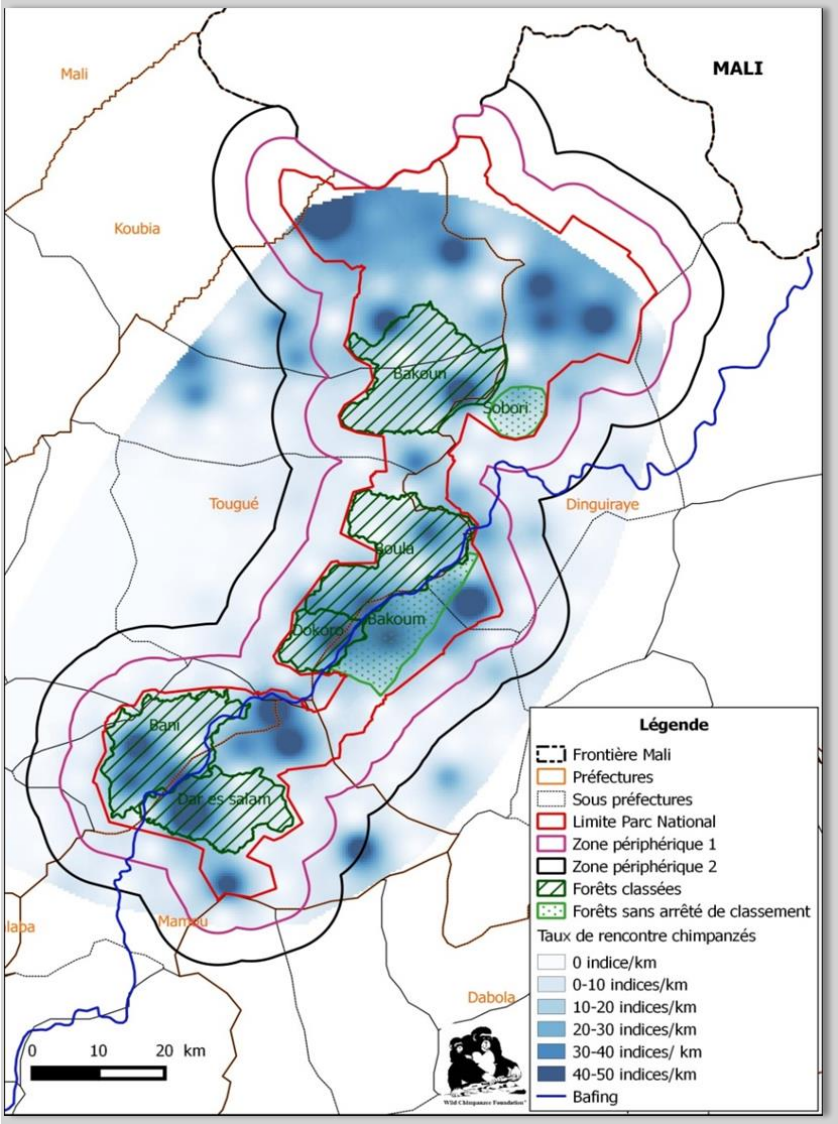


Figure 18: Map showing the density of chimpanzee across the proposed Haut-Bafing National Park (WCF 2015d)

Key risks and limitations

Key risks to the establishment of an offset in the proposed Haut-Bafing NP include:

- Construction of at least one hydroelectric scheme (e.g. Koukoutamba dam which will impact the Bani and Dar-Saloum CF's) on the Bafing River. Dam development is considered an opportunity by some including OGUIPAR who see it as an opportunity for wetland conservation and protection of

other species in the area (M. S. Keita, pers. comm. Tuesday 19 January 2016) rather than a risk for the chimpanzees and/or their important habitat. However, gallery forests being an important habitat for chimpanzees, the flooding of large extents of this habitat type along the river could potentially have significant impacts on their population. Furthermore, potential influx of people associated with the dam construction would need to be controlled to avoid substantial negative indirect impacts on chimpanzee habitat, for example through an increase hunting pressure.

- Poaching, identified by OGUIPAR as a major threat to conservation in the area as they had ceased two tonnes of meat on a road coming from the area (M. S. Keita, OGUIPAR, pers.comm. 19 January 2016). However, the proportion of bushmeat that comprised chimpanzees was not specified so this threat would need to be investigated further. Since the area is apparently difficult to access it is also considered difficult to have a law enforcement presence on the ground. The religious beliefs of the communities who inhabit the Foutah Djallon protect chimpanzees since they have a special relationship with chimpanzees and their religion prohibits them to hunt or kill them (M.S. Diallo, Guinée Ecologie, pers.comm. 20 January 2016); (Sylvatrop 2016)).
- Construction of an international road crossing the Bafing area financed by the African Development Bank (AFD);
- Development of the Dabola-Tougue bauxite project, and
- Lack of formal legal status and incorporation of previous work towards conservation in the area into a management plan. Therefore issues such as the type of management for the fully protected area and potential resettlement associated with protection has not yet been documented

The infrastructure developments were not viewed as threats by OGUIPAR. Charcoal making in this area is apparently limited by demand. Wood cutting, although taking place, is not viewed as a major threat by OGUIPAR (M. S. Keita, OGUIPAR, *pers.comm.* 19 January 2016). The National Directorate for Water and Forest (DNEF) identified a number of threats to chimpanzee conservation including: habitat loss, food scarcity, habitat fragmentation and subsequent loss of corridors for movement, poaching, burning for agriculture, mining is expected to push chimpanzees into areas inhabited by people in search of food leading to human wildlife conflict and the people will kill the chimpanzees, conflict between different groups that are forced into each others' territory, demand for energy (wood & charcoal) will lead to further cutting of gallery forests and trees in general (Mr Diallo, Mr Dia, Mr Bangoura, DNEF, *pers. comm.* 20 January 2016.

A main data limitation for the study was that available information about the Haut-Bafing proposed NP was limited to information provided by WCF in their report.

Proposed next steps to assess and/or reduce risks associated with the Haut-Bafing proposed NP:

- Clarify the type of management and legal status of the proposed fully protected area and check the feasibility of developing the proposed NP in compliance with lenders' standards;
- Undertake a rapid assessment of the direct impacts of the Koukoutamba dam on chimpanzees in the CF of Bani and Dar-saloum and of the indirect impact on the overall proposed NP;
- Re-run the residual impact and Net Gain requirement calculations to demonstrate that sufficient chimpanzees are found in the proposed NP when considering the impacts of the Koukoutamba dam to enable a Net Gain for chimpanzees; and

- Verify chimpanzee population estimates as these are currently extremely high for the type of habitat found in the area in order to demonstrate that gains are still feasible.

Further details are given in Section 6

5.2.3.2 Combination of Badiar N'Dama Reserve and Koumbia

Main limitations and risks

Neither the Badiar N'Dama Reserve nor Koumbia would individually have enough chimpanzees to cover GAC's offset requirements. However, they may have enough chimpanzees if combined although this would need to be verified through rapid surveys. This would be the case if the N'Dama CF had a similar chimpanzee density to Koumbia. Although chimpanzees are known to be easy to find in the N'Dama CF (Pellegrini & Ghiurghi 2005), no reliable estimate of the chimpanzee population was found in the literature[17].

Even if this combination of sites supported sufficient chimpanzees, the population would likely only be high enough to cover the 'optimistic' scenario offset requirements. This 'optimistic' scenario is likely to be an underestimate of the genuine offset requirements to achieve a "fair exchange", meaning that choice of this site would only meet the offset design requirements if either:

1. Mitigation actions on the GAC concession are demonstrated to be significantly more successful than expected; and/or
1. Feasibility study data show that chimpanzees are much more threatened at this site than currently estimated (i.e. current or projected net loss rate >> 1%/yr) AND it is feasible to reduce these threats rapidly in order to generate sufficient gains; and/or
2. GAC commits to including an additional site in the offset portfolio to make up for any shortfall in the balance between losses and gains.

Key data required before choosing the combination of Badiar N'Dama Reserve and Koumbia are

- Undertake quantitative chimpanzee surveys in the N'Dama Classified Forest and, if this area is confirmed as promising, undertake further surveys in the Badiar Sud and Badiar NP (where the habitat is less favourable to chimpanzees);
- Re-run the calculations to demonstrate that sufficient chimpanzees are found in the combination of offset sites to enable a Net Gain (if necessary the period of 20 years to achieve a Net Gain could be extended in consultation with stakeholders).

Further details are given in Section 6.

[17] WCF data collected for GAC was not available for this study.

Description of the potential offset in the Badiar N'Dama Reserve ("Réserve du Badiar N'Dama")

The Badiar N'Dama Reserve is described as the complex of protected areas including: the Badiar National Park, the Badiar Nord (38,200 ha) and Badiar Sud (8,600 ha) Classified Forests and the N'Dama Classified Forest (67,000 ha) as well as the surrounding area (including two buffer zones totalling 32,800 ha and a transition zone of 137,700 ha with joint management or co-management) also included in the Badiar Biosphere Reserve (see Figure 19). A fourth central conservation area, "Laderie" is in the process of being classified, it lies between the prefecture of Gaoual and Koundara.

This zoning has been proposed by the « Programme Régional d'Appui à la Gestion Intégrée des Ressources naturelles des bassins du Niger et de la Gambie » (AGIR) in a Management Plan in 2005 (Pellegrini & Ghiurghi 2005). This management plan was developed to include the management of the Badiar National Park - classified as a "Réserve Spéciale de Faune » in 1985[18] - with the wider landscape classified as a Biosphere Reserve in 2002 and integrated into the Niokolo-Badiar Transboundary Complex spanning northwards to Senegal and the Parc National Niokolo Koba (PNNK). The management plan foresees the upgrading of the two Classified Forests to fully protected areas (as is already the Badiar NP) and defines two main objectives:

- Conservation of ecosystems,
- Improvements of livelihoods of local communities.

The management plan was developed as a participatory process involving the Guinean administration and the local communities in defining the objectives and zoning of the project of reserve establishment.

Funding of the project AGIR stopped in 2005 and the management plan was never adopted legally, leaving the Direction Nationale de la Diversité Biologique et des Aires Protégées of Ministère de l'Environnement et du Développement Durable (ex OGUIPAR) with limited resources to implement the plan. The METT evaluation from 2009 reports that implementation of activities was non-existent or extremely limited and that no monitoring and evaluation is in place (PAPACO 2009). Sylvatrop's site visit established the existence of considerable useful equipment and the existence of ecoguards but a complete lack of funds for anything aside from their wages. The current annual budget, apart from staff salaries, is nonexistent while the annual budget of the AGIR project was of the order of 120 to 130 million Guinean Francs.

The existence of a management plan developed relatively recently coupled with the obvious lack of funding for the Badiar N'Dama Reserve offers an opportunity for GAC to step in and obtain results relatively quickly by providing technical and financial support for:

- Revision and approval of a Reserve Management Plan with an emphasis on chimpanzee conservation;

[18] This was the first national park to be created in Guinea under Ordonnance N°124/PRG/85 du 30 Mai 1985 (Appendix 3.2)

- Legal upgrade of the Classified Forests in accordance with the objectives of the Management Plan and the Guinean "*Code de protection de la faune sauvage et réglementation de la chasse*";
- Implementation of activities most aligned with conservation of chimpanzees, in particular the N'Dama Classified Forest where most of the chimpanzee population is expected to occur.

Once the preferred offset site has been selected and stakeholder buy-in has been obtained there will be an opportunity for GAC to catalyse early gains for chimpanzees prior to the completion of the detailed offset design and beginning of implementation. Stakeholder engagement with NGOs and government is likely to highlight specific actions that would be useful to undertake in the short-term.

Key supporting activities that could start in parallel to revision of the Management Plan and process of legalizing the Reserve could include:

- Initiate conservation of the classified forest and/ or formal protected area creation;
- Train ecoguards and build their capacity[19];
- Develop and implement educational and anti-poaching initiatives in nearby communities;
- Develop infrastructure to support management in each of the fully protected areas;
- Design and implement a chimpanzee monitoring and evaluation plan.

These activities could, however, only be undertaken once implementing partners have been identified and a governance structure agreed upon.

[19] According to Sylvatrop's field investigation Badiar NP currently has 105 rangers belonging to the paramilitary corps of conservation but which are still not armed. The GNP has long been supported by the European Union (1994 and 2005, regional development project Watershed projectProject and ACT) and the Italian Cooperation (Veterinarians without Borders who made the first inventory studies in 1985). The park has well-equipped buildings. The base has many buildings totally abandoned due to lack of finance for maintenance means, but still in very good condition, thanks to the conservationists who, without any budget, avoided the theft of equipment (air conditioning, roofs, doors, etc.). The park has some infrastructure that could easily be repaired. (Sylvatrop 2016)

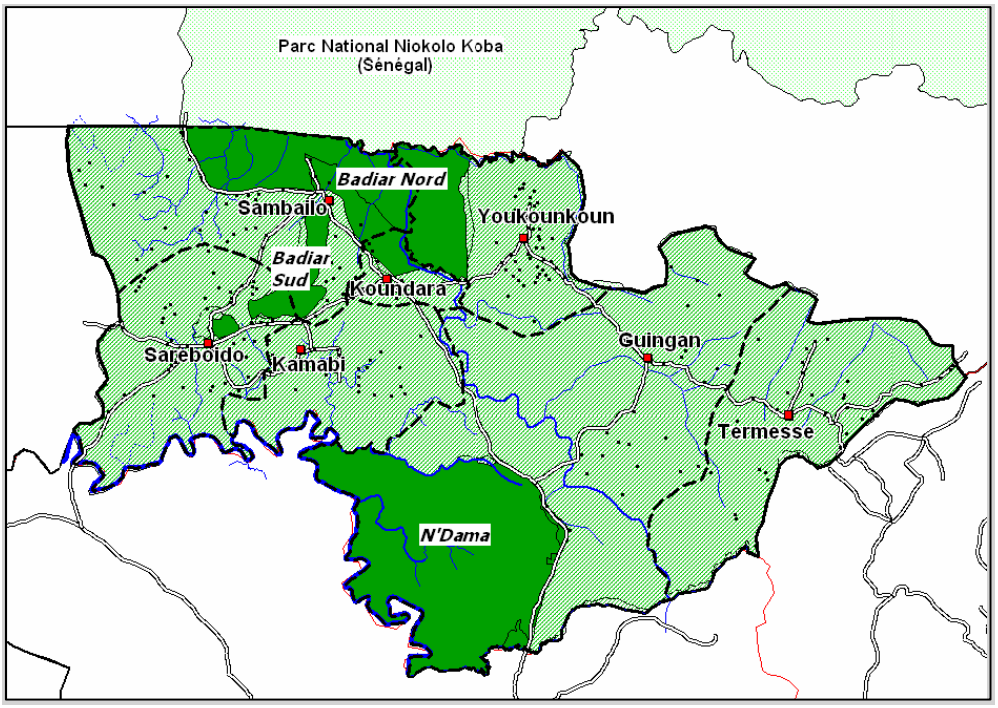


Figure 19: Map showing the zoning within the Badiar N'Dama Reserve and the connectivity with the Niokolo Koba National Park in Senegal (Pellegrini & Ghiurghi 2005)

Main limitations and risks for Badiar

The key limitations for Badiar N'Dama relate to:

- **Ecological equivilence:** whether increased protection would provide sufficient gains, given the low number of chimpanzees encountered by WCF in the area and a low amount of remaining suitable habitat (see WCF 2012).
- **Social feasibility:** social challenges include the strong dependency of communities on the natural resources of the park (especially for wood) and the unreceptive attitude this may present to its protection.
- **Additionality**: since part of the area is already protected. Stricter protection of the area may also be politically challenging.

