Olam Palm Gabon: Offset feasibility study.

November 2023

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Acronyms

Acronym	Definition
ANPN	Agence Nationale des Parcs Nationaux du Gabon
BAP	Biodiversity Action Plan
BMP	Biodiversity Management Plan
C	Carbon
CH	Critical Habitat
CHA	Critical Habitat Assessment
CNAT	Centre Nationale des Affectations du Terre (National Land Use Centre)
DGFAP	Direction Générale du Faune et des Aires Protèges
DGEPN	Direction Générale de l'Environnement et le Protection de la Nature
ESIA	Environmental and Social Impact Assessment
ha	Hectare
HCV	High conservation Value
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
km	Kilometre
MBG	Missouri Botanical Gardens
MINEF	Ministère des Eaux et Forets (Ministry of Water and Forests)
NG	Net Gain
NH	Natural Habitat
NNL	No Net Loss
OPG	Olam Palm Gabon
PS6	Performance Standard 6
QH	Quality Hectare
RIA	Residual Impact Assessment
SMART	Spatial Monitoring And Reporting Tool
TBC	The Biodiversity Consultancy Ltd
WCS	Wildlife Conservation Society
WWF	World Wild Fund for Nature

Executive Summary

This document is the Offset Feasibility Study (OFS) for Olam Palm Gabon (OPG). OPG manages six oil palm plantations across western Gabon (the Project), totalling approximately 202,000 ha, of which c. 63,300 ha (30%) has been developed for the cultivation of oil palm[1]. The report summarises OPG's net gain (NG) requirement and assesses the feasibility of delivering all required gains for critical habitat (CH) and natural habitat (NH) features within existing OPG set asides. Specifically, it outlines the gain mechanism for achieving no net loss (NNL) for savannah (NH), and NG for lowland terra firma forest, Forest Elephants (*Loxodonta cyclotis*), Western Gorillas (*Gorilla gorilla gorilla*) and Central Chimpanzees (*Pan troglodytes*) (all CH), and includes a summary of the required activities to achieve gains. The feasibility assessment for on-site set asides concludes that while significant gains can be achieved in on-site set asides, for all CH and NH features, off-site offset actions will also be required to achieve NNL/NG. Specifically, there remains a deficit of 5,441 Quality Hectares (QH) for savannah, at least 62 QH for lowland terra firma forest, at least 106 Great Apes and at least 101 Forest Elephants.

The report therefore assesses the feasibility of the Sud-Estuaire landscape as an off-site offset to deliver the remaining required gains. The proposed off-site offset covers an area of circa 129,000 ha, and comprises a mixture of lowland terra firma forest, mangrove, savannah, swamp forest and coastal forest, but is primarily lowland terra firma forest that has undergone varying levels of logging over past decades. The landscape has multiple land uses and includes Pongara National Park, the Okala sustainable development concession and two logging concessions (GGFMI and EBE), with connectivity for biodiversity between these areas and OPG's Awala HCV set aside.

The report assesses the technical feasibility of the off-site offset, including comparability and additionality of the landscape, and key threats, alongside capacity of implementing partners. The report also summarises the key findings from the socioeconomic study undertaken in January 2023, and defines the gain mechanism for achieving NNL / NG for all NH and CH features. It also includes details of the required activities to achieve gains, the proposed partnership and finance mechanism.

The report finds that the offset landscape is comparable and would deliver significant additionality, with illegal hunting identified as a current major threat to biodiversity. Human population density within the landscape is very low - between 0.1 and 4.9 people/km^2 - and most hunting is done by non-residents who hunt primarily to sell in markets in nearby Kango and Libreville. The primary offset actions identified are anti-poaching patrols and community engagement for livelihood development, alongside biomonitoring to measure the impacts of offset actions. The implementing partners for offset actions – Okala Project and Agence

[1] Of this, approximately 61,700 ha has been developed by OPG, with 1,710 ha of pre-existing planted area in the Bindo concession (part of the Makouke plantation) developed by SIAT, and additional land cleared for supporting infrastructure and facilities.

Nationale des Parcs Nationaux (ANPN)– are already present in the landscape, and Okala are in the process of transitioning the offset area from a logging concession into a sustainable development permit (and looking for external funding to make this viable long-term). Okala project are already developing cutting edge digital solutions and economic models to monitor and protect biodiversity, and implementing the offset within the Okala landscape presents an exciting opportunity for OPG to become a leader in supporting environmental technology and enhancement of natural capital, while protecting biodiversity and cultural heritage and supporting activities that provide economic benefits for local people.

The feasibility assessment has established appropriate gain mechanisms for CH features (lowland terra firma forest, Forest Elephants, Western Gorillas and Central Chimpanzees) based on available literature and expert input, and concludes that the proposed actions would be sufficient to achieve NG for all CH features over the 41 year period of the offset project duration. For savannah (NH), the landscape is not suitable for delivering the required gains to achieve NNL, since it has very little savannah. Instead, an area of circa 27,000 ha of savannah directly to the West of Mouila Lot 2 is identified as an additional offset site. This savannah area is currently a combination of community savannah, CBG forestry permit and unallocated savannah (i.e., no permits). If 11,000 ha of this savannah (comprised of existing unallocated and CBG areas) comes under OPG management, it could deliver sufficient gains to achieve NNL.

Finally, the report assesses any foreseeable technical, social and operational feasibility issues likely to impede success of achieving NNL/NG for OPG via both on-site and off-site actions. For any issues, actions are proposed to overcome them. Based on the findings of this OFS report, it is considered highly likely that the Project will be able to align with PS6 requirements to deliver NNL for impacted NH and NG for impacted CH features, via the proposed offset actions.

Key next steps for the development will be to (a full table of actions is found in Section 6):

- Finalise and review on-site and off-site budgets
- Develop framework agreements with the implementing partners for the 41 years offset;
- Establish management structures and financing mechanisms for the off-site offsets;
- Develop an offset implementation plan, including a framework for monitoring progress in offset road-map implementation;
- Develop five year management plans and one year annual implementation plans (that include activities, budget and key milestones/ performance indicators) for both on-site and off-site offsets;
- Obtain baseline density data on great ape and elephant population size in both on-site and off-site offsets, using the protocol developed in 2022, and use findings to update the net gain estimate;

- Update OPG's existing BMEP for the on-site offset and develop a BMEP for the off-site offset including an integrated state-pressure-response monitoring framework to enable assessment of whether mitigation actions are effective.

Figure 1: Overview of the proposed onsite and off-site offsets

Type	Onsite offset: set asides	Off-site offset: Sud Estuaire landscape	Off-site offset: Mandji
Target biodiversity	• Forest and Savannah habitat • Central Chimpanzee • Western Gorilla • Forest Elephant	• Forest habitat • Central Chimpanzee • Western Gorilla • Forest Elephant	• Savannah habitat
Approach	Site-based conservation management	Site-based conservation management	Site-based conservation management
Location	HCV set asides with savannah, terra firma and gallery forest habitat (In Awala, Mouila 1,2 & 3, Ndende & Makouke plantations)	Okala concession, Pongara National Park, and two logging concessions (GGFMI and EBE)	Mandji savannah
Net gain mechanism	Conservation activities to enable restoration of forest and savannah habitat and avert the loss of species from hunting and human-wildlife conflict	Conservation activities to enable restoration of forest habitat and avert the loss of species from hunting and human-wildlife conflict	Establishment of Savannah Management Plans with local communities to manage fires and responses to fires to restore habitat quality

Report Caveat: The offset approach detailed in this report represents the best option for Olam based on information currently available. Due to recent changes in government, some uncertainties and risks remain for the off-site offset. If the proposed off-site offset becomes a non-feasible option due to changes in priorities of the new government, other off-site offset options will be considered to achieve NG for the Project.

1 Introduction

OPG is a palm oil joint venture between Olam International Limited ("Olam", 60%) and the Republic of Gabon (40%) established in 2011. OPG holds and manages six operational palm oil plantations[2] or 'Lots' (the Project) totalling approximately 202,000 ha, of which c. 62,000 ha has been cleared by OPG for planting and infrastructure, c. 8,000 ha cleared by AgroGabon in the 1980's (1,710 ha of which remains operational), and c.63,300 ha (30%) has been developed for the cultivation of oil palm (Figure 2; Table 1). The Project thus comprises:

1. Four greenfield palm oil plantations developed by OPG, namely Awala, Mouila Lot 1, Mouila Lot 2, Mouila Lot 3 and its extension.
2. A greenfield plantation at Ndende developed by SOTRADER[3] and subsequently transferred to OPG.
3. The pre-existing plantation at Makouke Agro-complex (developed in 1981 by AgroGabon) that was acquired by OPG from SIAT (a Belgium-based palm/rubber company) in June 2016.

OPG has conducted ESIAs and HCV assessments[4] for all six plantations, and as of 2022 all of their six plantations are RSPO certified. All plantations are on a 49-year lease agreement from the Gabonese government with the exception of Makouke (which has a 38 year lease).

OPG is seeking financing from the IFC and therefore aims to align with the IFC Performance Standard requirements, including Performance Standard 6 (PS6) on biodiversity conservation and sustainable management of living natural resources (IFC 2012).

All six OPG plantations are in Critical Habitat (CH). The Project has therefore developed a Biodiversity Action Plan (BAP), that presents OPG's strategy for mitigating biodiversity impacts for the six palm oil plantations. As part of BAP development several assessments were undertaken:

- A Critical Habitat Assessment (CHA) to identify NH and CH-qualifying biodiversity associated with the Project as per the guidance notes of the IFC Performance Standard 6 (IFC 2019)

[2] In this report 'plantation' refers to groups of concessions managed as a single unit by OPG. OPG operates six plantations, consisting of nine concessions: Makouke plantation (Makouke, Bindo and Bene concessions); Awala plantation (one concession, Lot 8); Mouila Lot 1 (one concession); Mouila Lot 2 (one concession); Mouila Lot 3 (Lot 3 and Lot 3 extension concessions); and Ndende (one concession).

[3] SOTRADER was a joint venture between the Republic of Gabon and Olam that attempted to set up a small-holder managed plantation.

[4] An ESIA is an Environmental and Social Impact Assessment that is designed to assess and predict potential adverse social and environmental impacts and develop suitable mitigation measures. HCV refers to a High Conservation Value, and is a globally applicable approach to identify, manage and monitor High Conservation Values (HCVs) in current or potential future development sites – there are 6 HCV categories that cover biological, ecological, social and cultural values (see Appendix 1.1.1 for details).