Description of the potential offset in Koumbia

The potential offset site of Koumbia has been delineated by WCF on the basis of the work by Brugière & Kormos (2008) who identified this site as a Key Biodiversity Area. It is not a protected area but an agro-pastoral zone with at least 27 villages (c. 2,700 people) but a low hunting rate and a high density of large mammals (WCF 2012).

This area was previously classified as a National Park in 1933 by the French colonial authorities for its abundant large fauna but is considered as non-existent by the current administration (Brugière & Kormos, 2008). However, it is recognized as a subset of the wider Transboundary Protected Area of Rios Rio Kogon,

Korubal and Nunez, between Guinea and Guinea Bissau. This area is proposed for legal classification as a protected area by the GoG but the application decree has not been signed off yet (UICN-PAPACO 2008) possibly due to bauxite reserves as described below.

The Transboundary Protected Area of Rios Rio Kogon, Korubal and Nunez received support from the AGIR project which identified a number of community conservation areas that could be legally raised as community forests with a private governance. AGIR put in place a training program in order to raise awareness in communities towards environment. Unfortunately the program stopped in 2005 and since then the activities seems to have considerably reduced (UICN-PAPACO 2008).

WCF have suggested creating a transboundary National Park with a core area along the border and a buffer zone down to the road/Wendou M'bourou, with the possibility of extending the area along the Kogon in the South-West (WCF 2012). This area could be further developed in alignment with the existing conservation community areas found in the Koumbia site. Several of them seem to have natural resource management plans in place and governance structures for implementation (mixed committees representing both the local communities and the administrative authorities) (UICN-PAPACO 2008). In addition, the financial and technical support of law enforcement by the local authorities could bring some good results to reduce poaching, especially because the local communities supported the past conservation initiatives and are not involved in commercial hunting.

Koumbia offers the opportunity to build on:

- Existing/historic community conservation areas;
- Transboundary Protected Area initiatives; and
- Remnants of the AGIR activities in the area.

Main limitations and risks for Koumbia

The major threat to selecting Koumbia as a suitable offset site is mining. Alliance Mining Commodities Ltd (AMC) obtained a mining concession from GoG in November 2010 have completed an SEIA for the Koumbia Bauxite project (S.B. Sidibe, BGEEE, *pers comm*. 19 January 2016). Although it is currently unclear when this project might commence the high bauxite reserves make it unlikely for Koumbia to be set aside for conservation (Mr Diallo, DNEF, *pers. comm*. 20 January 2016; M.S. Diallo, Guinée Ecologie, *pers comm*. 20 January).

In addition a key limitation of selecting Koumbia will be whether it supports enough suitable habitat to cover GAC's offset requirements. Although WCF indicates a reasonable chimpanzee abundance c.296 individuals (WCF 2012), large areas of Koumbia have already been deforested and high human population pressure is likely to make strict protection and enforcement of the area socially challenging. The current estimated number of chimpanzees makes Koumbia an unsuitable option unless combined with other sites. There is also existing infrastructure including a major road passing through and connecting Guinea and Senegal which may facilliate activities such as hunting and habitat destructruction in the future. Furthermore, if CBG

proceeds with mining in the North of Cogon, the likely influx of people into the area may make it very difficult to enforce strict protection.

Box 2: Aggregated offsets

Aggregated offsets involve two or more companies investing into the same offset site(s). This type of offset may be particularly appropriate in a Guinean context, where there are multiple companies with similar impacts having to meet PS6, and where there are high threats but only a few suitable offset sites. Kormos et al. (2014) also promote aggregated offsets for chimpanzees as part of a national offset strategy.

Aggregated offsets may provide GAC with an appropriate and (cost) effective means to help achieve a Net Gain for chimpanzees. Aggregated offsets have several benefits to the Project:

- *Reduces costs related to economies of scale, as costs are spread between all projects investing into offset;*
- *Limits schedule delays for the Project where the offset implementation is delayed; and*
- *Provides a mandate to an external body/institution to address technical and political feasibility challenges on behalf of GAC*

These offsets are likely to receive wide stakeholder support – including from government and NGOs – as they fit well into national scale conservation planning, helping a country meet its conservation goals. Furthermore, they are strategically useful as they help facilitate large-scale ecological functionality and connectivity that would otherwise not be possible through individual, ad hoc offsets. This also means aggregated offsets can be effective in addressing cumulative impacts.

Aggregated offsets can be challenging to establish, as they require close collaboration between companies (to ensure a fair and equitable offset contribution), significant setup costs and with the same risks as individual offsets. Bet-hedging may therefore still be needed to minimise project risk.

One of the ecological limitations is that the allocated site would need to be able to provide sufficient gains to offset impacts on all the Project's involved in the aggregated offset. This is unlikely to be feasible for many offset sites that have low chimpanzee numbers and/or low threats. Due to their high chimpanzee populations, Haut-Bafing proposed National Park and Mamou Transboundary Area may be the only two sites where aggregated offsets are feasible (Table 12)

5.3 Conclusion

This pre-feasibility study demonstrates that at least one off-site offset site offers theoretically sufficient conservation opportunities to achieve a Net Gain on chimpanzees, including under the worst case scenario where up to c.277 chimpanzees are lost due to direct and indirect impacts associated with mining on GAC's concession and a population of up to c.3615 individuals are required in the offset site(s) to achieve a Net Gain within 20 years (the estimated Project Life for the southern portion of the concession) (See also Section 3.7). In addition, two other off-site offset sites (or combination of sites) may have the potential to achieve a Net Gain if residual impacts and therefore offset requirements were demonstrated to be considerably lower and chimpanzee populations are confirmed to be sufficient in these potential offset sites.

The choice of the site or combination of sites to be developed as an offset for the Project is ultimately a strategic and political decision to be made by GAC in consultation with its stakeholders and specifically with the GoG. There are a number of considerations that go beyond the scope of this pre-feasibility study (e.g.: the potential need for the offset to also cover other CH qualifying species) or beyond technical considerations that we are able to assess (e.g.: the level of risks that IFC is likely to consider acceptable, the collective will to develop an aggregated offset with other companies active in the region and seeking chimpanzee offsets).

To facilitate the decision making, Table 14 summarises the portfolio of potential offset sites that may cover the needs for each of the 3 impact scenarios defined in Section 3.

Table 14: Portfolio of sites that may enable a Net Gain under the different scenario of impacts (Orange = to be confirmed with additional data, Green = ok)

Scenarios	Badiar N'Dama Reserve + Koumbia	Haut-Bafing proposed NP
1. 'Optimistic'	(but chimpanzee population numbers need to be verified)	
2. 'Conservative'		
3. 'Worst-case'		

As discussed in Section 2, the high level of uncertainty in affected population size, location of chimpanzee groups (or communities) in relation to proposed mining activities, the impact magnitude and offset effectiveness means it is recommended to adopt an adaptive approach enabled by a scalable offset should monitoring reveal that the offset needs are significantly higher or lower than expected. This means that if a single site is chosen, existing information tends to favour the Haut-Bafing proposed National Park (as long as the issues identified in It should be noted that very limited information is available on these sites and due to time constraints, it was only possible to gather preliminary information on the social context and social feasibility of two of the proposed offset site options (i.e. Badiar N'Dama Reserve with Koumbia, and Haut-Bafing). This is a recognised limitation of this study which is planned to be addressed in the first stages of full feasibility assessment (Section 6).

Table 13 above can be resolved) as it is the only option currently known to cover the "worst case scenario" (scenario 3). However, if GAC wished to develop a portfolio of sites, a combination of other sites could meet these requirements. WCF have recently been involved in an extensive data gathering exercises in Haut-Bafing (as part of a PhD thesis) and will continue to collect socio-economic data in approximately 40 villages in the Haut-Bafing area. This information, if made available, may provide invaluable insights into threats and opportunities of implementing an offset in Haut-Bafing. Close collaboration with WCF during the Feasibility stage of the offset assessment is therefore highly recommended.

Designing an offset portfolio based on the 'optimistic' scenarios of impact estimates is not precautionary and should not be considered without careful assessment of the risks this would entail. Such a strategy would place a much more significant burden of proof on GAC that the strategy is appropriate. In practice this would require:

- Investing in additional surveys to significantly reduce uncertainty in the range of estimates of possible impacts in the southern part of the GAC concession,
- Effective implementation and enhanced monitoring of all feasible additional mitigation actions;
- Reassessment of the impacts and demonstration and agreement with stakeholders that less than 50% of the chimpanzee population will be lost,
- Clear demonstration that proposed offset sites 1) have sufficient chimpanzees 2) are experiencing much greater threats than estimated and 3) that it is feasible to rapidly reduce these threats.
- We emphasise that it remains possible that impacts will in fact be at the higher end of estimates. In this case, if GAC had started with a smaller offset portfolio, GAC would find themselves requiring a much larger offset (since gains would need to be generated more rapidly) and result in overall higher costs than if the larger target were used from the start. In other words, it is likely to be more cost-effective overall (as well as better aligned with IFC guidelines and offsetting good practice) to 'start large and perhaps scale down' than to 'start small and perhaps scale up'.

6 Offset implementation

6.1 Overall approach

The offset analysis (Section 5) suggests that delivering a Net Gain through off-site offsets is potentially feasible at a number of sites. However, significant work is required to clearly demonstrate feasibility and to move towards implementation. This section outlines the suggested approach and the principal steps required for implementation.

The approach is set out in four main phases (Figure 20):

- Review and feasibility: choosing an offset site, detailed demonstration of feasibility of generating sufficient gains and obtaining government approval and stakeholder buy-in;
- Implementation: actual set up and implementation of conservation actions;

- Maintenance: once a Net Gain has been achieved, it is important to maintain gains at least as long as impacts;
- Handover: ensuring a smooth transition to long-term management of the chosen site(s) for chimpanzee conservation after GAC's requirements are met.

It is important to recognise that while some steps are on the critical path, other steps can potentially occur in parallel. For example, it would be possible for GAC to support some activities for protection of chimpanzees immediately after a site has been selected and while stakeholder consultation is on-going.

The following sections discuss each step in more detail, focusing on the most immediate phases.

6.1.1 Implementation of on-site mitigation

Offsets are only appropriate if all feasible on-site mitigation is implemented to reduce impacts as far as practicable. Some of the mitigation actions identified in Section 3 are complex to implement and will require on-going oversight, particularly given the fluid nature of the mine plan. It is essential that responsibility for implementation be clearly assigned to an individual, who is based on-site, who has appropriate authority to ensure that actions are implemented and adapted as required. Opportunities may arise for GAC to revisit its avoidance and mitigation measures as the demand for bauxite fluctuates and the mining plan and mining methods are adjusted accordingly. *Ideally GAC will hire a full time Biodiversity Manager who can provide guidance and oversight of the implementation and avoidance measures on the GAC concession.*

6.1.2 Stakeholder engagement

The long-term success of the offset will depend on successful management and governance within an appropriate regulatory framework. Stakeholder engagement is an iterative process that needs to start at conceptualisation of the offset and continue throughout implementation until GAC exits offset implementation. On-going stakeholder engagement, of community and government representatives, chimpanzee experts and NGOs is essential.

GAC commenced stakeholder engagement during the pre-feasibility study: TBC staff met with select government representatives and one NGO in Conakry on GAC's behalf on 18th and 19th January 2016. The purpose of these meetings was to share the preliminary findings of the pre-feasibility study and provide an opportunity to gather information on support and preferences for the three short-listed offset sites (namely Badiar Biosphere Reserve and Koumbia, Proposed Haut-Bafing National Park and Mamou Transboundary Area). Table 15 summarises the organisations and individuals met and key findings from the meetings. Further details of the meetings are included in Appendix 3.1.

Comprehensive stakeholder engagement, in accordance with a stakeholder engagement plan (SEP), will need be undertaken during the Offset Feasibility Study.

Table 15: Summary of stakeholder meetings held in Conakry on 18th and 19th January 2016

Name of organisation	Person(s) met	Key findings
Bureau Guinéen d'Etudes et d'Evaluations Environnementales (BGEEE)	Seydou Bari Sidibé, Director	• Involved in National Ecological Compensation project with Guinée Ecologie. • Intend to incorporate biodiversity offsets into new Fauna and Forest Code in development.
Office Guinéen des Parcs et Réserves (OGUIPAR)	Mamadou Saiba Keita, Director Mamadou Bhoye Sow, Deputy Director	• Establishment of a new PA (e.g. Haut Bafing or Mamou) is preferable as this will make a greater contribution (than for e.g. the existing Badiar NP) to the national target of 25% protected area by 2020. • Strongly support Haut-Bafing as potential offset site since it is recognised as important for chimpanzees, and possibly other predators and some migratory species. • Consider hunting as key threat to chimpanzees in this area. • Mining and road development projects, charcoal making and fuelwood collection are not considered key threats to chimpanzees.
National Directorate for Water and Forest (DNEF)	Colonel Diallo, Deputy Director Mr Dia, Head of Fauna Division Commandant Bangoura , Head of Forestry Legislation Division	• Main threats to chimpanzees are considered to be a) habitat destruction (loss and fragmentation) caused by burning for agriculture, mining and demand for energy (wood & charcoal) creating conflict between chimpanzees and people and chimpanzee groups and b) poaching. • Potential actions against poaching include community awareness, capacity building and law enforcement. • The European Union project has recruited and trained 2000 eco-guards covering Haut Niger National Park, the Ziama Reserve and the Nimba Mountains
Guinée Ecologie	Mamadou Saliou Diallo Muhammad Yaya Diallo Mariam Savané	• Considered critical to develop a PA in the Bafing area to protect chimpanzees from threats associated with development of dams, new international road and the Dabola-Tougue bauxite project. • Focused on creating Source du Bafing NP around existing PAs, and including the following CFs: Bagataye, Kegneko, Diogounè, Gueroual, Gouba, Satiba, Bantarawel, Fello Diouna

Sylvatrop undertook nine days (8-15 January 2016) of field work to gather data on the social feasibility of the short-listed offset sites. Mamou was not visited but Badiar NP, Koumbia and Bafing were visited. Discussions were held with hunters, farmers, livestock herders, fishermen, representatives of DNEF and members of civil society, préfets and, sous-préfets (a comprehensive list of people met is included in Annexe 1 of the Report, Appendix 3.2) to gather information of ethnicity, religious beliefs, livelihoods, attitudes to

conservation, activities that were likely to threaten chimpanzee conservation, hunting practices, The detailed report is attached as Appendix 3.2 (Sylvatrop 2016). A summary of Sylvatrop's key findings is provided in Table 16.