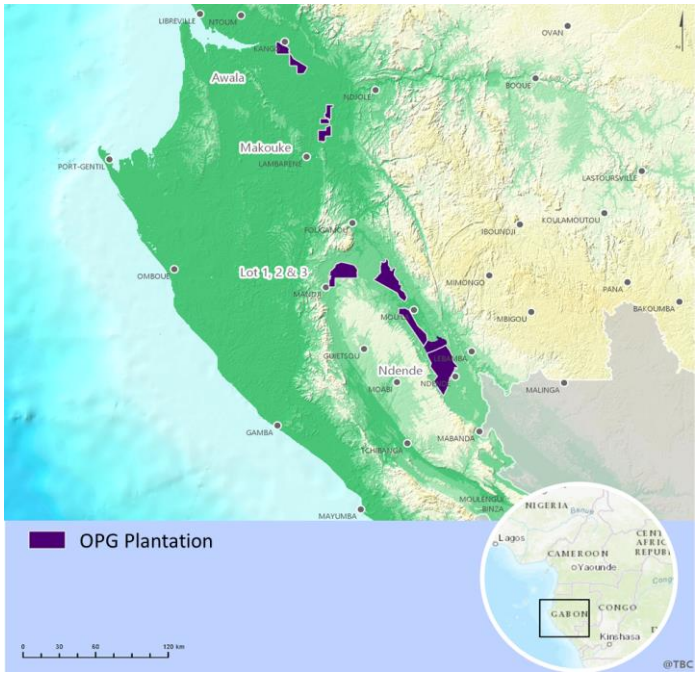
- A Risk Prioritisation report to identify priority biodiversity from the suite of CH-qualifying biodiversity to be the focus of mitigation and monitoring actions for the Project

- A Residual Impact Assessment (RIA) to quantify the residual direct and indirect impacts of the Project, (after the application of mitigation actions), and enable offset planning

In addition, five plantation specific Biodiversity Management Plans (BMPs) that contain details on how the proposed on-site mitigation actions will be implemented by OPG, and Biodiversity Monitoring and Evaluation Plan (BMEP) to ensure that measures included in the BMPs are effective and to enable adaptive management if necessary have been prepared[5].

The BAP forms part of OPG's overarching biodiversity management framework and sets out the Project's mitigation strategy to avoid, minimise restore and compensate biodiversity impacts and to achieve NG for CH and NNL for NH. It is a living document that will be updated regularly as OPG obtains further inputs from stakeholders and the expert advisory panel[6], and as understanding increases of the status and ecology of priority biodiversity values, impacts to biodiversity and the effectiveness of mitigation measures.

Figure 2. Location of OPG's six oil palm plantations (Lots) in Gabon. Source: TBC.



[5] BMPs and BMEP should be revised during 2023 to align with the BAP and this OFS.

[6] OPG has established an Environmental and Social advisory panel to provide technical support and guidance in the implementation of mitigation and monitoring. Panel members comprise representatives of the Government, conservation NGOs and researchers. Their aim is to support OPG in aligning with good mitigation practice by reviewing Project progress, raising concerns, recommending actions, and identifying additional work required to achieve OPG's objectives.

Table 1. Overview of OPG's six oil palm plantations (data provided by OPG in 2023)

Name	Plantation size (ha) [7]	Area of natural habitat cleared by OPG	Area of natural habitat cleared by SIAT / AgroGabon	Year planted [8]	Area developed for Oil Palm by OPG (ha)
Awala	20,030	7,100	0	2011-2013	6,810
Makouke	18,613	0	8,243	2016-2018	5,759*
Mouila Lot 1	35,354	16,797	0	2012-2016	15,885
Mouila Lot 2	31,800	10,029	0	2014-2017	9,061
Mouila Lot 3	38,363	19,594	0	2015-2016	18,284
Ndende	58,401	8,200	0	2016-2017	7,531
TOTAL	**202,561**	**61,720**	**8,243**		**63,330**
	*There is an additional 1,710 ha of planted area in the Makouke concession that was developed by SIAT and that remains operational				

2 Offset requirements

A quantitative residual impact assessment (RIA) was undertaken to assess the significance of residual impacts from OPGs operations after avoidance, minimisation and rehabilitation mitigation (TBC, 2022). The assessment focused on a sub-set of biodiversity features based on the outcomes of the risk-based prioritisation (Annex 2 of BAP - Risk Prioritisation). These features were considered appropriate proxies for wider biodiversity values. This approach focused on two habitats: terra firma forest and savannah habitat and included a species-specific impact assessment for Central Chimpanzee, Western Gorilla and Forest Elephant. For all features except Great Apes only direct impacts were quantified as indirect impacts were considered insignificant compared to direct impacts. For Great Apes, the indirect impacts of economic in-migration were also assessed.

The approach to assess residual impacts was based on the following:

- For lowland terra firma forest and savannah a Quality Hectare (QH) metric was applied to OPG's impacts. A QH metric ensures that there is uniform accounting or exchange between losses (OPG impacts) and gains (offsets). QH is a widely used metric that combines measures of habitat extent (hectares) and habitat condition (quality), in recognition that even "natural habitat" is in different states of quality due to past land

[7] These are plantation areas reported by OPG. GIS-derived estimates of plantation areas differ slightly.

[8] Timing of land conversion from start of land preparation to end of planting. The exception is Makouke, for which land conversion occurred in the 1980's, this date therefore reflects planting only.

uses and pressures. A static baseline was used to assess impacts, this is precautionary as it assumes that populations and habitat integrity are stable.

- For Central Chimpanzee and Western Gorilla impact estimates were based on published information on average densities of the two species outside protected areas in Gabon. Only lowland terra firma forest was considered as suitable habitat for Great Apes in the impact assessment (see Section 3.9 for rationale).

- For Forest Elephants, estimates were based on published information on densities from a recent nationwide genetic study (Laguardia *et al*. 2021). Density was assumed to be at 70% in savannah habitat compared to forest habitat, and impacts were estimated separately for each concession based on the nearest / most appropriate sampling point from the genetic study using different density estimates. Estimated density was highest in Mouila Lot 3 and Ndende, and lowest in Awala.

2.1 Results and NNL/NG requirement

Residual impacts for habitats and species are summarised in Table 2. To achieve net gain OPG will need to implement offset measures that will generate a gain of more than 10,935 QH of lowland terra firma forest and a gain equal to 27,647 QH of savannah habitat. For species, OPG will need to generate gains of more than 178 Great Apes and more than 226 Forest Elephants.

Table 2. Summary of the residual impact assessment and offset targets

Feature	Residual impact (in QH / individuals)	Offset target
Lowland terra firma forest	10,935 QH	**Greater than 10,935 QH**
Savannah	27,647 QH	**Equal to 27,647 QH**[9]
Great apes (Central Chimpanzee & Western Gorilla)	178 (range 106 – 247) weaned individuals	**Greater than 178 individuals**
Forest Elephants	226 individuals	**Greater than 226 individuals**

2.2 Mechanisms to generate gains

There are two main approaches to generate gains:

1. Averted loss (protection) gains are generated by preventing future damage to biodiversity in an area under threat of imminent projected loss, because of factors

[9] Savannah is classed as natural habitat and therefore a no net loss outcome is the target, although it is recognised as an important habitat for critical habitat-qualifying species (e.g., Rosy Bee-Eater; African River Martin; Forest Elephant).

unrelated to the Project (for example, preventing degradation of forests from activities not related to the Project). These offsets typically involve enhanced management of an area.

2. Restoration gains repair past damage to biodiversity that was originally not caused by the project. For example, the restoration of heavily logged forest, or wooded grassland degraded due to overgrazing. Note the distinction from the restoration step of the mitigation hierarchy, which addresses direct and indirect project impacts.

Both averted loss and restoration gains are acceptable approaches according to international good practice and IFC PS6 (2012) and both approaches may occur simultaneously in the same landscape. For OPG, both mechanisms can be used to generate biodiversity gains in on-site and off-site offset areas. However, Gabon is quite an anomaly in having low levels of development and low population density, with the majority of the population living in urban areas, and has been successful in protecting its wildlife. As a result it has very high populations of mammals that are endangered in other countries (and globally, e.g., forest elephants) and also has extensive areas of natural habitat that remain intact, making restoration gains challenging to achieve. At the same time, globally threatened species and habitats are under increasing pressure in Gabon from hunting and habitat loss, and so averted loss offsets will be the key mechanism for gains in the context of this Project (although restoration gains are also included). OPG's offset project will undertake both on-site offset measures and off-site offset measures in order to achieve the required gains, with an emphasis on averted loss, but with some restoration gains also possible, particularly for habitats.

2.3 List of stakeholders consulted for the OFS

Stakeholder engagement is a key activity undertaken during offset development to ensure the planned offset aligns with local and national expectations and the expectations of international stakeholders with specific concerns for biodiversity values. Table 3 summarises all stakeholders consulted as part of the OFS, their role and the topic discussed with them.

Table 3. Organisations and specialists consulted between December 2022 May 2023 during the development of the OFS

Organization	Name and title	Topics discussed & key information used to inform the BAP
Ministry of Water and Forests	**Stephen Mouba** Director General of the Environment and Nature Protection (DGEPN) **Lucien Massoukou** Director General Fauna and Protected Areas (DGFAP) **Michelle Ngwapaza Mendong**	• Overview of the biodiversity context in Gabon, and national priorities • Discussion of Offsets for OPG, and identification of other development projects in the vicinity of OPG plantations

Organization	Name and title	Topics discussed & key information used to inform the BAP
	Director General Adjoint Fauna and Protected Areas (DGAFAP)	
ANPN	**Stephan Ntie** Technical Advisor ANPN **Patrick Eveso** Conservateur Pongara **Stephanie Bourgeois** Senior Scientist **Magalye Moussanda** Chef de Service ICL **Christian Rembeyo**, Conservateur Moukalaba Doudou	• Update on historic and ongoing partnerships between OPG and ANPN in Pongara & Moukalaba Doudou • Update on current threats, activities, priorities and ANPN capacity in these protected areas (including provision of SMART reports on patrols and monitoring), and activities of other stakeholders; • Discussion regarding proposed offset savannah extension to Moukalaba Doudou • Input on habitat use by elephants and the role of savannah; as well as support and validation of approach to estimating residual impacts to elephants, and recommendations for offset actions to deliver gains • Discussion of socio-economic study findings
The Nature Conservancy / Duke University	**Michelle Lee**	• Discussion regarding progress on the Savannah Strategy and identification of the savannah offset option adjacent to Moukalaba Doudou protected area • Update on conservation corridors progress • Update on the 30 x 30 by 30 strategy for CBD COP commitment, and the priority for connectivity • Support to identify land use in the Mouila savannahs
Centre Nationale des Affectation des Terre (CNAT)	**Pierre Bongolo** Focal point of the CNAT	• Information on land use allocations and permits in the Sud Estuaire landscape • Information on land use in the Mandji savannahs • Information on proposed new National Park adjacent to Sud Estuaire landscape
IRET – Gabonese Institute of Tropical Ecology Research	**Donald Iponga** Director at IRET-CENAREST	• Provided research data on carbon stocks and bushmeat hunting in Gabon to inform NG approach
CENAREST	**Alfred Ngomanda** Commissioner General **Steeve Ngama** Research Fellow IRAF-CENAREST (elephant expert)	• Overview of the biodiversity context in Gabon, and national priorities • Discussion of Offsets for OPG • Discussion on value of habitat / landscape connectivity • Human-elephant conflict and different actions being trialed to mitigate it, including electric fencing and national compensation program.
Okala Project	**Robbie Whytock** CEO	• Site visit to Okala concession to meet team and observe activities