Table 16: Summary of strengths, weaknesses, opportunities and threats, based on social feasibility criteria, of the short-listed offset sites (Haut-Bafing proposed National Park, Badiar NP and Koumbia) visited during Sylvatrop's study in January 2016

Short-listed offset sites	Positive (Strengths & Opportunities)	Negative (Weaknesses & Threats)
Haut Bafing proposed National Park		
Internal	**Strengths:** • Important number of chimpanzees • Food taboos limiting hunting pressure on chimpanzees • Communities are highly aware about chimpanzee's conservation • Natural habitats preserved • Clear separation between habitats occupied by chimpanzees and anthropic areas so low possibilities of conflicts.	**Weaknesses:** • Strong tradition of hunting affecting wildlife in general • Need to assess the remaining carrying capacity of the ecosystems • Saturated land, little space usable by displaced people following the developments planned in the short term (Dam, Park), risk of increase of anthropic pressures on natural habitats. • Bush fires practice in natural habitats occupied by chimpanzees • Area far from GAC settlement zone
External	**Opportunities:** • Reduction of non-native hunters intrusions by a reinforcement of the future park surveillance services • Surveillance reinforcement in the future central protected areas (especially against bush fires).	**Threats:** • Classification of a park involving relocation of actual inhabitants (especially along the Bafing River) so consequently their relocation in an area that is already highly occupied. • Construction of a dam along the Bafing River • Destruction by the flooding of big surface areas currently occupied by chimpanzees. • Intensification of hunting pressure in general, due to the increase in demand for bushmeat

		in the bordering areas that are empty. • The risk that the hunting pressure on chimpanzees increasesdue to the influx of non-native hunters that do not respect the local traditions.
Badiar Area (including N'Dama Forest)		
Internal	**Strengths:** • Food taboos limiting hunting pressure on chimpanzees • High awareness of chimpanzee protection and of biodiversity in general • Natural habitats preserved in the central areas • The park had already been created, so relocations and compensations have been undertaken, and infrastructures and staff are already in place. • Isolated area far from the sites creating hunting pressures. • Area located at 1 day drive from GAC	**Weaknesses:** • Bush fires • Agricultural encroachment
External	**Opportunities:** • Improvement and reinforcement of existing surveillance.	**Threats:** • The area is being opened up by the repair of roads. • Forest N'Dama will be more affected than the central areas of the northern border. • The opening will induce an increase in anthropogenic pressures on ecosystems and in particular an increase in hunting pressure from non-native people coming from south or east Guinea.
Koumbia Forest Area		
Internal	**Strengths:** • Close to GAC.	**Weaknesses:** • Few chimpanzees (in the words of the local communities).

	• Food taboos limiting the hunting for food. • Few small gallery forests consisting in the chimpanzees habitat.	• Bush fires practice • Highly degraded forest cover, especially by a general production of charcoal. • High level of anthropisation. • Slaughter of chimpanzees when there is conflicts on crop products (red flag), suggesting a higher risk of deadly conflicts generated by the increase of the chimpanzees population in case of the establishment of a conservation area.
External	**Opportunities**	**Threats** • Continuous degradation of remaining natural habitats (gallery forests). • The charcoal demand is increasing.

Sylvatrop's perspective on the short-listed offset sites is summarised as follows:

Badiar/N'Dama

- Preferred offset site for chimpanzee conservation, particularly the north-eastern and central areas of the park (towards Lansanaya), because the areas bordering Senegal seem to be less subject to the pressures expected by the future developments of the region (e.g. road repairs).
- The northern part is also better connected to conservation areas located in Senegal.
- N'Dama Forest would also make a good conservation area especially because it could be relatively easily connected (by natural corridors) to the others central areas of Badiar. But this forest is more exposed to future development pressures (e.g. roads).
- Chimpanzees are generally respected across Badiar, they are not consumed and hunting activities are limited, areas used by local inhabitants don't overlap with chimpanzee habitat which has enabled these natural habitat areas to be preserved. The area is isolated and far enough from Senegalese or Guinean urban sites known as cities where people eat monkeys or are engaged in the trafficking of baby chimpanzees (as it is the case of Boke and Conakry).

Haut Bafing proposed National Park

- Considered very interesting but threats related to the classification of the park (relocation of communities along the river) on one hand, and the establishment of a dam (relocation of communities and destruction of natural habitats by flooding) on the other hand, will greatly change

the social and economic morphology of the area, and it may produce high pressures on the adjacent areas, decreasing the benefit obtained by the protection of the central areas.
- There is a strong local tradition of hunting, including from non-native people coming from Forest Guinea, to meet the growing demand for bushmeat.
- Chimpanzees could be protected by raising awareness and reinforcing the decentralized technical services skills.

Koumbia Forest

- Not considered a suitable area for chimpanzee conservation.
- The natural habitats are highly degraded and will continue to be degraded in a more intensive way as long as the charcoal demand will remain important and as long as the agricultural expansion will exist through slash and burn farming.
- Chimpanzees are neither protected nor respected as they are in Haut Bafing and Badiar. They are regularly killed in case of conflict, especially when crop devastation occurs.

During the field visit Sylvatrop identified some key activities to support conservation of chimpanzees in the offset sites:

- Control access to offset areas by hunters from outside the area;
- Conduct a socioeconomic study on the "bushmeat industry" and assess relationships between hunters and landowners/permanent inhabitants of the offset site;
- Empower anti-poaching agents to be active in the field by providing travel and means of communication, appropriate training and building technical skills to facilitate anti-poaching and awareness;
- Assess the feasibility of planting fruit trees (especially mango and orange) exclusively for chimpanzees to limit human-wildlife conflict caused by chimpanzees stealing from the cultivated areas of local inhabitants;
- Strengthen and enhance local beliefs about the value and importance of conserving chimpanzees (possibly in collaboration with Muslim leaders and/or local witch doctors);
- Conduct a socio-anthropological study to understand the hunter organizations "donso" (in the case of Bafing). The objective is to strengthen the status of hunters (as a guide or eco-guards) and also encourage them to only practice selective hunting and perhaps participate in conservation endeavours as wildlife managers.

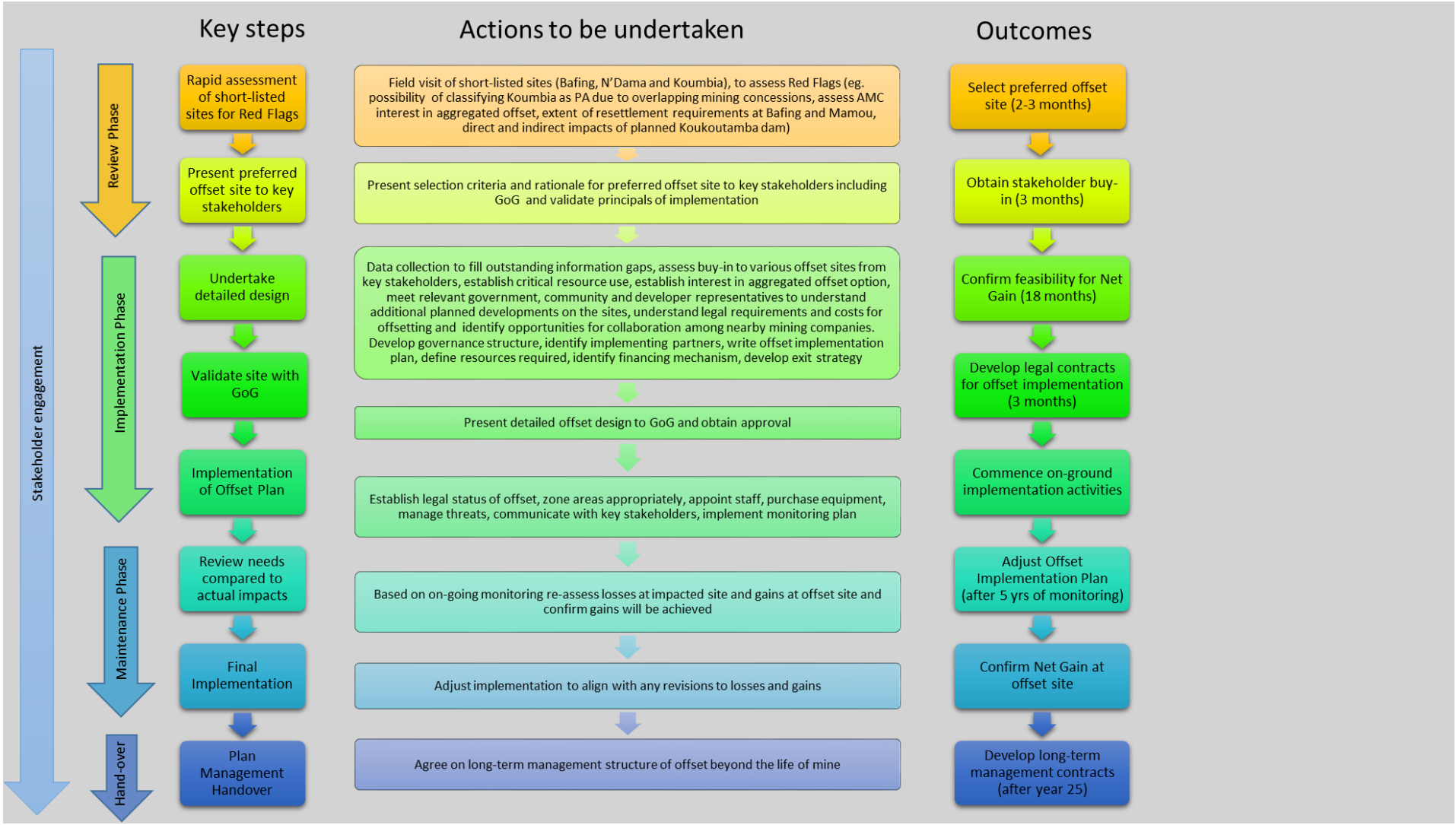


Figure 20 : Main steps for offset implementation

6.2 Key steps

6.2.1 Review and feasibility

The most immediate step is to finalise the choice of an offset site so that detailed feasibility assessment can begin. A first step will be to identify potential 'red flags' that might preclude a particular offset site from being included and so narrow down the list of choices. The major possible 'red flags' identified and means to address them are presented in Table 17 below.

Table 17 : Potential 'red flag' issues and potential means to address them in each site

Site	Potential 'red flag' issues	Potential means to assess
Badiar Biosphere Reserve and Koumbia	Limited number of chimpanzees. The Net Gain may therefore take longer to achieve and costs of implementation will be increased High rate of degradation Gov't willingness to designate all or part of Koumbia as a protected area	Rapid assessment of chimpanzee numbers and human pressure (field-based recce and transect surveys) Rapid assessment of deforestation/degradation rates (use radar data to assess AGB) Engage with GoG to evaluate probability of bauxite mining occurring in Koumbia
Proposed Haut-Bafing NP	Risk of significant resettlement required Impacts of planned dams and other mining activities on chimpanzees	Rapid socio-economic survey (PRA-style) to assess potential for effective conservation of chimpanzees without resettlement of local populations Model potential impact of dams and other mining activities on chimpanzees (habitat loss, displacement +indirect impacts) and re-assess offset feasibility

Once major red flags have been assessed a site can be selected and initial approval sought from the GoG. It is essential that there is strong GoG buy-in to the choice of offset site to avoid risks of developments incompatible with offset site statues. The National Biodiversity Offset Commission that has recently re-started meetings may be an effective means of ensuring good communication and understanding by government.

It would also be advisable to consult stakeholders more widely at this stage, notably expert chimpanzee conservation stakeholders such as the IUCN Primate Specialist Group Section on Great Apes.

Once a site has been selected, detailed feasibility assessment can begin. The main steps of detailed feasibility assessment are outlined in Figure 21 below and details about each step are provided in Table 18.

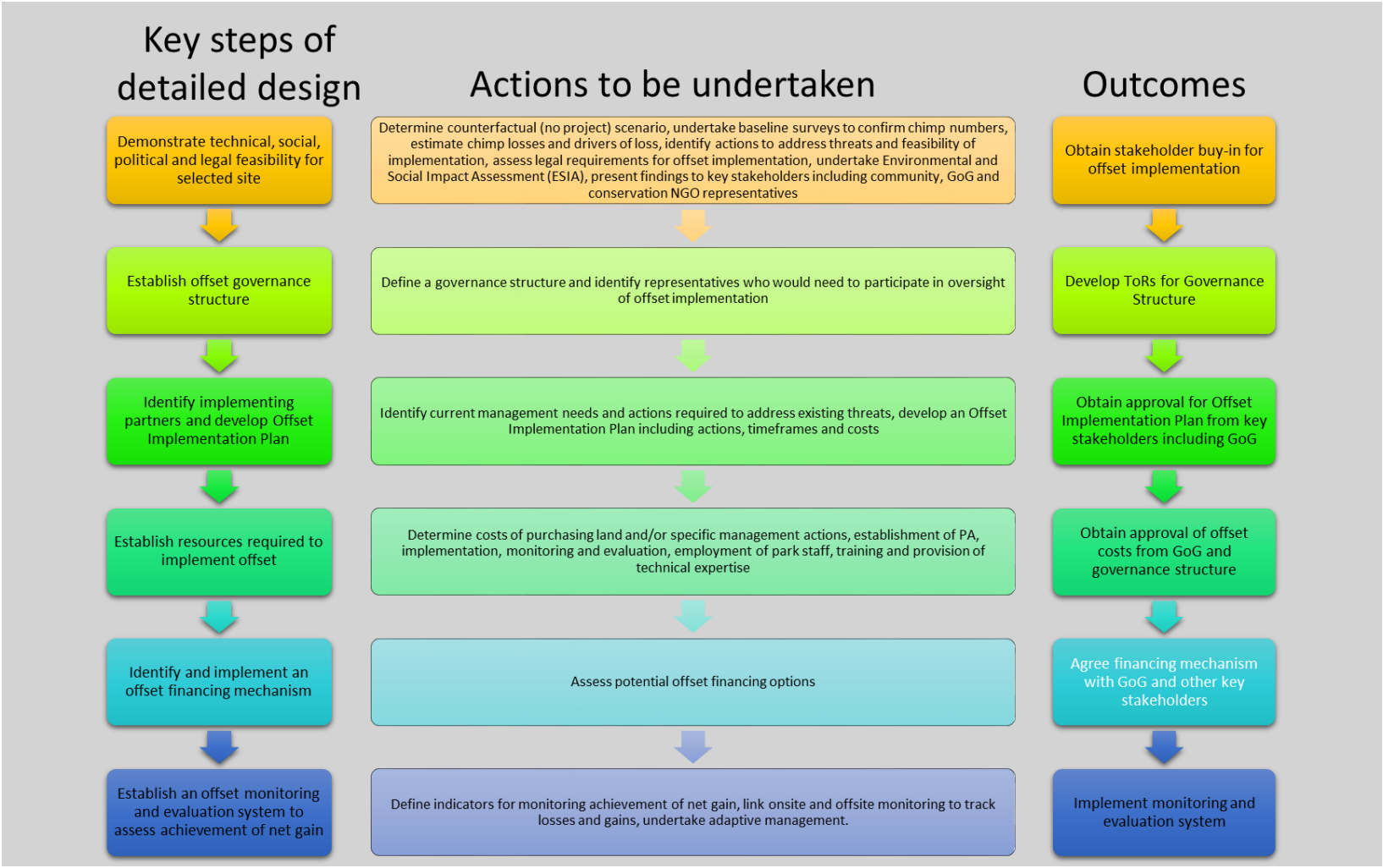


Figure 21 : Principal steps required for detailed design at an identified offset site

Table 18: Summary of activities required for demonstrating technical, social, political and legal feasibility of a selected offset site

Action	Details	Approach
Determine background rate of chimpanzee losses and develop counterfactual for chimpanzees at offset site	Assessing gains requires predicting the without-Project or counterfactual scenario. This should be informed by site-specific data.	Historical analysis of deforestation rates; Rapid chimpanzee and hunter-sign surveys (recces/transects) where data not available; Support with interviews with local residents; Review potential future scenarios with informed stakeholders and model effect of each; Expert input to help predict background threats and future losses at offset site.
Update forecast of chimpanzee losses at GAC concession	Integrate full results of on-going complementary studies on chimpanzees to refine estimates of potential losses	Assess additional camera trap and/or other data collected by Sylvatrop/WCF and integrate into estimates
Threats assessment at offset site	Evaluate the principal threats to chimpanzees at the offset site (e.g. hunting vs habitat loss) and identify the drivers (e.g., local consumption vs trade of bushmeat)	Socio-economic survey PRA methods + (household survey), supported by key informant interviews Recording presence of hunter sign during chimpanzee surveys Use of specialist techniques to assess illegal hunting may be appropriate (e.g. unmatched counts technique).
Identify offset actions	Identify plausible interventions to address threats and clearly document expected theory of change	Develop in workshop format with key stakeholders and appropriate technical expertise
Ensure offset will provide additionality by confirming offset site is under threat and government lacks resources to address threats and protect site without support from offset.	Assess government resources and land use planning including protected area management plans. Ensure there is a long-term plan to continue to protect and manage the area beyond the offset.	Review government management plans for the zone (e.g., regional development plan). Statement from government presenting case for the need of support from offset.
Undertake updated loss-gains forecasting	Demonstrate that Net Gain is feasible for chimpanzees through an updated loss-gains forecast of chimpanzees based on 1) distribution and population data and 2) offset actions to address key threats.	Update the loss-gain forecast presented here with improved data; validate in a workshop with key informed stakeholders.