Organization	Name and title	Topics discussed & key information used to inform the BAP
	Charles Trouve Gabon Operation Manager	• Discussion of offset activities and actions, partnership agreement, and development of budget
Missouri Botanical Gardens (MBG) – External botanical experts hired by OPG, also sub-contracted by TBC	**Tariq Stevart**, Associate Curator Africa and Madagascar Department **Pete Lowry** Senior Curator Africa and Madagascar Department **Anne Helene Paradis** Research Assistant	• Classification of savannah types within OPG concessions • Support in identifying ecologically suitable savannah and lowland terra firma forest offsets, including identification of the Mouila savannahs • Expert input on political pressures on savannahs in Gabon
Panthera - International Conservation NGO	**Christopher Orbell**, PhD student	• Update on the status of establishing conservation corridors to maintain connectivity within the landscape (including OPG's plantations) • Update on national cam trapping activities, to align with OPG monitoring
GGFMI	**Antony Spinelli** General Director	• Planned activities in the concession, timeframe and operational procedures • Discussion of the planned offset project, and desire for collaboration • Discussion of selling circa 2,000 ha of logging concession to OPG
EBE	**Jonas Bitoli** General Director	• Planned activities in the concession, timeframe and operational procedures • Discussion of the planned offset project, and desire for collaboration • Discussion of undertaking patrols / biomonitoring in 'serie de conservation' (and more broadly)
ARRC Taskforce – part of the IUCN Section on Great Apes	**Genevieve Campbell & Tatyana Humle**	• Guidance regarding offset activities and whether they would contribute to gains (specifically gorilla habituation) • Review of offset feasibility study, activities and gain mechanism
Wildlife Conservation Society	**Boo Maisels** Conservation Scientist, Africa program	• Support and validation of approach to estimating residual impacts and gain potential for Great Apes and elephants
WWF	**Pierre-Brice Maganga** Southern Program Coordinator	• Activities in Moukalaba Doudou landscape and status of 'PROLAB 2' (a project focused on monitoring the whole Gamba complex to reduce hunting)
Conservation Justice	**Quevian Makaya**	• Discussion of human-elephant conflict, elephant poaching issue and ivory trafficking in Gabon. Provided data on arrests since 2010.

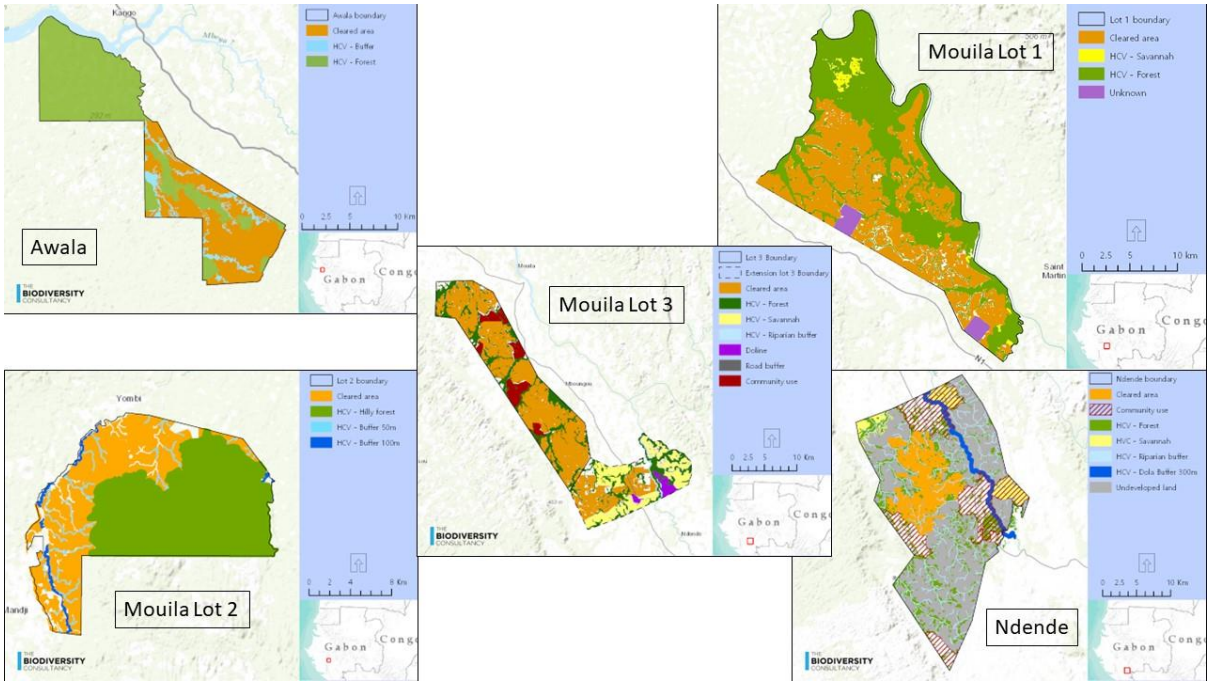
3 On-site offset: set asides

OPG have set aside circa 105,000[10] hectares of High Conservation Value (HCV) lowland terra firma forest, gallery and riparian forest (> 50m wide) and savannah across the six plantations, equal to around 50% of the total area acquired by OPG. Each plantation includes at least one large set aside that is contiguous with the wider landscape (Figure 3). Most of the on-site set asides consist of lowland terra firma and gallery forests, however Ndende also includes 22,500 hectares of savannah habitat (split across two areas of the plantation) that is not currently designated as a set aside but has not been developed for oil palm. OPG has no plans to develop this savannah and will instead convert it into set aside areas to contribute to their savannah offset (N.B. this area is not designated HCV as no studies have been undertaken to determine its value). One of the two areas lies to the East of the Dola river and includes dolines and freshwater habitat, the second is in the far south of the Ndende plantation and includes gallery forest. Table 4 provides a summary of the total size of both forest and savannah set asides in each plantation (including the additional proposed Ndende savannah), and also an estimate of number of Central Chimpanzee, Western Gorilla and Forest Elephants residing within set asides, based on the same density estimates used in the residual impact assessment[11].

[10] An additional circa 1,000 ha of forest area has been retained as riparian buffers of less than 50m, but these areas have not been quantified and so are not included in the total set aside area.

[11] No baseline data exists for set asides and so the residual impact assessment used data from nearby surveys to estimate density of Forest Elephants and Great Apes. These estimates should be revisited once baseline data has been collected.

Figure 3. Maps of Awala, Mouila Lots 1, 2 and 3 and Ndende (and Makouke shown below) showing planted areas (orange areas) and set asides (green, yellow and blue areas). Source: TBC



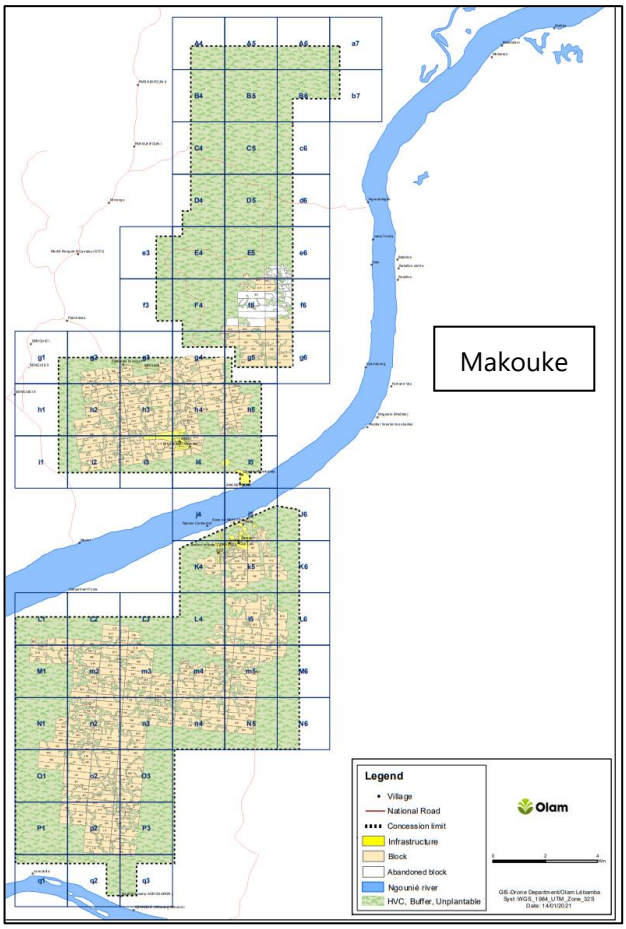


Table 4. Summary of size of lowland terra firma forest and savannah set asides, and Great Ape and Forest Elephant estimated population size in each OPG plantation (based on RIA approach)

Plantation	Awala	Mouila 1	Mouila 2	Mouila 3	Ndende	Makouke	TOTAL (ha/ind)
Savannah set aside (ha)	-	1,100	50	10,500	10,250	-	**21,900**
Lowland terra firma and gallery forest set aside (ha)	12,594	18,422	17,750	8,250[12]	17,750[12]	5,599	**80,365**
Additional Ndende savannah set aside	-	-	-	-	22,500	-	**22,500**
Great Apes (Central Chimpanzee & Western Gorilla)	74	109	105	-	-	33	**321 (range 190 – 446)**[13]
Forest Elephant	34	75	69	75	202	15	**470**

3.1 Status, threats, current actions and objectives of on-site set asides

All set asides except the proposed additional Ndende set aside have been delimited, and local communities residing near set asides have been informed about access rights in these areas. The set asides do not have a legally recognised status (e.g., protected area, nature reserve, other conservation use) but their gazetting is in active discussion with the Ministry of Water and Forests (MINEF), and they will likely form part of Gabon's commitment to protect 30% of land and freshwater by 2030.

OPG follows the Gabonese Forestry Code regulation that recognises the management rights of local communities over the forests that they depend upon and has provided access cards to all eligible local residents living in proximity to OPG set asides, so they may continue to hunt in compliance with the applicable hunting legislation (e.g., no hunting of protected species, no use of snares etc.). These cards allow them to legally access OPG set asides to hunt within the limits of national regulations on number and composition of species. During patrols, OPG's biodiversity team check that (i) any individual encountered is in possession of an access card, and (ii) that those with access cards follow specific rules about total number of carcasses, and composition from different taxonomic groups and species. More than 700 access cards have been provided across the six concessions, and the list of those eligible for such cards is updated on an annual basis. There is still room for more outreach programs to villages regarding their

[12] This is all gallery forest, and so was not included in the residual impact assessment or net gain calculations for forest habitat.

[13] Both ape and elephant estimated population size in set asides are calculated using the same approach as in the residual impact assessment, average density per hectare multiplied by total hectares of set aside (54,365 ha of lowland terra firma forest (for Great Apes and Forest Elephants) and 21,900 ha of savannah and 26,000 ha of gallery forest (for Forest Elephants only).

customary rights in HCV areas (how to access them and how their activities can remain in the legal framework). In parallel, OPG are developing a Livelihood Development Plan to create alternative and sustainable sources of income.

Within the set asides OPG undertakes both biomonitoring (comprised of recces and camera trapping to monitoring wildlife) and regular SMART (Spatial Monitoring and Reporting Tool[14]) patrols. SMART patrols are designed to deter illegal hunting, logging and mining activities, and uncontrolled fires. Whilst the effort applied to patrols has been variable over time, it has increased year on year, with 7,938 km walked in 2022 compared to 6,668 km in 2021 and 6,313 km in 2020. OPG data suggests that hunting reduced by 30% in 2021 (6,668 km walked) compared to 2020 (6,313 km walked) and patrolling effort has stabilised. Similarly, in 2022 a 45% decrease in illegal activities (mining and sawing) was recorded compared to 2021 (16 cases versus 29). This followed a previous reduction of 40% compared to 2020 (29 cases vs 49). However, it is important to note that the OPG monitoring team are not yet spending sufficient time patrolling the large HCVs, particularly in Awala (P. Despretz, pers. Comm), and so whether this reduction in illegal activities applies to the large HCV's remains to be seen. Once systematic monitoring has been implemented as part of the on-site offset, these numbers should be reviewed. Levels of hunting in the Awala set aside exceed those observed in other concessions, and are clearly undertaken by organised, armed groups hunting for commercial purposes, due to proximity to Libreville. OPG have no legal mandate to arrest hunters, and so are working with Gabon's National Parks Agency (ANPN) and MINEF's agents to patrol set asides, with some success, but greater resources are required to effectively tackle this issue.

The on-site offset objectives are therefore to increase the frequency and effectiveness of patrolling in order to reduce further illegal hunting, logging and mining activities and uncontrolled fires. Implementing activities to reduce ongoing threats will ensure that forest and savannah habitat extent and quality is improved (i.e., restoration gains), while prevention of poaching will support the maintenance of species populations, thereby generating avoided-loss gains.

3.2 Comparability and additionality of the on-site offsets

In terms of comparability, it is clear that the HCV set asides in OPG concessions are comparable[15] (in terms of habitats and species composition) to the areas developed, since they are both adjacent to, and in some cases, intertwined with one another. No systematic review is therefore required to assess comparability. In terms of additionality, there is clear additionality since the set asides form part of the concessions that OPG were given permission to develop

[14] SMART Conservation Software - Spatial Monitoring and Reporting Tool (smartconservationtools.org)

[15] Please note that 'comparable' in this context refers to habitat **type** and presence of species, it does not refer to habitat **quality**, since OPG prioritised planting where the habitat was lower quality.

plantations in. If OPG were not aligning with good international practice, they would have developed such areas, or handed them back to the government to be given to other developers. They could also have set aside the areas without implementing any conservation actions to protect their integrity. It is therefore considered that preserving and actively protecting set asides of HCV forest and savannah is an additional action to a without offset scenario.

3.3 Technical feasibility

As of Q3 of 2023, OPG's biodiversity team is comprised of 40 individuals across the six concessions and company headquarters. Concession-level staff are overseen by an overarching biodiversity manager who centralises all data, and coordinates activities on the ground. The biodiversity team already undertake regular biomonitoring patrols (that combine enforcement of rules around hunting and other unpermitted activities with data collection of biodiversity observed) and are familiar with using field equipment (GPS, compass etc), and in identifying signs of faunal activity. In addition, in March 2022 OPG's biodiversity staff underwent training on PS6, the mitigation hierarchy, and implementation of line transects and camera trapping by external experts. Powerpoint presentations of these trainings are available to OPG biodiversity staff to refresh on any of the elements included. Offset activities have been developed to ensure they are feasible for OPG staff to implement and OPG has an annual budget to ensure that all activities outlined in Table 7 below have resources to enable their implementation. Additional staff may be required to fulfil the requirements of the on-site offset, but this is accounted for in the on-site offset budget, which is currently under review.

As outlined in Section 3.1, OPG patrol data shows that as patrol effort has increased, evidence of illegal activities has decreased, highlighting that anti-poaching patrols are successfully reducing pressure, and that significant gains can be achieved via this activity. Pressure from hunting and other illegal activities across the different concessions is variable, and patrol effort will need to be adapted accordingly (per concession) to account for this. For example in Awala there is intense pressure from commercial hunting of all species, while in Mouila Lot 3 (and to some degree Ndende) buffalo hunting and illegal sawing are particularly problematic (P. Despretz, pers comm). Pressure is lower in Makouke and Mouila Lots 1 and 2, but nonetheless monitoring data from 2020-2022 shows that illegal activities are observed in HCV forest across all concessions. Therefore, if OPG implement the offset actions (patrols and monitoring) summarised in Table 7 (see Section 3.6) at the required intensity, this should be sufficient to deliver the required gains for CH features (see Section 3.7 – 3.10). Based on the existing capacity of OPG staff, and the impact of the required conservation actions, the on-site offset is considered to be feasible from a technical perspective.

3.4 Social feasibility

During Project development, OPG engaged in dialogue with all communities within and around the concessions prior to implementation of any activities. Participatory mapping was carried out to accurately map land tenure and ensure that plantations did not interfere with any customary or traditional uses. During this process, the limits between the plantation and village territory were decided together and agreed by all parties. OPG followed the FPIC process, leading to the

co-creation of a social contract that set development objectives for the communities, supported by OPG on a long-term basis. As already outlined, more than 700 access cards for local residents have been provided across the six concessions in 2023, and the list of those eligible for such cards is updated on an annual basis. Those with access cards are allowed to enter set asides to hunt non-protected species and collect NTFP's.

OPG partners with 61 villages around their concessions and has long-term social commitments to these villages to implement actions that will support them in livelihood development. OPG's focus is on shifting from an "assisted villages" approach to a "partnering communities" approach, by addressing gaps in infrastructure and developing income generating activities to support livelihood development. Table 5 below shows OPG's contribution to social actions to date. In terms of investment per category, 46% of funds have gone towards water and energy support, 30% towards education, 11% on health, 9% on economic catalysts and 5% on leisure.

Table 5. OPG's contribution to various social actions to date

Health	Education	Water & Energy	Economic Catalysts	Leisure
8 dispensaries built	18 schools and/or classrooms built	69 water pumps built	17 kms road renovated	4 football fields built
11 dispensaries renovated	26 schools renovated	64 water pumps renovated	6 market construction / gendarme post	34 community meeting rooms built
2 nurse/ doctor houses built	739 school kits donated	862 solar streetlights renovated	1,142 tools / small equipment donated	5 churches renovated
2 nurse / doctor houses renovated	20 teacher houses built	991 solar lights installed	66 farmers received agricultural support	964 litres diesel donated

OPG is also working to improve their complaint and conflict management system and to bring additional transparency to their grievance management procedure. Actions include providing a toll-free number that has multiple entry points (SMS, Web etc). OPG also publish data on number of grievances and the outcomes of claim resolution. Table 6 below shows the number of grievances per concession in 2021 and 2022.

Table 6. The total number of grievances against OPG by local communities in 2021 and 2022.

Concession	Number of grievances	
	2021	2022
Awala	0	0
Makouké	3	0
Mouila Lot 1	2	1
Mouila Lot 2	0	0
Mouila Lot 3-Ndendé	0	4
Total	**5**	**5**

The proposed offset areas are already designated HCV areas that have been delimited in agreement with local communities. There are no boundary line changes or land-use changes

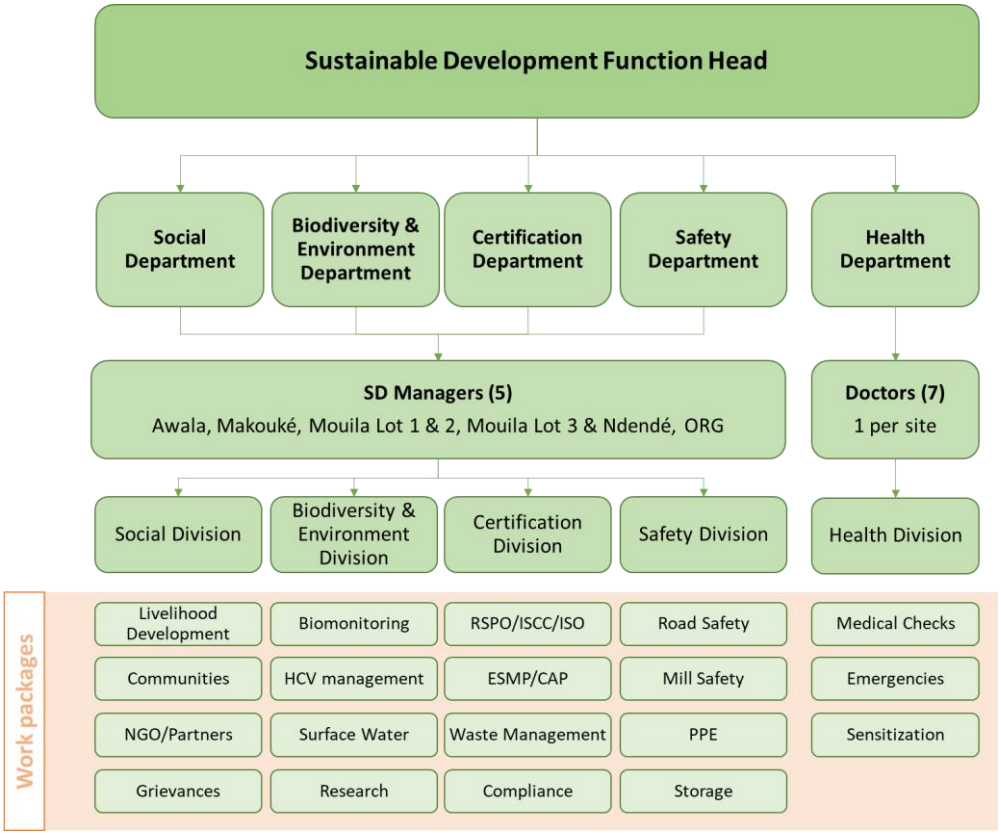
planned and there will be no change in governance/status or community access to resources related to offset implementation that would impact communities who live around the concessions. OPG will need to manage any ongoing misunderstandings linked to community access, but this should be addressed in the Livelihood Development Plan. The implementation of the proposed on-site offset project therefore presents a limited social risk and is deemed to be feasible from a social perspective.