Action	Details	Approach
Confirm political feasibility of achieving offset	Confirm that the proposed offset site has the political support for protection and that government is able to ensure long-term protection of offset site.	Review government management plans for the zone (e.g. regional development plan). Engage with relevant central and local government departments and other relevant stakeholders (e.g. NGOs, communities).
Develop and implement a stakeholder engagement plan	Ensure key stakeholders are appropriately engaged to avoid resistance to offset development	Review national/international NGO, community, government and other potentially relevant stakeholders. Identify which stakeholders need to be consulted when in the offset implementation process, including the type of engagement (e.g. inform, corroborate, seek approval etc.). Develop a map of key community stakeholders in the area to direct further information gathering for social team. Develop a plan for engaging with key stakeholders (when, why, how). Develop materials for presenting to stakeholders (e.g. offset strategy and presentation materials). Implement agreed stakeholder engagement plan, including mechanisms for adaptively managing the plan where required.
Develop a governing body to provide oversight for offset implementation	Ensure that there is a clear and transparent mechanism for decision-making about the offset site	Develop a governing body to provide oversight to offset implementation including appointing a board, advisory members and implementing partners (including other potential industry partners). Agree timeframes for implementing offset actions. Agree roles and responsibilities.
Third-party review of offset design	Ensure the offset design meets international standards of good practice	Disclose offset strategy to key chimpanzee conservation stakeholders for review, adapt as appropriate.
Establish implementation framework	Agree overall framework for offset with implementing stakeholders	Develop a draft governance structure approved by internal stakeholders and aligned with government expectations and legislation. Ensure links and integration to appropriate finance mechanism. Discuss/negotiate governance structure with government.
	Set in place a legally binding offset agreement	Finalise structure, ToR and establish formal contracts for offset implementation. Contracts to be signed by GAC, government and implementing stakeholders, as appropriate.

6.3 Offset cost estimates

To ensure GAC achieves a Net Gain for chimpanzees a strategy for financing the offset needs to be developed and long-term financing secured. At this point an offset site has not been selected so only an order of magnitude estimate of overall costs can be made. There are few data on the cost of conservation in Guinea so we 1) made a bottom-up estimate of running costs of a protected area and 2) triangulated using available data to produce a range of estimates.

6.3.1 Estimating offset costs

The following assumptions were used to estimate offset costs:

- A set-up period of approx. 24 months;
- 20 years of full investment to achieve a Net Gain;
- 20 further years of 'maintenance' investment to ensure gains are maintained at least as long as impacts. We estimated maintenance costs to be 40% of running costs;
- These costs are actual 'on-the-ground' costs and do not consider any cost of administration, overhead or fund creation or endowment.
- Based on rough estimates of the major components of protected area running costs20, scaled to Guinea costs we estimated an overall cost for offset implementation. We use a high and low scenario to illustrate the possible range of uncertainty but stress that these are guideline figures only that should be re-assessed once a site has been selected. This process produced estimates of c.US$15.5m - US$23m. Costs have neither been scaled for future inflation nor discounted for NPV.
- These cost estimates may need to be revised if CBG are already funding the offset program and GAC and CBG collaborate on a joint offset.

Table 19 : Illustrative estimate of offset costs (see Appendix 5 for details)

Cost component	**'Optimistic' scenario**	**'Worst-case' scenario**
Steps prior to implementation (feasibility, technical design and stakeholder engagement) (on-off)	650,000	985,000
Initial establishment costs (one-off)	700,000	1,000,000
Implementation costs (annual, during net-gain period) – annual average	500,000	750,000
Maintenance costs (annual, after Net Gain period) – annual average	200,000	300,000
Cost calculation		

[20] Personnel, infrastructure, operations, community engagement and development, training, studies and monitoring.

Steps prior to implementation (feasibility, technical design and stakeholder engagement)	650,000	985,000
Initial establishment costs	700,000	1,000,000
Implementation costs (20 years)	10,000,000	15,000,000
Maintenance (20 years)	4,000,000	6,000,000
Total offset costs	**$15,350,000**	**$22,985,000**

6.3.2 Triangulating cost estimates

There is no standard estimate of Protected Area (PA) management costs. Globally, published estimates of protected area expenditure vary by more than seven orders of magnitude: from $0.10/ha/year to over $1m/ha/year (Balmford *et al.* 2003) and a global review of protected area running costs suggested that actual levels of funding for protected areas in Africa were about US$240/km^2 and the required level was about US$458/km^2 (James *et al.* 1999; costs have been scaled to 2015 dollars). However, many protected areas are not effective and so published expenditure estimates are not necessarily a good guide to the investment required to reliably achieve conservation gains (Bruner *et al.* 2004). Published estimates suggest protected area funding in Africa is frequently only 35-45% of requirements (Githiru *et al.* 2015).

This means it is hard to apply estimates of running costs of other protected areas to Guinea. Using the high and low estimates of James *et al.* (1999) and assuming an area of 2000km^2 being managed would produces a range of estimates from $15m-$27m under the same assumptions as above (20 years to Net Gain, 20 year maintenance), which is roughly the same order of magnitude.

A KfW-supported programme for managing 6 classified forests in Guinée Forestière which was widely regarded as successful while it operated has a budget of approximately $7m for 6 classified forests (about 2,700 km^2 in total) or about $1.2m/protected area/year. This was in an extremely challenging region for conservation (high population density) and the budget was not uniquely for protected area management so actual costs per protected area were likely lower.

This suggests that the offset cost estimates made above are roughly compatible with cost estimates from elsewhere, but that considerable refinement is necessary during the process of feasibility assessment.

6.3.3 Co-funding and additionality

It may be possible for GAC to seek co-funding for the offset, including from government or from other companies. However, this does not necessarily automatically reduce the cost to GAC of delivering offset gains:

A risk of supporting a protected area as part of an offset is that offset funding displaces existing funding so reducing the effective level of biodiversity gains generated (e.g., Pilgrim & Bennun 2014). To avoid this risk, we therefore suggest that the offset agreement with GoG be pegged to the government maintaining some

mutually agreed upon level of funding based on current and projected funding to similar protected areas in Guinea (as recommended by Githiru *et al.* 2015 for example).

It may also be possible for GAC to seek co-financing from other companies (e.g. CBG or RUSAL) who may also be interested in participating in GAC's offset. It is possible that with another company investing in an adjacent area as an offset, there may be economies of scale and so the level of biodiversity gains per dollar could be increased. However, if GAC seeks co-financing to invest in a single site, the biodiversity gains should be divided pro rata based on the amount of funding each contributor makes (see Temple *et al.* 2012 for an example).

7 Monitoring and evaluation

Monitoring the effectiveness and implementation of offset and mitigation activities is essential to enable progress to be evaluated and adaptive management implemented if required. Given 1) the high level of uncertainty around potential losses and gains and 2) the special status of chimpanzees, effective monitoring and evaluation will be critical to ensure that mitigation and offset actions are appropriate and to clearly demonstrate this to stakeholders.

This section provides an overview of approaches and possible challenges for monitoring and suggests a process for evaluating results. The detailed methods and thresholds for monitoring chimpanzee populations and pressures on them will need to be developed once offset site selection is finalised. While a standardised monitoring protocol should be followed, monitoring should itself be adaptive and the intensity and/or coverage of monitoring adjusted to respond to new data or particular concerns.

7.1 Monitoring implementation

7.1.1 On-site

Implementation of the mitigation measures identified in Section 0 should be tracked using simple verification of implementation. This process should be integrated into the Project EMS and BMS which itself will be integrated into the wider Project Environmental and Social Management System. GAC should consider appointing a Biodiversity Manager (as CBG has done) in charge of monitoring implementation of chimpanzee mitigation actions.

The implementation of a public-private-partnership for controlling hunting and the development of alternative sustainable livelihoods both require enhanced monitoring to ensure effectiveness. These should be developed as part of the detailed design of these actions:

- For control of hunting, use of standard software packages such as SMART enables more effective design and tracking of interventions. Such a system should be established with appropriate expertise and training.

- For sustainable livelihoods a clear 'theory of change' is required to ensure that interventions are designed to potentially reduce hunting or habitat clearance (see for example Coad & Wicander 2014); an appropriate monitoring approach should be developed as part of the design of implementation with the support of a competent professional.

Monitoring of rehabilitation should include specific indicators linked to ensuring suitability of rehabilitated habitat for chimpanzees. As it may not be possible to restore the habitat to it original species diversity and composition, emphasis should be place on connecting forest patches using fast-growing species. Enhacement to habitat connectivity in degraded areas or recently burned areas should be made around plateaus that are expected to be mined. Trial rehabilitation should be started early on using seedlings of species used by chimpanzee for nesting and feeding, to assess the possibility of rehabilitating the mined areas after closure to make them suitable chimpanzee habitat.

7.1.2 Off-site

The process of implementation of this offset strategy can be monitored using a number of simple, objectively verifiable outputs as shown in Figure 22 below. These indicators track progress along the process rather than results, but, together with a robust evaluation process (see below) would provide assurance that the offset strategy is being effectively implemented.

The Management Effectiveness Tracking Tool (METT) is a widely-used and simple tool for evaluating the effectiveness of protected area management (Stolton *et al.* 2007). It focuses on assessing management processes (such as definition of goals), adequacy of inputs and training, and would be appropriate for tracking the overall effectiveness of management of the chosen site, if complemented by detailed review.

We suggest that regular third-party reviews of offset site management take place. A reasonable frequency would be for these to take place once every two years for the first eight years of management, with the frequency potentially being reduced (to once every 3 or 4 years) thereafter.

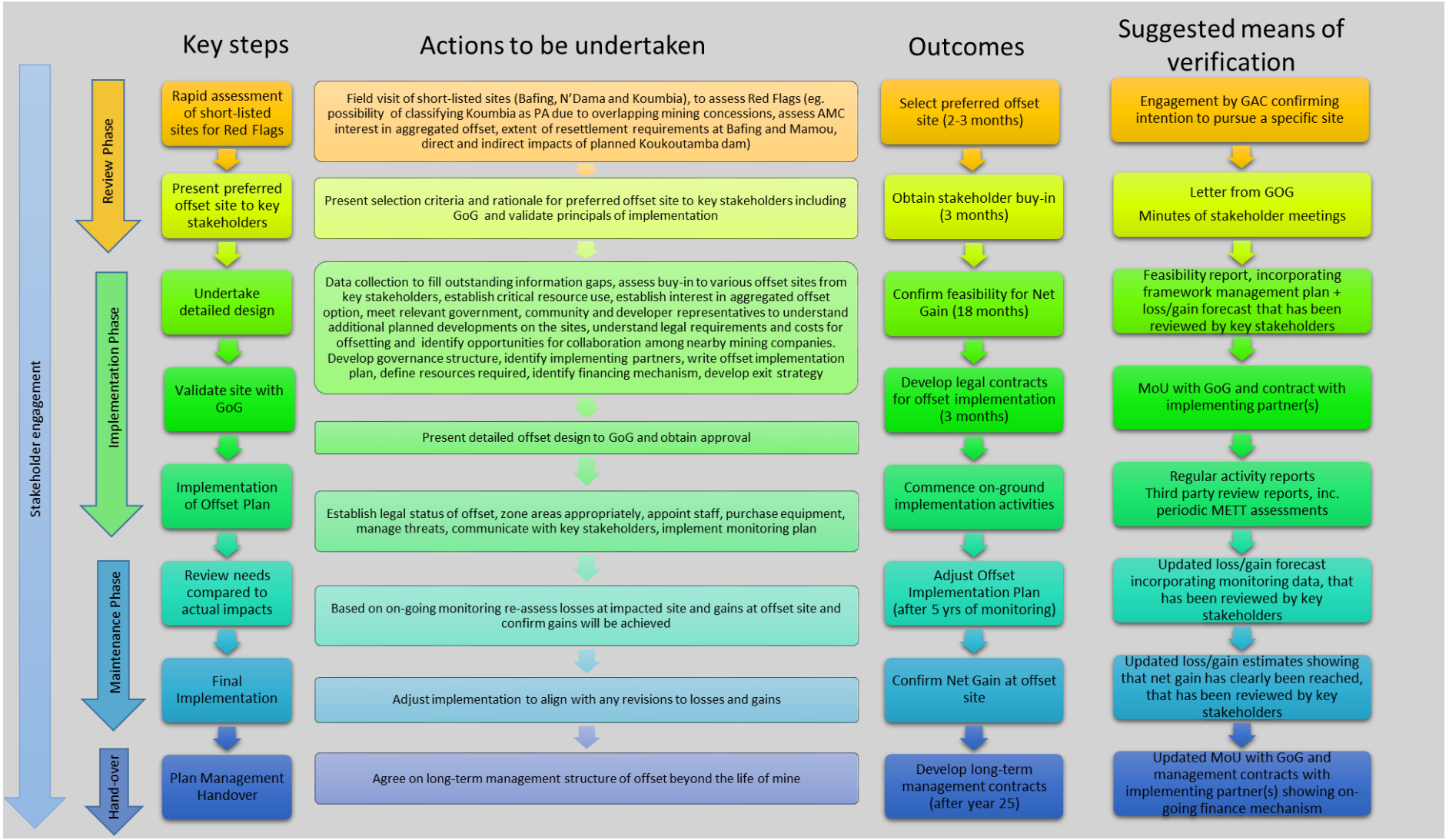


Figure 22 : Suggested objective means of verification for the process of offset implementation

7.2 Monitoring outcomes

An important part of a full feasibility study will be to asses and confirm which metrics will be used to measure a Net Gain. Measuring actual changes in chimpanzee numbers to a high level of precision may not be feasible, particularly at large offset sites. It may be appropriate to consider more detailed indicators about population structure, relative abundance and general health (e.g., measured by body condition).

Given the difficulty and potential time lags in monitoring chimpanzee populations, it is essential to also monitor pressures since 1) pressures are frequently easier to measure, 2) pressures can change more rapidly and serve as an early warning indicator of population changes and 3) they are most clearly linked to conservation interventions.

7.2.1 On-site

The principal objective of on-site outcome monitoring is to measure actual impacts. We suggest a two-scale approach:

- Intensive targeted surveys based on a hypothesis-testing approach aiming at understanding the potential impacts. Since noise disturbance, reduced reproductive rates and inter-group conflict are potentially the most significant impacts, surveys should target understanding these impacts.
- Concession-wide monitoring of chimpanzee population size, group numbers and occupancy/location in most-used chimpanzee habitats, habitat availability and distribution.

The hypothesis-testing approach could, for example, involve assessing chimpanzee presence in specific areas at different distances from a plateau to be mined before, during and after blasting occurs. Given the habitat heterogeneity and the relatively small number of chimpanzees, camera trapping is likely to be the most effective approach for targeted surveys. Unlike nest counts, camera trapping can also allow evaluation of 'early warning' indicators such as body condition and population structure if capture rates are sufficiently high.

At the scale of the entire concession, a combined distance-based nest-count survey would probably be appropriate. Given the wide variation in chimpanzee nest encounter rate between habitats, a stratified sampling approach is essential to minimise variation[21].

We strongly recommend upfront investment in expert design of a monitoring programme, including a pilot survey and peer-review of methods. It would be appropriate to separate the roles of data collection and data analysis or at least to include detailed independent third-party review at all stages.

[21] For example the repeated surveys undertaken on GACs concession that were not stratified still have a very large confidence interval after 5 years of surveys and would likely only allow impacts to be detected after a long time frame.

7.2.1.1 Pressure monitoring

Key pressures that should be monitored are: 1) rate of habitat loss and degradation and 2) hunting.

Given the relatively small size of the area a combined remote-sensing and ground survey approach for assessing habitat loss is likely to be appropriate. If feasible[22], measurement of canopy cover or above ground biomass using radar images could be a cost effective means of tracking loss and degradation across the habitat types most used by chimpanzees. Ground surveys could include a number of fixed plots to allow calibration of radar images and a wider qualitative assessment using a condition score approach (see for example Hawthorne *et al.* 2011).

Monitoring of signs of hunting should be an integral part of the hunting control programme (see Box 1). It is unlikely to be feasible to measure the level of hunting of chimpanzees directly, but rather an overall index of hunting pressure based on encounter rates of snares and other hunting signs. Surveys of bushmeat trade may be appropriate but are most useful when linked directly to enforcement effort (i.e. they should be seen as intelligence-gathering rather than monitoring *per se*).

7.2.2 Off-site

Monitoring of chimpanzee population size at offset sites will be challenging since 1) the required gain is small in proportion to the overall population and 2) even under an ideal scenario the precision possible from surveys across a wide area will be low[23]. A pilot survey at offset sites will be essential to develop a robust and properly stratified but feasible survey design. It will likely be appropriate to ensure survey designs will allow an assessment of occupancy as a fall-back if adequate precision in population size is not feasibly attainable.

As for off-site monitoring, it will likely be appropriate to monitor at two scales:

- Site-wide monitoring to look at large-scale trends in population size (and occupancy) and distribution;
- More intensive site-specific monitoring to measure 'early warning' indicators such as population structure and body condition and to test hypotheses about how interventions are working.

7.2.2.1 Pressure monitoring

Given the probable lack of precision in population estimates, monitoring of pressures will be an essential complement. The pressures to be monitored and appropriate methods and frequency will depend on the specific offset site and should be chosen based on the theory of change developed in the management plan

[22] Since gallery forest are sometimes in quite steep-sided valleys some radar images may not be appropriate.

[23] A coefficient of variation (CV) of 15% would be excellent, 20-30% is not unlikely given a reasonable level of effort.

for the site. At a minimum pressure monitoring should include the extent and condition of vegetation types most used by chimpanzees and hunting signs.

7.3 Evaluation and assurance

Evaluation of monitoring data compared to expected trends is an essential step in implementing adaptive management. An important part of evaluation is to establish thresholds (e.g. "A decline of average chimpanzee body condition of one condition class") that, if crossed, triggers further review and potentially corrective action. Two types of threshold should be established:

- Early warning or 'orange' thresholds that suggest that either impacts or gains may be deviating significantly from expect trends so corrective action may be necessary.
- Alert or 'red' thresholds that suggest significant deviation from expected trends to the extent that the Project's ability to deliver a Net Gain may be jeopardised and a comprehensive review and urgent and extensive corrective action may be required.

Thresholds should be established as part of an initial loss-gain forecast based on baseline data collected as part of offset feasibility and should themselves be peer-reviewed to ensure that they are sufficiently sensitive.

We propose that evaluation of monitoring results take place at a series of frequencies:

- On-site: Regular evaluation by GAC's environment team and advisors – annually or twice annually;
- Off-site: Independent third-party review, initially every 2 years, but potentially less frequently after offset sites are established and clearly delivering gains.

Evaluation at the offset site should be funded as part of offset finance, including the flexibility to rapidly mobilise funds for review and investigation when thresholds are breached.

8 Conclusions

This report has assessed the feasibility of biodiversity offsets to deliver a Net Gain for populations of the West African chimpanzee (*Pan troglodytes verus*), given predicted impacts from the GAC Bauxite Export Project. This initial assessment will help support the development of a full feasibility assessment that will enable a final approach to reaching a Net Gain to be selected and implemented, in collaboration with the Government of Guinea (GoG) and other stakeholders. This rapid pre-feasibility assessment has been based on available (limited) data, on the mine plan shared by GAC in January 2016 and on initial stakeholder consultations.

Through its Bauxite Export Project, potentially being partially funded by the IFC, GAC has the opportunity to demonstrate practical application of the mitigation hierarchy and the implementation of an offset leading to a Net Gain for chimpanzees. Such an initiative would be pioneering for the mining sector in Guinea. The GoG recognises that biodiversity offsets need to be tackled at the national scale due to the likelihood that

numerous bauxite projects, located in close proximity of each other, may commence simultaneously. To this end changes in policy are being investigated and the timing may be suitable for interested parties to collaborate and work towards shared biodiversity conservation objectives through Aggregated Offsets. GAC has the opportunity to lead the way forward on offset development in Guinea. Success of the offset would require further targeted research, stakeholder support (from e.g. government, NGOs, recognised chimpanzee experts, local villagers in both the concession and at the offset site), finance and where possible collaboration between neighbouring mining companies. Three alternative sites (or combination of sites) have been short-listed for further investigation and the northern part of the proposed Haut-Bafing National Park appears to be the most favourable option.

Key conclusions:

Impacts and mitigations:

- Considerable uncertainty exists about the types and magnitude of impacts on chimpanzees. This is related to poorly studied and /or understood chimpanzee response to noise impacts. Furthermore, uncertainty exists regarding impacts on chimpanzee movement across the landscape and access to food resources due to mining of plateaus.
- Specific ecological and behavioural features of chimpanzees mean impacts could be multiplicative and highly significant – loss of c.30-60% of the local population is possible and a complete loss of its viability cannot be ruled out;
- The Project has already committed to undertake a range of effective avoidance and minimisation measures to mitigate impacts to chimpanzees. Additional avoidance and minimisation measures identified by TBC will be investigated in greater detail and potentially incorporating in later mine plans and/or engineering design and could help to further mitigate Project impacts;
- Residual impacts to chimpanzees are unavoidable; reaching a Net Gain will require offsets;

Offset feasibility:

- One or more off-site offset(s) are required to deliver an overall Net Gain;
- Potentially feasible off-site offset options include the proposed Haut-Bafing National Park, or a portfolio of sites (e.g., Badiar N'Dama Reserve and Koumbia) that each support smaller chimpanzee populations;
- Potential obstacles to achieving Net Gain exist at each of the short-listed sites have been identified. This report identifies 'Red Flags' that require further investigation to finalise the offset site selection. An offset implementation framework is presented, with an initial focus on selection of a preferred offset site;
- Uncertainty exists in offset gain rates. Although these are considered to be technically feasible for the Project, delivery is expected to be challenging in the Guinean context. Limited data and the difficulty of predicting the success of chimpanzee conservation measures with precision means that estimates of possible offset gains have wide confidence limits.
- Given the level of uncertainty in both impact magnitude and offset gain rates, an adaptive approach to estimating offset requirements is appropriate, in which offset actions and associated funding are

based on an initial precautionary estimate of impacts. These estimates can then be refined as monitoring helps determine actual impacts as well as the feasibility of delivering gains. We recommend a 5-year timeframe for refining these estimates;

Recomendations:

- Recommendations for additional data gathering requirements on both the GAC concession and at the preferred offset site(s) have been provided.
- Given the sensitivity of offsets for chimpanzees, and the necessity to plan for chimpanzee conservation beyond this Project, we strongly recommend a wider process of stakeholder consultation be conducted during the feasibility stage to alleviate stakeholder concerns and obtain buy-in to the offset implementation process. Apart from the Guinean Government and local stakeholders, this could include consultation of the Section on Great Apes of the IUCN Primate Specialist Group and the Scientific Committee of the Great Ape Survival Partnership (GRASP).
- Multi-stakeholder support is a pre-requisite of successful offset implementation and ultimately achievement of Net Gain.

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Appendix 1 Estimation of the minimum population at offset site

Appendix 1.1 Minimum size of population at potential offset site(s)

Offset requirements were defined as the minimum size of the chimpanzee population at the offset site to enable sufficient gains to achieve a Net Gain over a 18 year time scale. This is the most fundamental criterion to identify the best options for offset sites.

The following formula was used to calculate the minimum population based on the assumptions discussed in Section 0:

$$\boldsymbol{I = \frac{P_{imp}}{(R_0 + E \times (R_2 - R_0))^T - (R_0)^T)}}$$

Where:

- I is the minimum size of the initial population of chimpanzee at the offset site (ind.),
- P_{imp} is the population of chimpanzees impacted by the mine (ind.),
- R_0 is rate of growth at the offset site due to existing threats without intervention (possibly negative)
- R_1 is rate of growth at the offset site due to existing threats with intervention, ie R_0 + E x (R_2 – R_0)
- R_2 is the rate of natural growth with no threats
- E is the effectiveness of intervention to reduce the existing threats on chimpanzee at the offset site (0-1 without unit),
- T is the number of years to achieve a Net Gain (year).

The minimum population at the offset site(s) (I) was used as a preliminary threshold to screen the sites harbouring significant population of chimpanzee in Guinea and to make sure the screening focusses on sites (or combination of sites) likely to provide sufficient gains.

These thresholds were defined to facilitate the screening exercise and were not intended to provide a precise estimate of the potential gains at offset sites. These gains ultimately depend very much on the local context of the threats and the type of actions/level of effort planned. Further calculations, specific to each potential offset site, will be necessary to confirm their individual or collective potential to generate the required gains. These thresholds cover the range of possible scenarios to make sure all relevant sites receive the attention they deserve.

An illustrated example is given here below for the 'conservative' impact scenario where assumptions are as follows:

- P_{imp} is the population of chimpanzee impacted by the mine (ind.): 98,
- R_0 is rate of growth at the offset site due to existing threats without intervention (possibly negative): -1%/yr,
- R_1 is rate of growth at the offset site due to existing threats with intervention, ie $R_0 + E \times (R_2 - R_0)$: $0.99 + 0.5 \times (1.0165 - 0.99) = 0.33\%/yr$,
- R_2 is the rate of natural growth with no threats: 1.65%/yr,
- E is the effectiveness of intervention to reduce the existing threats on chimpanzee at the offset site (0-1 without unit): 0.5,
- T is the number of years to achieve a Net Gain (year): 18 years.

The minimum size of initial population at the offset site required to achieve a Net Gain in the given period is:

$$\boldsymbol{I = \frac{98}{(0.99 + (0.5 \times (1.0165 - 0.99)))^{18} - (0.99)^{18}} = 433\ ind.}$$

Gains forecasts over time period are illustrated in Figure 23. When starting with an initial population of 433 individuals as estimated above, a Net Gain is achieved after 18 years as expected. The chimpanzee population at the offset site increases slightly, meeting the objective of a "stable or increasing population".