3.5 Governance and management feasibility

On-site biodiversity offset actions will occur inside OPG managed concessions and will fall under the purview of existing teams and organizational structure. Therefore, it is expected that there will be fewer governance-related challenges associated with implementation and management of the on-site offset, compared to an offset that occurs outside of OPG managed areas.

As summarised in Sections 3.3 and 3.4, OPG already have well established biodiversity and social actions within and around their concessions, as well as defined budgets for implementing activities. Roles and responsibilities for the different activities within the organisation are also well developed, with an overarching sustainable development head that oversees both social and environmental departments and their managers (Figure 4). While the on-site offset may involve scaling up existing activities, it does not involve developing new activities, and it is therefore considered to be feasible from a governance and management perspective.

Figure 4. Organigram of sustainable development team in charge of implementing OPG's BAP, offset project and other biodiversity-related management plans (provided by OPG, Dec 2023)



3.6 Activities in on-site set asides

Table 7 outlines the required activities to meet the objectives of the offset, in OPG's on-site set asides. OPG will be responsible for further developing and implementing these activities. For certain actions (specifically support with patrols, implementation of habitat quality assessment of gallery forest, and camera trap data analysis) external experts will need contracting by OPG to implement. Further details of these actions can be found in OPG's Biodiversity Action Plan.

Table 7. Required activities in on-site set asides

<table>
<tr><th>Actions</th><th>Activities</th><th>Timeline</th><th>Responsibility</th><th>Verification</th></tr>
<tr><td>Set aside status</td><td>• Set asides need legal recognition to safeguard their long-term protection. OPG will explore the most appropriate designation in collaboration with the Direction General du Faune et des Aires Proteges (DGFAP) and Direction Générale de l'Environnement et la Protection de la Nature (DGEPN) and ensure the set asides are given a recognized protected status.</td><td>• Signed agreement on designation by September 2024</td><td>• OPG sustainable development head</td><td>• Signed agreement with GoG on official protected status of set asides</td></tr>
<tr><td>Biomonitoring Patrols</td><td>• The Project will complete 636 days of biomonitoring patrols each year across all set asides to deter illegal hunting, logging and mining activities. The effort per concession is calculated based on the size of set aside and the level of threat from hunting and other illegal activities and is summarized in the table below.
<table>
<tr><th>Concession</th><th>Monthly patrol target (km walked)</th><th>Number of patrols per month</th></tr>
<tr><td>Awala</td><td>180</td><td>15 (min. 3 with ANPN / Eaux et Foret)</td></tr>
<tr><td>Makouke</td><td>72</td><td>6</td></tr>
<tr><td>Mouila 1</td><td>108</td><td>9</td></tr>
<tr><td>Mouila 2</td><td>108</td><td>9</td></tr>
<tr><td>Mouila 3</td><td>90</td><td>6</td></tr>
<tr><td>Ndende</td><td>120</td><td>8</td></tr>
<tr><td>TOTAL across all concessions</td><td>660 km per month</td><td>53 patrols per month</td></tr>
</table></td><td>• Implementation of systematic patrolling to commence by end of April 2024. First report (covering 6 months) delivered by end of October 2024.
• Regular patrolling (at least 3 patrols per month) with ANPN in Awala by end of April 2024
• Vaccinations and TB checks for all biodiversity staff by end of June 2024.</td><td>• OPG biodiversity manager</td><td>• Biodiversity Manager to undertake monthly checking, per concession, of a) km of patrols walked;
b) number of patrol days;
c) number and location of grid cells covered by patrols (to ensure systematic coverage over time);
to ensure that they are aligned with targets in the table.
• 6 monthly reporting (for the first 3 years, followed by annual) on:</td></tr>
</table>

	Effort level per concessions is also based on the assumption that there are at least 6 biodiversity team staff per concession, that 12 km per patrol can be covered in forested set asides (Awala, Makouke, Mouila Lot 1 and Lot 2) and 15 km per patrol in savannah set asides (Mouila Lot 3 and Ndende). If the teams can cover more ground than this, then the number of patrols will be increased accordingly. Note that patrols are **additional** to days spent in the set asides undertaking monitoring activities (see 'biomonitoring' cell below), meaning that OPG presence in set asides will be more regular than is indicated by patrol effort, and this additional presence will also contribute to disincentivizing illegal activity. • Engage with ANPN and Eaux et Forêts officers to support patrols in all set asides (but especially Awala) and ensure that illegal human activities are effectively tackled. • Ensure that all HCV biodiversity team staff are vaccinated against Polio and Measles, and undergo an annual TB check.			1. Total number of patrols and kms walked per concession 2. Number (and tracklog) of patrols undertaken within HCVs with ANPN / Eaux et Forets staff. 3. Number and type of signs, and location of illegal activity per concession per year 4. Number (and location) of people apprehended. • Annual HCV staff immunization reports
Biomonitoring	• The Project will implement the camera trapping protocol for Great Apes and Forest Elephants that was developed in 2022, and ensure baseline data for these species is collected as soon as possible as per ape monitoring protocol. Camera traps will be set up in a 2 x 2 km grid, and nine-week surveys will be conducted two times per year – once in the rainy season and once in the dry season. The effort per concession in terms of camera traps installed is calculated based on the size of set asides and distribution of suitable habitat is summarized in the table below.	• Central database of patrol and monitoring activities created by end of June 2024 • First great ape and elephant camera trapping survey complete by end of June 2024, with data analyzed by end of	• Biodiversity manager is responsible for (i) ensuring camera trapping is implemented, (ii) that a central database of all actions, activities and data is created and maintained, and (iii) ensuring camera	• **Data collection**: Verification by Biodiversity Manager that all concessions implement camera trap survey twice per year in line with protocol. Verification that Biodiversity Manager has centralised all

	<table><tr><th>Concession</th><th>Number of camera traps</th></tr><tr><td>Awala</td><td>32</td></tr><tr><td>Makouke</td><td>24</td></tr><tr><td>Mouila 1</td><td>48</td></tr><tr><td>Mouila 2</td><td>48</td></tr><tr><td>Mouila 3</td><td>20</td></tr><tr><td>Ndende</td><td>20</td></tr><tr><td>TOTAL across all concessions</td><td>192</td></tr></table> • Monitoring will follow the thresholds developed in OPG's BMEP and will apply adaptive management accordingly. Specifically, if 'warning' or 'critical' thresholds for pressure indicators are reached the frequency in monitoring will be increased, or additional data will be collected. If status monitoring shows no change after repeated assessments and pressure indicators also indicate no threat, there may be justification to reduce the frequency of monitoring. Population size will be estimated using a) encounter rate to provide a measure of relative abundance and b) DISTANCE for camera trap software to provide a density estimate. • Alongside the camera trapping, OPG will continue to implement the Forest Elephant genetic and radio collar study (already ongoing) in Mouila Lot 1 and Lot 2. Thirteen Forest Elephants have been radio collared (with 2 more planned) in order to better understand their movements and activity patterns within the Mouila landscape. The genetic survey across Mouila Lots 1 and 2 will provide an estimate of	September 2024 and report submitted by end of October 2024. Second survey complete by end of December 2024, with data analyzed by end of January 2025 and report submitted by end of February 2025 • Elephant radio collaring and genetic study is ongoing, planned completed in 2025.	trap data is regularly analyzed. • ANPN is responsible for implementing the elephant radio collaring and genetic study.	camera trap footage and data sheets, and done quality control check to ensure data is accurate. • **Data analysis:** Written report from OPG on a 6 monthly basis (for the first 3 years, followed by annual reporting thereafter), summarising camera trapping effort, encounter rate with CH species, and population dynamics (e.g., distribution, party size, male/female and adult/infant ratio, health etc) Written report from expert sub-contractors, presenting results of camera trap analysis (specifically density estimate) on a 6 monthly basis (for the first 3 years, followed by annual reporting thereafter),

	the number and sex (males and females) of elephants visiting the plantations,, and information on ranging behaviour. • OPG will create / maintain a central database for all actions, activities and data to facilitate effective biodiversity management. • OPG will ensure that the data is regularly analyzed to assess changes in distribution and density (this will need to be sub-contracted at least in early years).			Final written report from ANPN presenting results of elephant collaring and genetic study (circa 3 years after project commencement).
Community engagement	• OPG identifies all villages using HCV areas, and provides access cards to local individuals using the area to hunt selected species according to prevailing legislation (already ongoing and repeated annually). • OPG will continue to raise awareness of biodiversity and rules regarding HCVs among the 61 villages around their concessions. • As per ESAP#20, OPG will develop Community HCV Management Plans that will establish management guidelines including any restrictions of access, roles and responsibilities and monitoring requirements. The plans will be designed to integrate biodiversity requirements so that biodiversity and community needs can be sustainably met within such areas, especially with regards human-elephant conflict. The management plans will be socialized amongst the communities and OPG security personnel.	• First two actions are actions already ongoing, and will be continued on a regular basis. • Community HCV management plans will be developed by Dec 2024.	• OPG Biodiversity manager and OPG Senior Social Manager	• List of card holders and community of origin • 6 monthly reporting (for the first 3 years, followed by annual reporting thereafter) on percentage of villages and individuals engaged each year, and subjects discussed
Staff training	• OPG will undertake annual training with plantation staff, as well as inductions with any new staff and external contractors to: - remind them of plantation limits - raise awareness regarding the negative effects of pesticides and fertilizers	• Training is already ongoing	• OPG Biodiversity manager	• Reporting on percentage of plantation staff (by category) taking part in training each year, and topics covered

	- remind them of biodiversity related rules regarding HCVs including reducing disease transmission			
Savannah management	• Undertake research to understand the dynamics of savannah fire setting in the region (i.e., locations, causes, area affected etc) and work with communities to develop a sustainable fire regime. • Develop a fire response programme • Formal delimitation of additional 22,500 ha of savannah in Ndende • Undertake baseline surveys of habitat quality (and composition) for additional Ndende set aside (sub-contracted) • Identify all Rosy-Bee Eater nesting areas (during dry season patrols and baseline habitat surveys) and ensure a) their location is recorded and stored in the central monitoring database; and b) that OPG takes steps to avoid any impacts to known nesting areas (even if the birds do not use the identified area every year).	• Dynamics of fire setting research and sustainable fire regime (and fire response program) developed by end of December 2024. • Baseline surveys and formal delimitation of Ndende by end of September 2024.	• OPG biodiversity manager	• Community informed fire management plan, and fire response program • Designation of 22,500 ha as additional set aside (with same legal status as HCV – see action 1) • Baseline habitat survey results from additional set aside
Habitat quality research	• Complete baseline surveys of savannah habitat quality and lowland terra firma forest biomass / carbon storage in all concessions (sub-contracted) • Assess habitat quality and water stress in gallery forest where priority plants have been identified to assess if buffer between the HCV and the planted area is large enough to maintain ecological integrity. If impacts observed, apply adaptive management (sub-contracted). • Undertake assessment of savannah habitats every 5 years to assess changes in quality[16] (sub-contracted).	• Baseline surveys of savannah habitat quality and lowland terra firma forest biomass / carbon storage in ALL concessions, and habitat quality / water stress in gallery forest,	• OPG biodiversity manager	• Baseline survey results of habitat quality and biomass from all HCV's • Report on gallery forest habitat quality / water stress.

[16] Once it has been acquired, OPG should include the 11,000 ha Mouila savannah in all "on-site" research and monitoring activities – see Section 4.8.2 for details of Mouila savannah.

	• Undertake biomass / carbon assessment of forested set asides every 5 years to assess changes in quality.	by end of September 2024.		
Auditing	• Annual 3rd party auditing of biomonitoring activities, analysis and results	• First audit (of first baseline survey) complete end of September 2024.	• Biodiversity manager is responsible for organizing audits of data	• 3rd party audit reports on an annual basis.

3.7 Estimate of gains for lowland terra firma forest

The conceptual model for lowland terra firma forest and associated CH-qualifying species is that protection of the set asides in the long-term, preventing repeat logging combined with decreasing the level of hunting, will result in forest regeneration and increasing wildlife populations.

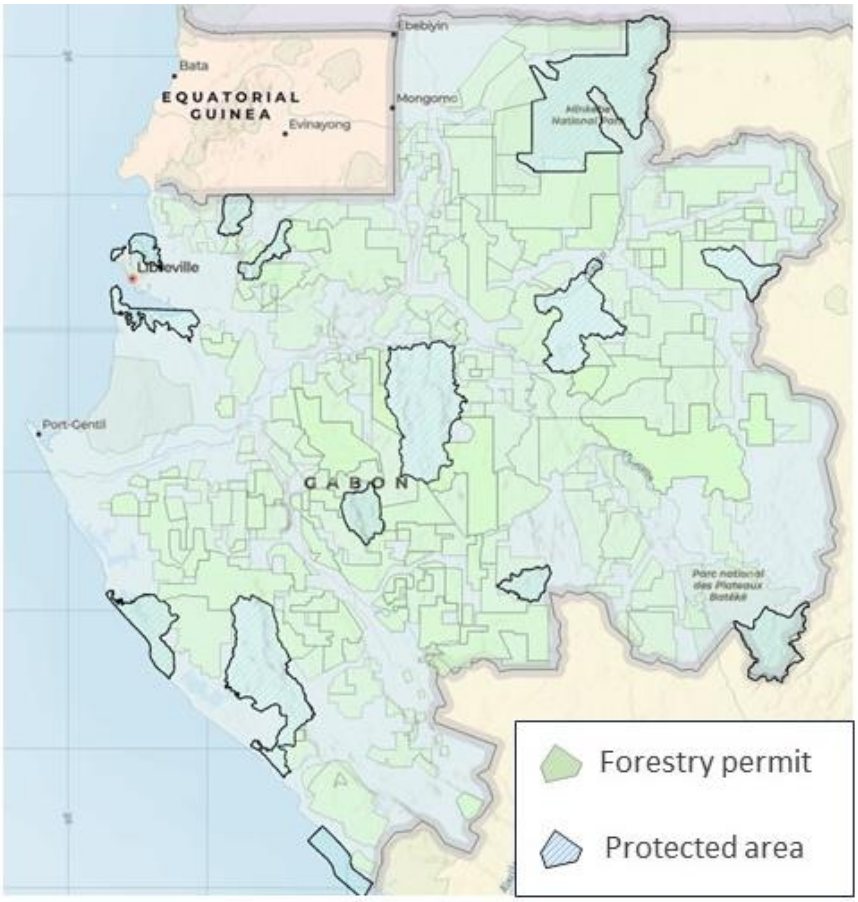
For estimating potential gains to lowland terra forest, only HCV set asides and wide (>50m) riparian buffers in Awala, Makouke and Mouila Lots 1 and 2 are considered (totalling 54,365 ha). Forested areas in Mouila Lot 3 and Ndende are primarily gallery forest and are not equivalent to the forest areas cleared in Mouila Lots 1 and 2, nor are they essential[17] great ape habitat, and are therefore not considered as potential lowland terra firma forest offsets (and are excluded from the forest net gain calculations below). Narrow riparian buffers of forest (< 50m on each side of a water stream) in Awala, Makouke an Mouila Lots 1 and 2 which have been retained from surrounding clearance are also excluded because they have more limited conservation value and may even degrade over time due to edge effects. The conservative approach is therefore to not include these areas. Long-term monitoring may demonstrate the conservation value of the narrow riparian zones (for example as corridors). Areas set aside for socio-cultural purposes (HCV 5 and 6) might have some biodiversity co-benefit, but the conservative approach is to assume these areas will not accrue gains and therefore they are also excluded.

If OPG had not set up the onsite set asides, it is assumed that low-intensity, well-managed timber harvesting would take place across the entire set aside area[18]. This is an appropriate without offset scenario, as outside of protected areas the vast majority of forested habitat in Gabon is allocated as forestry permits (Figure 5).

[17] Essential great ape habitat in Gabon is considered contiguous areas of terra firma forest that contain a wide diversity of fruits and other foods necessary to sustain Great Apes. Gallery Forest in the Mouila and Ndende concessions contains few great ape fruiting species and a lot of *Raphia sp.* species, and thus is not considered to be essential great ape habitat. Furthermore, the biodiversity team have never observed direct or indirect signs of Great Apes in the gallery forest of Mouila Lot 3 and Ndende.

[18] 2.2 million ha of forest in Gabon is already under FSC certification, and the government of Gabon has an ambition to have all their forest concessions certified FSC by 2025 (FSC 2023).

Figure 5. Map of Gabon showing forestry permits and protected areas. Note the most areas without allocated permits are either savannah habitat, or infrastructure (cities, roads etc). Source: ARC GIS publicly available layers.



There are other possible without offset scenarios which would create different estimates of biodiversity gains. These include:

(i) A well-managed forestry scenario, in which set asides are established on the steep slopes of Mouila Lot 2 (as the nearby FSC-certified CBG concession has done) and also established in similar locations as OPG. In this scenario the gains estimated here are potentially overestimated.

(ii) A poorly managed forestry scenario in which rotational cycles are shorter than 25 years and logging uses poor techniques and is more intensive. In this scenario impacts are much greater and the gains estimated are an underestimate.

(iii) A plantation scenario whereby set asides are turned over to another oil palm company who clears the whole area. In this scenario impacts are much greater and the averted loss gains are an underestimate.

(iv) A development corridor scenario. Some stakeholders consulted in 2019 suggested that the Awala concession is in a rapidly developing corridor outside Libreville and so a plausible without offset scenario could include loss of a significant part of the forest in this concession for peri-urban agriculture and infrastructure development. However, other stakeholders indicated that there is no evidence of such rapid loss

of forest habitats in areas to the west of Awala between the town of Ntoum and the Komo River, and in 2023 no stakeholders highlighted this as a key concern. In addition, Global Forest Watch data between 2001 and 2021 does not indicate that forest loss in the department of Komo is accelerating (circa 415 ha per year across the Department, with at or below average loss between 2018 and 2021). This OFS therefore does not include rapid loss of forest in Awala as a counterfactual scenario.

Under the selected without project scenario, gains are created as a result of improved quality (i.e., restoration) over time in the absence of selective logging activities. The Okala project (location of the off-site offset, see Section 4) recently undertook carbon mapping of their landscape to assess current total above and below ground biomass against a 2007 baseline (logging ceased in 2011). Forests in the Okala landscape have previously undergone a similar level of logging to those in the OPG concessions – repeated selective logging over the past 100 years. Their survey revealed that over a 15 year period between 2007 and 2022, total biomass increased from an average of 281 tonnes per ha to 422 tonnes per ha - an increase of 140 tonnes per ha (see Section 4.8.1 for more details).

Based on the QH metrics used in OPG's residual impact assessment, an increase of this scale would increase the Quality score of a forest in fairly good existing condition by 0.2 (i.e., from a quality score of 0.7 to 0.9), or, if the forest was in poor condition to start with, by 0.3 (i.e., from 0.5 -0.8). Forests developed by OPG had an average quality of 0.4, but OPG prioritised lower quality forest for development, and so to be precautionary we assume that condition of set asides was 0.7 when OPG began operations. Based on this, we can infer that quality would increase from 0.7 to 0.9 over the 49 year offset period[19] (precautionary, considering that a similar change was observed within just 15 years in the Okala concession).

The forest set asides in Mouila Lot 3 and Ndende were not considered for gains because they are primarily gallery forest and cannot be considered equivalent forest type to the areas cleared in the other plantations. Mouila Lot 1 and 2 were combined due to their geographic proximity (circa 6 km at the closest point) and comparable habitat profile (see Table 8 for details). The calculations show that while significant gains for lowland terra firma forest can be achieved via on-site set asides**, an overall deficit of 62 QH remains, that will need to be achieved via off-site offset actions.**

[19] Each of OPG's six concessions has an operational permit for 49 years with the government of Gabon, but they did not all become operational at the same time. Mouila Lots 1 and 2 began operations in 2012, Awala in 2013, Mouila Lot 3 in 2015, and Makouke and Ndende in 2016. We therefore consider that OPG's onsite offsets will each be operational for 49 years from commencement – so for example gains for lowland terra firma forest will be considered in Mouila Lots 1 and 2 until 2061, and until 2065 in Makouke and Ndende.