Table 20 : Gain forecast over time at offset site (conservative scenario, without multipliers)

Year	Maximum possible population growth	Background scenario without offset	Scenario with offset	Net Gain
0	433	433	433	0
1	440	429	434	6
2	447	424	436	11
3	455	420	437	17
4	462	416	439	23
5	470	412	440	28
6	478	408	442	34
7	486	404	443	39
8	494	400	444	45
9	502	396	446	50
10	510	392	447	56
11	518	388	449	61
12	527	384	450	66
13	536	380	452	72
14	544	376	453	77
15	553	372	455	82
16	563	369	456	87

17	572	365	458	93
18	581	361	459	98
19	591	358	461	103
20	601	354	462	108
21	611	351	464	113
22	621	347	465	118
23	631	344	467	123
24	641	340	468	128
25	652	337	470	133

Rate of natural growth with no threats: 1.65%/yr

Rate of growth at the offset site due to existing threats without intervention: -1.00%/yr

Effectiveness of intervention to reduce the existing threats on chimpanzees at the offset site: 0.5

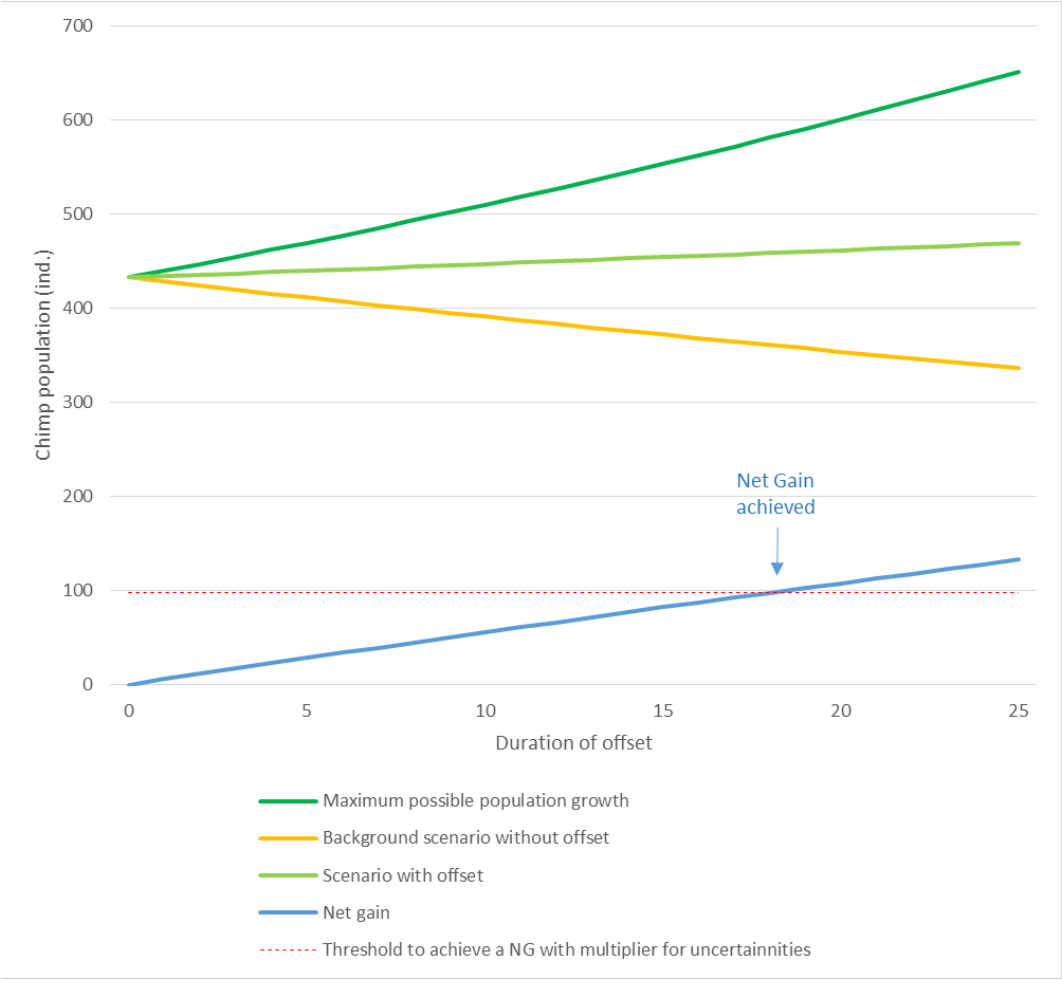

Figure 23: Gain forecast over time at offset site (conservative scenario, without multipliers)

Appendix 1.2 Effect of changes in some assumptions on gain forecasts

Gain forecasts in the offset sites use to define the 'minimum population size requested at the offset site' are based on a number of assumptions that have been set using the best available information (e.g.: growth rate of a chimpanzee population), or set as a desirable objective (e.g.: 20 years' time period to achieve a Net Gain.

However, uncertainties are associated with each of these assumptions. This is to accout for such undertainities that a multiplier is used in forecasts. Indded, small changes in the assumptions can lead to important changes in the gain forecast and so the minimum population size required at the offset site to achieve a Net Gain in the proposed period of 20 years.

To illustrate why the a multiplier us necessary and justified, a few examples of what could be the impact of a variation of such assumptions on gains forecasts are illustrated in Table 21 and Figure 23 for a minimum population size at the offset site of 433 chimpanzees (offset requirements of the 'conservative scenario' as defined in Section 3.7 and prior to consideration of multipliers).

Table 21: Examples of multipliers required to meet a Net Gain given different potential variations in key parameters

Example of uncertainty	Consequence on forecast	Needed minimum pop at offset site to achieve a NG in 18 years	Effective multiplier required
Threats at offset site are only reduced to 25% instead of 50% of existing rate	• NG is achieved after 45+ years • Popluation keeps decreasing	917	x 2.1
It takes 5 years before conservation actions reach expected effectiveness	• NG is achieved after 24 years	590	x 1.2 – x 1.4
Background scenario is of a stable population rather than a net 1% decline/year	• NG is achieved after 25 years	613	x 1.4
Actual intrinsic rate of population growth is 1%/year rather than 1.65%/year	• NG is achieved after 26 years • Popluation is stable	590	x 1.4
Actual chimpanzee population size at offset site is 1 standard deviation below the mean estimate (assuming a 33% co-efficient of variation)	• NG is achieved after 28 years • Popluation is increasing	"656"	x 1.5

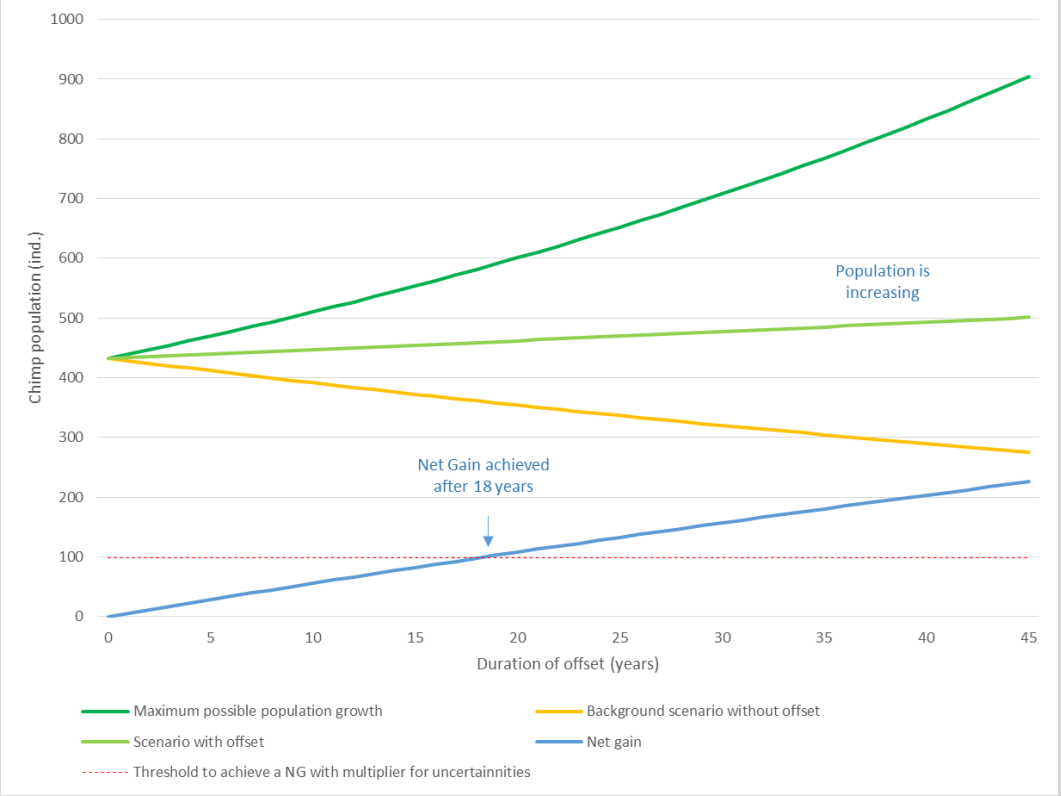

Figure 24: Gains forecasts at offset site (conservative scenario – without multiplier)

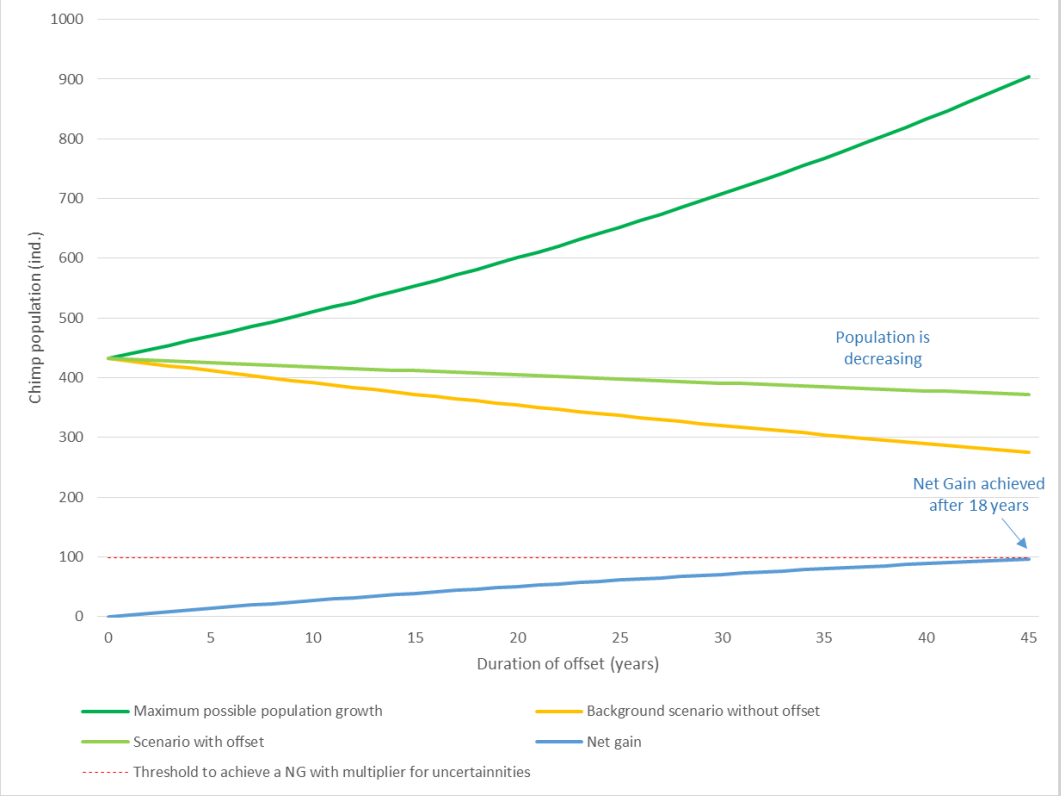

Figure 25: Gains forecasts at offset site if threats at offset site are only reduced to 25% instead of 50% of existing rate (conservative scenario – without multiplier)

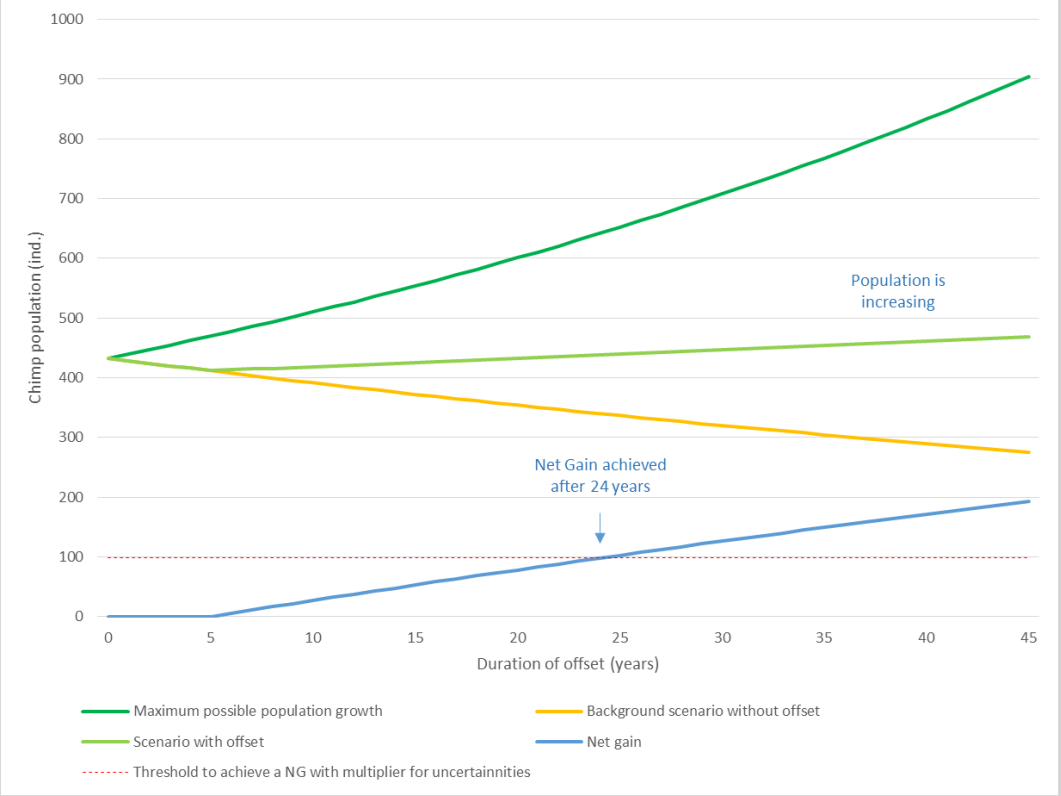

Figure 26: Gains forecasts at offset site if it takes 5 years before conservation actions reach expected effectiveness (conservative scenario – without multiplier)

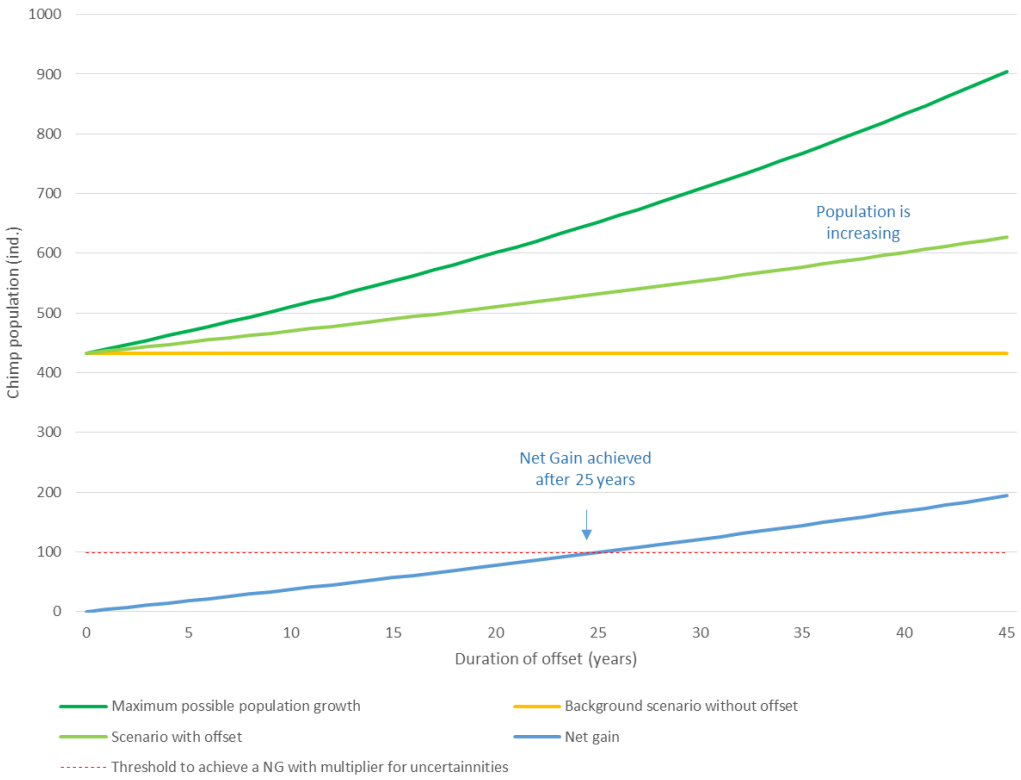

Figure 27: Gains forecasts at offset site for a stable population rather than a net 1% decline/year as a background scenario (conservative scenario – without multiplier)