Table 8. Summary of estimated gains achievable per concession and overall for lowland terra firma forest in on-site set asides, and the remaining deficit after gains have been achieved[20].

Plantation	Awala	Mouila Lots 1 & 2	Mouila 3	Ndende	Makouke	TOTAL
Lowland terra firma forest losses (QH)	2,916	8,019	None	None	None	-10,935 QH
On-site offset (ha)	12,594	36,172	None	None	5,599	54,365 ha
On-site offset (QH – assuming 0.7)	8,816	25,320	None	None	3,919	38,065 QH
Q change at T + 49 (based on 0.7 – 0.9 QH)	2,519	7,234	None	None	1,120	10,873 QH
NG potentially feasible at this site?	No	No	NA	NA	Yes	No
Deficit for achieving NG (QH)	-397	-785	NA	NA	+1120[21]	**-62 QH**

3.7.1.1 Summary of assumptions made for gains in lowland terra firma forest

For this assessment the following key assumptions have been made:

- Forest set asides of each concession contain a broadly equivalent mix of forest types (in terms of vegetation composition rather than degradation level) as forests cleared.
- Forest in the set asides has previously been logged at least twice over a 25 year period, it is therefore assumed that over the Project lifetime (49 years) the forest would be logged a further two times[22].
- The set asides will have permanent protection that is effectively applied so they will not be converted or selectively logged in the future.
- These gains are against a without OPG set aside counterfactual scenario of further future rounds of selective logging. Alternative counterfactual scenarios are possible and some

[20] In the "TOTAL" column, total lowland terra firma forest loss is equivalent to -10,935 QH, the total area of lowland terra firma forest set aside by OPG is 54,365 ha, within which there is potential for gains of 10,873 QH over a 49 year period. In terms of feasibility, this leaves a deficit of 62 QH from the original total of 10,935 QH, that cannot be offset via onsite actions (i.e., 99% of OPG's impacts to lowland terra firma forest can be offset via on-site actions).

[21] In Makouke, there were no losses, but gains are possible from the set asides, hence this figure is a positive number that has been subtracted from the overall remaining deficit

[22] This is a reasonable assumption since forests in the OPG concessions have been allocated as logging concessions since at least the 1960's (WRI 2000) and proximity to the Ngounié River and sawmills at Lambaréné means this area has been economically accessible to logging for most of that time. The Proforest HCV assessments note that lowland forest in each concession has been logged, and there is evidence of logging even on some steep slopes in the Mouila Lot 2 set aside (Proforest 2013).

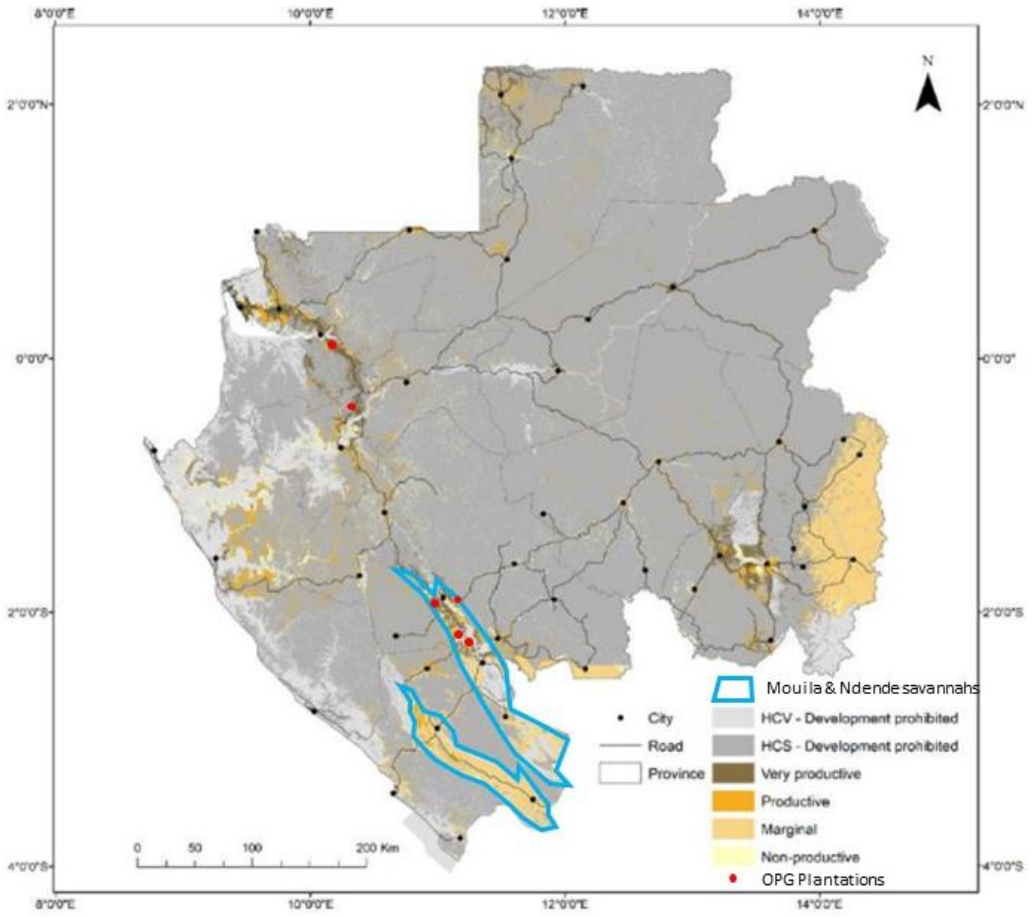
stakeholders suggested that the expected intensity of logging in the future might be quite low, given that Gabon's logging sector is currently relatively moribund, and that some of these concessions have previously been heavily logged.

3.8 Estimate of gains for savannah habitat

For savannah habitat, the conceptual model is that protection of the set asides will prevent agricultural development in these areas which would convert savannah habitat into plantations or other types of agriculture.

This counterfactual scenario is justified as savannah habitat is prioritised for agricultural development over forest habitat in Gabon due to carbon targets and other forest protection priorities (CNAT, 2020; M. Lee, T. Stevart, P. Lowry pers comm), as well as the EU's zero deforestation policy. Gabon's National Guidelines for oil palm development (National Directive on site selection for industrial agriculture; CNAT 2020) clearly show that after accounting for nationally protected areas, areas of high carbon stocks (HCS), high conservation value (HCV) areas and productivity potential, the savannahs of southern Gabon (Mouila, Ndende and Nyanga) are priority areas for development of palm oil (Figure 6). A 2012 report on savannah diversity also highlights that the southern savannahs are a focus for agricultural development in Gabon (Walters *et al*. 2012), while Gabon's 2017-2019 'Plan de relance de l'economie' (economic recovery plan) states that the country is aiming to reduce agricultural imports by 50% through developing production of coffee, cacao, manioc, bananas, palm and livestock. Furthermore, given that currently very little savannah in Gabon is protected, OPG's existing protection represents a circa 3-fold increase in savannah protection for the country.

Figure 6. Oil palm suitability and areas where development is prohibited for HCV and HCS. Map shows OPG's concessions are located within areas considered "very productive" or "productive". The "Very productive" category measures 506,156 hectares (1.9% of the country). The "Productive" category represents 668,875 hectares (2.6% of the country). Map adapted from CNAT, 2020.



Based on existing data and national priorities, it is reasonable to assume that over the next 49 years, in the absence of OPG protecting these set asides and instead returning them to the government, at least 40% of this savannah would otherwise be developed for agriculture or other purposes, creating an averted loss gain for the Project. Independent experts agreed this was a reasonable assumption (MBG pers comm. M. Lee pers comm).

In addition to averted loss gains, restoration gains are also possible for the savannah set asides. Savannah areas are currently degraded due to repeated, unmanaged fires and hunting. Savannah fires currently are un-coordinated and occur up to 5 times per year in certain areas (e.g., OPG community savannahs) and there is therefore potential for specific burning regimes to enhance quality. For example serial burning in some areas throughout the year could create grazing sites for buffalos and duikers, while maintaining shrubby savannahs, and avoiding fires during the nesting period could support populations of savannah-dependent bird species such as the CH-qualifying Rosy Bee-Eater (Bidault *et al.* 2017). This will be challenging and will require careful planning and collaboration with local communities (who set fires) to find an optimal balance that leads to improved savannah quality whilst maintaining livelihoods.

While a simple metric for savannah quality in Gabon is not available, apart from the reduction of large mammal populations, savannahs do not appear heavily degraded. The most conservative scenario for estimating potential gains in on-site set asides via improved habitat quality is to assume a low level of quality increase. The assumption for the estimate of gains is that a 10% increase in savannah quality over the 49 year Project operations period is feasible (assuming savannahs are already at 80% quality).

To model the potential gains via OPG's savannah set asides, it is assumed that gains are created via a combination of averted loss (40%) and natural restoration (10%) over the 49 year concession period. Table 9 provides a summary of the approach and potential gains. The calculations show that while significant gains for savannah can be achieved via on-site set asides**, an overall deficit of 5,441 QH for savannah habitat remains, that will need to be achieved via off-site offset actions, if feasible sensu PS6**[23]**.**

Table 9. Summary of gains achievable per concession and overall for savannah habitat in on-site set asides, and the remaining deficit after gains have been achieved.

Plantation	Mouila Lots 1 & 2	Mouila 3	Ndende	Additional Ndende savannah	TOTAL
Savannah habitat losses (QH)	5,412	15,675	6,560	0	-27,647 QH
On-site offset (ha)	1,149	10,514	10,250	22,500	44,413 ha
QH gains at T + 49 from a combination of averted loss of savannah habitat (based on 0.4 of area otherwise converted) and natural restoration of set asides (based on 0.1 increase in quality)	575	5,257	5,125	11,250	22,207 QH
NG potentially feasible at this site?	No	No	No	Yes	No
Deficit for achieving NG (QH)	-4,838	-10,418	-1,435	+11,250[24]	**-5,441 QH**

[23] Technical feasibility (per PS3, footnote 3) is an indication of whether appropriate skills, actions, or in this case, area are available to offset impacts. Recent (2023) habitat surveys by MBG have identified that there is ecological variation in Gabonese savannahs, with some floristic diversity observed across rainfall and soil composition gradients. While the Mouila and Ndende savannahs developed by OPG exhibit such variation (and are classed as separate sub-types by MBG), there is also significant floristic overlap between these savannah ecosystems, and in this OFS all savannah developed and set aside is considered to be ecologically comparable. Regardless, limited options for offsetting additional savannah of these two sub-types are available due to their small geographic distribution and competing land uses, hence NNL can only be achieved if feasible.