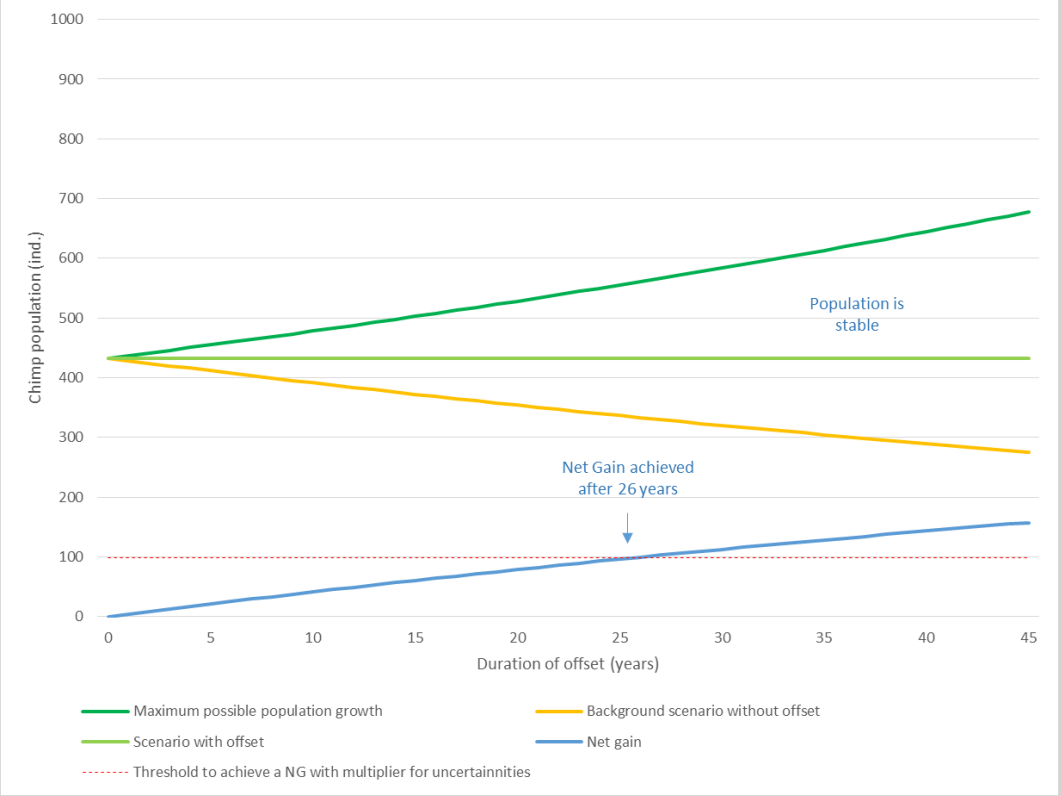

Figure 28: Gains forecasts at offset site for intrinsic rate of population growth of 1%/year rather than 1.65%/year (conservative scenario – without multiplier)

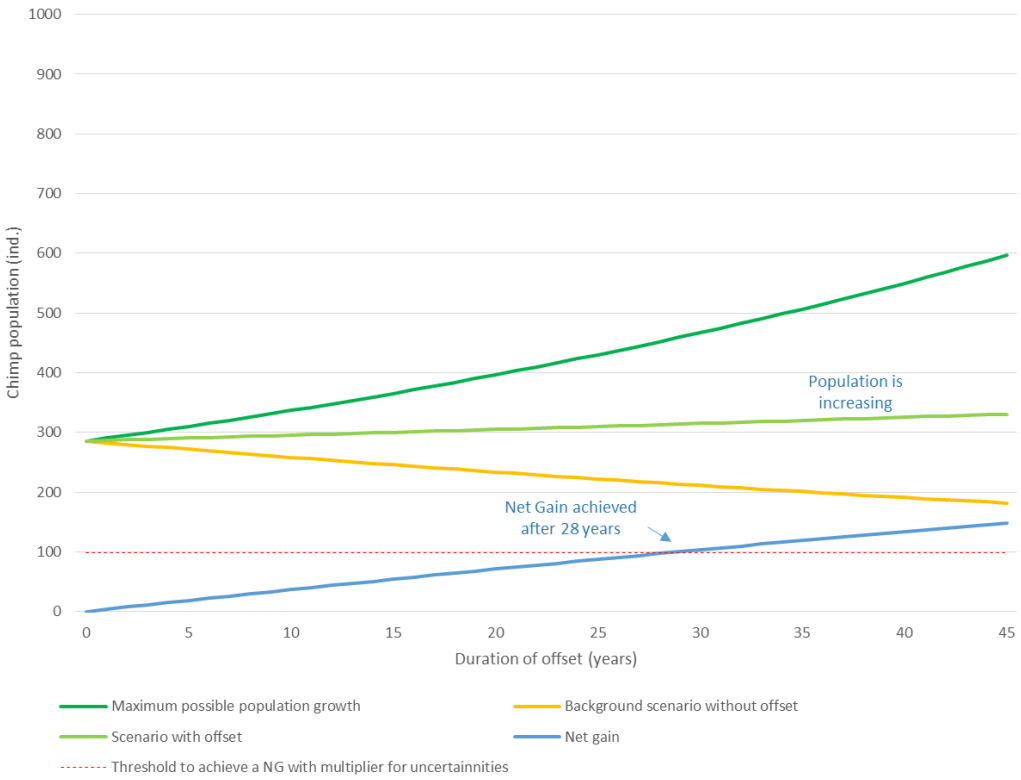

Figure 29 : Gains forecasts at offset site for an actual chimpanzee population size 1 standard deviation below the mean estimate (assuming a 33% co-efficient of variation) conservative scenario – without multiplier)

Appendix 1.3 Minimum area of potential offset site(s)

Detailed population estimates is not available in the literature for a few potential offset sites, even when they are known to harbour chimpanzees (e.g. Mamou Transboundary Area). The minimum population threshold was therefore converted into an area threshold using a density of (0.5 ind./km^2). The density used corresponds to the 'Worst-case' scenario of the densities calculated by WCF (WCF 2015e) in sites not located in Forested Guinea. Indeed, chimpanzee density is generally higher in forested areas where the carrying capacity of the habitat is higher (Nicolas Granier, *pers. comm.* 2015). This area threshold ensures that potential sites of interest could be considered even when precise population data was not readily available[24].

[24] Ie this is a precautionary over-estimate of possible chimpanzee numbers at the first step of the screening to ensure that sites are not unwarrantedly dropped at the first stage of screening. A more detailed assessment was conducted in the next step of the screening.

Appendix 2 Considered potential off-site offset sites not long-listed

Table 22 below lists the potential off-site offset sites considered but not included in the long list because they did not comply with the screening criteria (see cells highlighted in red) although in some cases (shown in italics) sites were included in combination with other sites for consideration as an offset site..

Table 22: Potential off-site offset sites considered but not included in the long list

Name	Protection status	Ecoregion	Area (km^2)	Approx. population of chimpanzees
Badiar NP	National Park (1985)	Guinean Forest-savannah Mosaic	382	20
Bakoun CF	Classified Forest, Core Area of the proposed Haut-Bafing NP)	West Sudanian Savannah	295	167
Bakoy	Ungazetted, KBA	West Sudanian Savannah	1,000	?
Balayan and Souroumba CFs	Classified Forest	Guinean Forest-savannah Mosaic	245	?
Bani CF and Dar Saloum CF	Classified Forest, Core Area of the proposed Haut-Bafing NP	Guinean Forest-savannah Mosaic	350	?
Déré CF	Classified Forest	Western Lowland Guinean Forest	89	0
Diécké CF	Classified Forest	Western Lowland Guinean Forest	640	80
Fello Digue CF	Classified Forest	Guinean Forest-savannah Mosaic	29	?
Gadha Woundou	Ungazetted	Guinean Forest-savannah Mosaic	?	47
APS Oure Kaba	Ungazetted	Guinean Forest-savannah Mosaic	490	86
Kounounkan Nature Reserve	Nature Reserve (formerly Classified Forest)	Guinean Forest-savannah Mosaic	50	?
Kouya CF (core area of the HNNP)	Classified Forest, Core Area of the Haut Niger NP)	Guinean Forest-savannah Mosaic	550	132
Mont Béro CF	Classified Forest	Guinean Montane Forests	270	?

Mont Nimba	Strict Nature Reserve; Biosphere Reserve; World Heritage Site	Guinean Montane Forests	125	177
Nialama CF	Classified Forest	Guinean Forest-savannah Mosaic	100	83
Pinselli and Soyah CFs	Classified Forest	Guinean Forest-savannah Mosaic	215	?
Reserve Naturelle de Kankan	Natural Reserve	West Sudanian Savannah	5,300	20
Sala CF	Classified Forest	Guinean Forest-savannah Mosaic	6	?
Source du Bafing proposed NP	6 Classified Forests + buffer area	Guinean Montane Forests	60	?
Souti-Yanfou CF	Classified Forest	Guinean Forest-savannah Mosaic	109	?
Tinkisso	Ungazetted, KBA	West Sudanian Savannah	500	?
Ziama CF	Classified Forest	Western Lowland Guinean Forest	1,200	20

Appendix 3 List of stakeholders consulted during the study

Table 23: List of stakeholders consulted during the pre-feasibility study

Institution	Description	Specialist consulted
Bureau Guinéen d'Etudes et d'Evaluations Environnementales (BGEEE)	Assessment and approval of Environmental Impact Assessment Monitoring of implementation of Environmental Action Plans	Mamadou Yette Diallo, Seydou Bari Sidibé
Cantonnement forestier de Wendeboure, Koumbia Préfecture	Management of the Classified Forests and forested areas	Mangue Manet
Direction Nationale de l'Hydraulique (DNH)	National Water Policy Management	Ibrahima Sory Camara
Direction Nationale des Eaux et Forêts (DNEF)	DNEF's mission is to design, elaborate and implement the Government Policy related to the sustainable management of forests and fauna.	Colonel Diallo, Mr Dia, Commandant Bangoura
Office Guinéen des Parcs et Réserves (OGUIPAR)	Management of the Guinean network of protected areas	Bakary Magassouba, Mamadou Saiba Keita, Mamadou Bhoye Sow
Senegal River Basin Development Organization (OMVS)	Regional cooperative management body of the Senegal River	
Guinée Écologie	National Conservation NGO	Mamadou Saliou Diallo, Muhammad Yaya Diallo, Mariam Savané
Sylvatrop Consulting	Local consultancy involved in the environmental assessment of the CBG Expansion Project	Sylvain Dufour, Nicolas Granier, Stéphane Bouju, Moussa Koné
Wild Chimpanzee Foundation (WCF)	International chimpanzee conservation NGO	Christophe Boesch, Virginie Vergnes
Alliance Mining Commodities (AMC)	Mining company with a concession	

	overlapping with the Koumbia potential offset site	
Wildlife Conservation Society (WCS)	International Wildlife Conservation NGO	Matthew Hatchwell, Hugo Rainey

Appendix 3.1 Summary of key findings from key stakeholder engagement meetings held in Conakry on 19th and 20th January 2016

Name of Organisation and key contacts	Place, date, time of meeting	Brief overview of organisation	Rationale for meeting	Key findings
Bureau Guinéen d'Etudes et d'Evaluations Environnementales (BGEEE) Seydou Bari Sidibé, Director	BGEEE office, Conakry, Tuesday 19 January 2016 14h00	BGEEE was created by the Ministry of Environment (Decree N°D/2011/047/PRG/SGG on 3 May, 2011) primarily to deal with ***approval process of social and environmental impact assessments (SIA's and EIAs, ESIAs)***	• BGEEE is responsible for approving ESIAs and follows implementation of Environmental Action Plans. • BGEEE has direct links to all companies from different sectors operating in the country. • BGEEE is currently involved in the process of national ecological compensation projects and is driving changes in policy to include biodiversity offsets for future mining development projects in Guinea. • In order for GAC to pre-empt changes in regulatory requirements, it is important to engage with BGEEE.	• BGEEE is involved (with Guinée Ecologie and other stakeholders) on the national ecological compensation project • A new Fauna and Forest Code will soon be submitted to the Assembly, BGEEE would like to see the biodiversity offsets addressed in the proposed new Code • A meeting was organized three years ago with all the key stakeholders and mining companies to discuss biodiversity conservation issues. BGEEE thinks there would be value in a similar follow-up meeting. • The AMC SEIA has been completed.
Office Guinéen des Parcs et Réserves (OGUIPAR) Mamadou Saiba Keita, Director Mamadou Bhoye Sow, Deputy Director	OGUIPAR Office, Conakry, Tuesday 19 January 2016 15h30	L'Office Guinéen des Parcs et Réserves (OGUIPAR), public department with administrative, social and cultural responsibility is the Government Authority ***in charge of creating and managing protected areas in Guinea***. It is under the authority of the Ministry of	• OGUIPAR is developing the national protected area network so it is important to ensure that their plans are considered when assessing the alignment of potential offset sites with their objective • OGUIPAR manages the Badiar NP, a potential offset site, and can provide useful information on threats and needs to better conserve the protected area	• OGUIPAR aims to develop the national protected area network to protect the targeted 25% of the national territory under protection by 2020. • Although OGUIPAR would very much welcome some support to existing PAs like the Badiar NP, the creation of a new PA is a much preferred option for OGUIPAR as it contributes to meeting their objective of extending the national PA network. **Haut-Bafing (HB)**

		Environment, Waters and Forests. The main mission of OGUIPAR is "implementing the Government Policy related to sound protection, management and valuating the fauna and their habitat within protected areas in general, and particularly national parks, fauna reserves and sanctuaries, hunting interest areas and wetlands, and for the improvement of surrounding populations livelihood"	• OGUIPAR was involved in defining the WCF proposed Haut-Bafing NP. • GAC's future offset sites might fall under the responsibility of OGUIPAR if a new protected area was created.	• Both HB proposed NP and Mamou Transboundary Area are welcome as new PA for an offset. • OGUIPAR supports, in particular, the creation of a national park along the Bafing River. Studies here have already demonstrated the importance of this area for chimpanzees and they suspect there may still be some large predators (e.g. lions, hyenas). Establishment of this PA is in a more advanced stage and could therefore be created than other sites. • HB NP is also on the migration route of the Western Giant Eland, a highly threatened and iconic species in Guinea. • North of the HB proposed NP and the Bafing Faleme Transboundary Protected Area is a low density population area, which provides natural protection for nature • The creation of the HB NP is a priority and OGUIPAR will continue to support this initiative irrespective of GACs decision to support HB NP. • The plan is to have GAC support the establishment of HB and CBG support the establishment of Bafing Source - mentioned transfrontier conservation idea extending from the north to the south of Guinea and extending into neighbouring countries. • OGUIPAR does not think the Koukoutamba dam is a threat to the conservation of chimpanzees or their habitat, and considers it an opportunity for the establishment of wetlands and associated wildlife in the area. Further, it will support the conservation of remaining species. • OGUIPAR noted possible alignment of objectives between development of the dam and the conservation of nature. The protection of the ecosystem of the dam watershed would ensure the availability of water for the dam.

				• OGUIPAR has not been involved in the Koukoutamba dam environmental evaluation. • OGUIPAR is a member of the inter-ministerial committee in charge of reviewing the dam SEIA document, and can raise any concerns they have on the dam construction. • OGUIPAR issued a 7-years Action Plan, a copy of which was presented to TBC in 2015. • The African Development Bank is supporting the development of the proposed international road crossing in Bafing. OGUIPAR does not consider this as a threat that would bring in question the feasibility of the new proposed protected area. • 4000 chimpanzees are reported to be in the Bafing area. OGUIPAR to provide evidence of this to TBC. • The main existing threat to chimpanzees in Bafing is poaching (2 tonnes of meat ceased on the road coming from the area). As the area is difficult to access it is therefore also difficult to have presence on the ground. • Mining and dams are not considered major impacts although associated influx of people is considered an issue. • Apparently no charcoal making in the zones they want to establish as PAs as demand is too low. However, timber is being cut but not considered a major problem in this zone. • Suggested the PAs need to exclude mining concessions. • Busy revising Code Forestier (1992) and Caude de la Faune Sauvage.
National Directorate for Water and Forest (DNEF)	Office of DNEF Wednesday 20 January 10h00	DNEF's mission is to design, elaborate and implement the Government Policy related to the sustainable ***management***	• DNEF is in charge of implementing the Government policy related to fauna protection.	• DNEF was contacted by GAC to help mitigate impacts to the 60 chimpanzees occurring on their concession. The Nialama CF was proposed by DNEF as relocation site but no further contact was made by GAC on the issue.

-Colonel Diallo, Deputy Director -Mr Dia, Head of Fauna Division -Commandant Bangoura , Head of Forestry Legislation Division		***of forests and fauna***. It has 4 divisions: Forest planning, Fauna Division, Rural Forestry and Forest Legislation	• Manages the Classified Forests (e.g.: those which are proposed to be converted into a NP by WCF along the Bafing river). • Possible partner for GAC to support chimpanzee protection in the concession through community awareness and law enforcement	• Nialama CF holds a management plan. • Jane Goodall Institute previously supported the establishment of a transboundary PA initiative. • More information on classified forests can be found with the USAID project LAMIL (information to be collected from former project workers). • DNEF believes that the chimpanzees risk disappearing from the concession as a result of the GAC Project and the survival of chimpanzees within Sangarédi area (holding the concession of GAC, CBG and Dian Dian) cannot be secured, whatever mitigation measures are put in place. • Main threats to chimpansees include habitat destruction and poaching • The new code for the fauna protection is under submission to the National Assembly. • Koumbia park does not exist anymore. • 600 chimpanzee individuals were reportedly found in Bakoum CF (however, no documentation was provided to support it). • Forest guards now exist and in place, but they do not have adequate resources to operate. • DNEF has representatives in Sangaredi and can help with implementing measures against poaching. • The following actions were proposed against poaching: community awareness, capacity building, law enforcement. • Some of the threats were also identified: habitat loss, food scarcity, habitat fragmentation and loss of corridors for movement, poaching, burning for agriculture, mining (which is expected to push chimpanzees into areas inhabited by people in search of food leading to human wildlife conflict and could lead to chimpanzees being

				killed, as well as resulting in conflict between different chimp groups that are forced into eachothers territory), demand for energy (wood & charcoal) will lead to further cutting of gallery forests and trees in general. • There are priority actions developed in the Security Reforms document and the DNEF is part of the process. • The new paramilitary corps of nature conservators is now in place (2000 eco-guards recruited and trained already). • There is also a European Union project under implementation: "Operationalizing the paramilitary corps of nature conservators", which covers the Haut Niger National Park, the Ziama Reserve and the Nimba Mountains. • DNEF is concerned about the number of ports being developed along the coast. • DNEF may be able to assist with managing poaching activities on GAC's concession in the future.
Guinée Ecologie Mamadou Saliou Diallo, Muhammad Yaya Diallo, Mariam Savané	Guinée Ecologie office, Wednesday 20 January 13h00	Guinée Ecologie is the first environmental NGOs in Guinea and is involved in the national offset process through different initiatives including Simfer and the ecological compensation project. The mission of Guinée Ecologie is to contribute through research, education, information, communication and management to the protection of environment and the conservation of	• Guinée Ecologie is a key stakeholder for GAC as it is the main Guinean registered (1990) non-governmental, volunteer and non-profit organization focusing on environment and biodiversity conservation • Guinee Ecologie is working jointly with the Wildlife Conservation Society on the conservation of the chimpanzees in the Foutah Djallon. .	• Guinée Ecologie is working on an initiative for the conservation of 60 sites where the presence of chimpanzees has been reported. • 10 sites among these 60 are benefiting from conservation actions including: identification of threats, identification and delineation of community conservation area where chimpanzees are occurring, future reforestation of gallery forests, implementation of microcredit schemes to support sustainable livelihood activities, fruit trees planting in forested areas. • Preliminary findings of their on-going study shows that 55% of chimpanzees population live near villages. • Guinee Ecologie believes that it is actually the cultural specificities of the communities who live in the Foutah Djallon that protect chimpanzees. They have a special

		biodiversity in Guinea following the principles of sustainable development.		relationship with chimpanzees and do not hunt or kill them. • Nialama is a good example of community and government co-management of classified forest, but the project ended when the support of USAID ended. • In addition to the dam, the presence of the road crossing through Mali, Guinea and Senegal will increase the pressure on natural resources in Bafing area including chimpanzees. • Poaching is the biggest threat on chimpanzees in the nationally PAs like Bakoum, Bani, Dar Es Saloum. • Guinee Ecologie believes it is critical to develop a PA in the Bafing area because with the development of the dams, the new international road and of the Dabola-Tougue bauxite project, chimpanzees are under imminent and great threat. • There is an opportunity to create a National Park around existing PAs, like in the proposed Source du Bafing NP where we can have an ecological corridor including the following CFs: Bagataye, Kegneko, Diogounè, Gueroual, Gouba, Satiba, Bantarawel, Fello Diouna. • The national strategy to be completed after the 3 years project of ecological compensation.

Follow-up actions:

- OGUIPAR to provide a copy of the 7-year Action Plan
- DNEF to provide more information on classified forests (through the former workers on the USAID-funded project LAMIL; also Nialama
- GAC to share outcomes of the prefeasibility study with OGUIPAR and DNEF
- GAC to organize a workshop with relevant key SH to contribute to the feasibility study of the offset sites

Appendix 3.2 Sylvatrop Report

Appendix 4 Long-listed potential off-site offset sites not short-listed

Table 24: Long-listed potential off-site offset sites not short-listed

Name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
Haut Niger National Park (include Kouya CF and Mafou CF)	Medium: chimpanzees present. Same ecoregions but habitats quite different than GAC concession.	High: Threats include: shifting agriculture and commercial poaching of large mammals. Reduction of threats feasible with a realistic level of expertise and investment. Estimated population of chimpanzee by WCF likely sufficient to satisfy the 'optimistic' scenario of GAC's offset requirements.	High: This core area of the NP used to be a CF so precedent for conservation management. The PA already exist and received a certain level of management and is recognised as such by local populations. However, this site is close to the Forested Guinea and Liberia where chimpanzee are hunted and eaten with a well develop international network of commercial hunting. This makes conservation actions challenging.	High: Priority site, identified in Guinea's National Biodiversity Strategy and Action Plan. Within the Haut Niger Extremely Important Area of the Regional Action Plan (Kormos & Boesch, 2003) Priority site in the National Action Plan for Chimpanzee(Kormos & Boesch 2003; Direction Nationale des Eaux et Forêts 2005)	Medium: already a national park (equivalent to IUCN category II) Little current management of this site. The Chimpanzee Conservation Center is installed in the Parc as well a botanical garden in the Sidakoro village	Low: Chimpanzee population unlikely to cover more than the need of the Project	High: Includes other IUCN Red List and regionally threatened species such as Hippopotamus, *(Hippopotamus amphibious)*, Lion *(Panthera leo)*

Name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
Mafou CF (core area of the HNNP)	Medium: chimpanzees present. Same ecoregions but habitats quite different than GAC concession.	Low: Threats include: shifting agriculture and commercial poaching of large mammals. Estimated population of chimpanzee by WCF too low to enable to achieve NG. 0.5 (instability of population) (WCF, 2015).	High: the NP management principles include the avoidance of this integral protection area as agreed with surrounding villages. A buffer zone was then identified for community economic activities	High: The NP was created in 1997by the GoG for the conservation of its rich biodiversity; later a Biosphere Reserve was in 2002 Within the Haut Niger Extremely Important Area of the Regional Action Plan (Kormos & Boesch, 2003) Priority site in the National Action Plan for chimpanzee (DN E&F & GRASP, 2005)	Medium: already a national park (equivalent to IUCN category II) Little current management of this site.	Low: chimpanzee population unlikely to cover more than the need of the Project	High: A 1997 survey reported the presence of *Panthera pardus , Felis sylvestris, Crocuta crocuta, Felis carcal, Leptailurus serval, Panthera leo, Profelis aurata, Hippopotamus amphibius, Cephalopus sylvicultor, Ourebia oureb. Loxodonta africana* as reported by L. Fishpool in Important Bird areas in Africa
Mamou - East (includes Oure Kaba)	Medium: High densities of chimpanzees present (Campbell 2013b; WCF 2015e). Same ecoregions but habitats quite different than GAC concession.	High: Threats exist but with appropriate zoning and focus are feasible to manage with a realistic level of expertise and investment.	High: Area is large and a zoning approach likely to identify areas where conservation will have local support. Challenging social context due to immigration	Low: Simandou Rail crosses the offset site. Close to the Kalia Mine project (Bellzone).	High: no current conservation intervention.	High: chimpanzee population likely to exceed the need of the Project. Potential for aggregated offset with the Simandou project.	Medium: A number of flora species of conservation interests also present. Potential for aggregated offset with the Simandou project.

Name	Ecological equivalence	Technical feasibility of gains	Social feasibility of gains	Alignment with GoG and other SH	Additionality	Opportunities for scaled offset and/or aggregated offset	Possibility of additional conservation outcomes
			associated to the Simandou project.				
N'Dama CF	High: Chimpanzees present but current population status unknown. Similar habitat than GAC, lot of gallery forest, great equivalence.	High: Richer fauna than Badiar NP. Has chimpanzee (Pellegrini, 1996). No estimation of population though, to be confirmed.	High: Almost no villages in the CF (which is partly flooded seasonally).	Medium: Core area of the wider Badiar N'Dama Reserve created in 2002. Recognized as KBA (Kormos & Brugiere, 2009)	High: Core area of the Badiar BR/NP. Management Plan for 2006-2010 (AGIR project). No MP currently nor fund.	Low: Chimpanzee population unlikely to cover more than the need of the Project	Medium: Wetlands of interest for migrating birds (Pellegrini, 1996).

Appendix 5 Details of financial estimates

This appendix presents details of estimates of offset costs. We emphasise that the costs are indicative, based on experience and literature from other sites and will need considerable refinement during the feasibility phase. The figures are to be interpreted as order-of-magnitude estimates to guide financial planning.

Appendix 5.1 Initial set up costs

These cover steps 1-4 of the implementation process. We estimate that this will cost cUS$650,000-US$1m. The actual costs may vary significantly depending on the results of the early red-flag analysis.

Component	Activity	Low (USD)	High (USD)
Initial Red-flag study	Identification of major threats to chimpanzees (bushmeat hunting, clearing of land for agriculture (remote sensing analysis), natural resource use study) including identification of potential threats needing more data for identification	60,000	90,000
	Chimpanzee baseline study	90,000	150,000
	Complementary socio-economic studies - crops, plantations, bushmeat, other NTFPs	40,000	60,000
Sub-total		*190,000*	*300,000*
Present preferred offset site to key stakeholders	Consultancy support to organise meetings, presentations etc	20000	30000
Sub-total		*20000*	*30000*
Detailed design	Complementary baseline data collection (monitoring baseline)	130,000	195,000
	Local stakeholder engagement	50,000	75,000
	Framework management plan with indicative actions	70,000	105,000
	Formal consultation - government meetings on offset establishment. Prefectural Governments awareness-raising on co-management	35,000	52,500
	Form Comité de Gestion Forestière / Forest Management Committee (COGEF)	20,000	30,000
	GoG and International stakeholder engagement	30,000	45,000
	Updated NPI forecast	75,000	112,500
Sub-total		*410,000*	*615,000*
Validate with GoG	Consultancy support to organise meetings, presentations etc	30000	40000

Sub-total		*30000*	*40000*
Total steps 1-4		**650,000**	**985,000**

Appendix 5.2 Establishment costs

Once an offset site has been agreed and there is a detailed plan for implementation, there will be a set-up period during which infrastructure and equipment need to be purchases, staff recruited and trained and management systems established. We estimate this will cost from c.US$700,000-US$1m.

Component	**Activity**	**Low (US$)**	**High (US$)**
Initial set-up of offset implementation	Equipment and infrastructure (3 x vehicles, motor bikes, 50x sets of field kit, office building, computers etc)	400,000	600,000
	Social and Environmental Impact Assessment for the offset	140,000	210,000
	Core recruitment and training of staff	50,000	75,000
	External consultancy support for set-up of SMART + GIS system	50,000	75,000
	Socio-economic study - crops, plantations, bushmeat, other NTFPs	40,000	60,000
Total establishment costs		**680,000**	**1,020,000**

Appendix 5.3 On-going running costs

Average annual running costs for a protected area with a core zone of 1-2000 sqkm are estimated as ranging from c.US$500,000/year to c.US$750,000/year. These are average costs; for effective management financial planning should be flexible so that small amounts can be spent in some years and higher amounts when required. We emphasise that these are order of magnitude estimates. Final estimates will depend greatly on:

- The level of threats at the area
- The identified intervention approach (the balance between enforcement and livelihood programmes);
- The number of stakeholders (which can greatly increase transaction costs);
- The configuration of the protected area(s) (core:edge ratio);
- Logistical challenges (e.g., if boats or aerial coverage is required);
- The overall size of the protected area (relatively small influence).

Item	Basis (US$)	Low (US$)	High (US$)
Ecoguard patrols	**60,000**	**150,000**	**225,000**
Community engagement and communication	**120,000**	**120,000**	**180,000**
Monitoring and evaluation of offset results	**65,000**	**65,000**	**97,500**
Infrastructure development and maintenance	**79,300**	**79,300**	**118,950**
Offices	8,000		
Power infrastructure	7,000		
Vehicles	35,000		
Fuel and oil	15,000		
Insurance	800		
Office furniture	1,500		
Technical and computing equipment	1,000		
Telephone, post and internet	1,000		
Office supplies	1,000		
Computer consumables	1,000		
Field equipment	8,000		
Training and staffing of offset programme	**67,000**	**67,000**	**100,500**
Offset implementation staff salaries and benefits	28,500		
Offset management staff salaries and benefits	24,000		
Staff training	5,000		
National travel	5,000		
International travel	2,000		
Audit	2,500		
External support	**15,000**	**15,000**	**22,500**

Third party review	15,000		
Total annual recurrent costs (US$)		**496,300**	**744,450**