[24] In the additional Ndende set aside there were no losses, but gains are possible, hence this figure is a positive number that has been subtracted from the overall remaining deficit

3.8.1.1 Summary of assumptions for gains in savannah habitat

For this assessment the following key assumptions have been made:

- the savannah set asides of each concession contain a broadly equivalent mix of savannah sub-types as those that were cleared;
- the entire extent of the savannah set asides is at least somewhat degraded (i.e. quality <1) so gains can be realised through management of fires and protection;
- the set asides will be managed for conservation so that fire will be managed according to an agreed management plan, and hunting will be controlled or managed to allow recovery of large mammal populations; and,
- these gains are against a without OPG set aside counterfactual scenario of agricultural conversion, development, un-planned burning, and continued hunting.

3.9 Estimate of gains for Great Apes

Central Chimpanzees and Western Gorillas are found across four of the six plantations (Awala, Makouke, Mouila Lot 1 and Mouila Lot 2), but to date have not been observed directly or indirectly in Mouila Lot 3 or Ndende. Gains via on-site set asides are therefore only considered for Awala, Makouke, Mouila Lot 1 and Mouila Lot 2.

As with residual impacts, gains for Central Chimpanzees and Western Gorillas are combined to estimate a "Great Ape" gain. This is because where the two species occur sympatrically, it is very challenging to distinguish between their nests (and to some degree the same issue applies to tracks and faeces, and even direct observations for inexperienced observers). As a result, most available survey data for Gabon does not distinguish between the two species and instead provides an estimate for Great Ape density. When estimating the potential gains for the offset the same approach is applied.

For Great Apes, potential for gains is based on averted loss through mitigating hunting. OPG have limited data on hunting rates within and around their concessions (data is restricted to number of illegal hunting activities encountered during patrols), and so a combination of OPG and published data from Gabon is used to estimate what impact hunting would likely have on Great Apes in OPG set asides in the absence of protection. While it is impossible to get accurate figures on how many Great Apes are killed each year due to hunting, by piecing together different studies it is possible to establish an estimate. The approach combines data of estimated tonnes of bushmeat harvested per year per km^2 in Gabon, with the average proportion of offtake that is Apes in Gabon and controlling for sex ratios in both Chimpanzees and Gorillas. Data on observed hunting activities from OPG patrols is then used to estimate the relative hunting pressure per concession.

A 2010 study estimated that on average, 130 kg of bushmeat per km^2 (1.3 kg per ha) is harvested in hunting areas in Gabon per year (Abernethy & Obiang, 2010). Three separate studies calculated that Great Apes account for between 0.07% (Thibault & Blaney, 2003), 0.11% (Froese *et al.,* 2021) and 0.3% (Bowen-Jones & Pendry, 1999) of annual bushmeat harvest in

Gabon, we therefore used the average which is 0.16%. From these studies we can infer that 0.208 kg of Great Ape is harvested per km^2, per year (i.e., 130 x 0.0016). Based on OPG having 54,365 ha (543 km^2) of lowland terra firma forest set asides, in the absence of protection it is estimated that 113 kg of Great Ape meat would be harvested from set asides each year.

To convert this into a specific number of apes, average weights for chimpanzees and gorillas were used (controlling for weight differences between males and females, as well as species sex ratio, and assuming a 1.5:1 ratio of chimpanzees and gorillas across the four concessions). The approach is shown in Table 10 below and resulted in an average Great Ape weight of 63 kg. The above estimated 113 kg of Great Ape meat that would be harvested from the set aside areas each year is equivalent to 1.8 Great Apes. Over 49 years (the duration of OPG's agreement with the Gabonese government) this would equate to an averted loss gain of 88 Great Apes.

Table 10. Summary of approach taken to calculate equivalent kg of one great ape.

	Avg weight male (kg)	Avg weight female (kg)	Species sex ratio (based on Head *et al.* 2013)	Average species weight (kg)	Species ratio (i.e., ratio of chimpanzees to gorillas)	Average "Great Ape"
Chimpanzee	55	38.5	1 : 2.1	44	**1.5**	**63 kg**
Gorilla	168	65	1 : 3.2	90.75	1	

Because OPG patrol data shows that encounter rate of illegal hunting activities is significantly higher in Awala compared to Makouke and Mouila Lots 1 and 2 (see Appendix 2), average annual harvest was calculated at the concession level to reflect these different pressures. Specifically, average annual harvest rate of Great Apes was considered to be twice as high in Awala compared to other concessions. Using this approach, an estimated 2.1 apes would be harvested from all set asides each year, in the absence of protection. Over 49 years this would equate to a gain via averted loss of 102 Great Apes.

However, such an estimate assumes that efforts to prevent hunting of Great Apes are 100% effective, a situation unlikely given that a) some 431 individuals possess access cards that give them permission to hunt in OPG's set asides[25]; and b) hunting pressure in the Awala set aside is intense and for commercial purposes (increasing the risk to Great Apes since commercial hunters are more likely to target apes than subsistence hunters), and it is unrealistic to think that hunting threats can be completely prevented. Furthermore, because of this intense hunting pressure in the Awala concession, it is considered that between 2013 (when operations began)[26]

[25] Note 431 is the number of access cards across Awala, Makouke, Mouila Lot 1 and 2 (concessions where Great Apes are present), an additional 273 access cards are held by residents living in proximity to Mouila Lot 3 and Ndende.

[26] It is considered that in Mouila Lot 1, Mouila Lot 2 and Makouke OPG's biodiversity team have been effective at reducing illegal hunting (since hunting levels are much lower in these concessions), and therefore gains are considered to accrue from when operations began).

and 2023 patrols were not fully operationalised, and minimal gains will have accrued. Gains for Awala are therefore only considered from 2024, when systematic patrols of the large set aside will begin.

Therefore, for Makouke, Mouila Lot 1 and Mouila Lot 2 potential gains via averted losses were estimated over a 49 year period, but with a 20% reduction in effectiveness (as reducing hunting will not be 100% effective), resulting in a gain of 51 Great Apes over this time period. For Awala, potential gains via averted losses were estimated over a 39 year period (to account for lack of effectiveness in anti-poaching efforts between 2013 and 2023), with a 30% reduction in effectiveness (to reflect the greater hunting pressure in this concession). This resulted in a gain of 21 Great Apes over 39 years. In total, it is therefore estimated that **OPG can deliver gains of 72 Great Apes via averted loss over a 49 year period. This leaves a deficit of 106 Great Apes that will require gains achieved via off-site offset actions.** It is key to note that OPG do not yet have baseline data on density of Great Apes in their set asides, and without this information there can be limited certainty of gains that can be achieved via avoided loss. For example, if density is found to be very low, then fewer Great Apes are 'available' to be hunted. The gain metric assumes the same density as estimated in the residual impact assessment - 0.59 weaned individuals/km^2 (range 0.35 – 0.82), which is equivalent to circa 321 (range 190-446) weaned Great Apes present across OPG set asides. Based on these assumptions of density, the OFS estimates that circa 20% of Great Apes would be lost from set asides in the absence of protection, over the 49 year duration of the offset. If density is at the lower end of the estimate (i.e., 0.35 weaned individuals/km^2) then gains of only 38 individuals would be achievable over the 49 year duration of the offset. Similarly, if hunting rates of Great Apes are found to be lower than average (i.e., less than 1.7 individuals per year across set asides), fewer gains via avoided loss will be achieved. Once OPG has collected baseline data for Great Apes, alongside SMART data from patrols, the above estimates may be adjusted.

3.10 Estimate of gains for Forest Elephants

There is very limited information on elephant killings in Gabon. One paper from 2003 estimated elephant hunting rates in the Gamba complex from bushmeat markets in 1997 (Thibault & Blaney, 2003), but this reference is outdated and from a small study. While elephant killings resulting from human-elephant conflict in plantations / villages are recorded at the provincial level by the Eaux et Forets, this data is not centralised and it has so far been impossible to gain access to it. Conservation Justice (the Gabonese arm of the 'Last Great Ape' Organisation (LAGA) have recorded 817 people arrested for ivory trafficking in Gabon since 2010 (circa 68 per year), but again it is difficult to turn such numbers into rates of elephant killings. A 2012 study on human-wildlife conflict around the periphery of Loango National Park (an area of circa 5,000 ha comprised of 23 villages across 5 "regroupements"[27]) estimated at least 10 elephants were killed in this area during a 2-year period (Fairet, 2012).

[27] Regroupements are the result of the French colonial administration's active "regroupement scheme", which aimed to group scattered settlements along transportation routes (Fairet, 2012).

The best available data is therefore the Monitoring Illegal Killing of Elephants (MIKE) database, which provides annual data (between 2004 and 2020) from two protected areas in Gabon – Lope and Minkebe National Park. On average 20 carcasses per year are recorded in Minkebe (combined poaching and human-wildlife conflict) and 11 per year in Lope. When controlling for landscape size, this results in approximately 0.0026 elephants killed per km^2 per year in Gabon[28].

For Forest Elephants, potential for gains is based on averted loss through mitigating hunting and reducing human-elephant conflict. OPG has set aside 124,765 ha of elephant habitat (combined lowland terra firma forest, gallery forest and savannah, and including the 22,500 ha of additional savannah OPG will set aside). If this habitat was not set aside and actively protected 3.3 Forest Elephants would be lost across all set asides each year, or 161 Forest Elephants over 49 years.

However, such an estimate assumes that efforts to prevent hunting and conflict of Forest Elephants are 100% effective, a situation unlikely given that a) some over 700 individuals possess access cards that give them permission to hunt in OPG's set asides; and b) hunting pressure in the Awala set aside is intense and for commercial purposes (increasing the risk to Forest Elephants since commercial hunters are more likely to target Forest Elephants than subsistence hunters), and it is unrealistic to think this can be completely avoided. Furthermore, because of this intense hunting pressure in the Awala concession, it is considered that between 2013 (when operations began)[29] and 2023, patrols were not fully operationalised and minimal gains will have accrued. Gains for Awala are therefore only considered from 2024 when systematic patrols of the large set aside will begin.

Therefore, for Makouke, Mouila Lot 1 and Mouila Lot 2 potential gains via averted losses were estimated over a 49 year period, with a 20% reduction in effectiveness (as reducing hunting will not be 100% effective), resulting in a gain of 116 Forest Elephants over this time period. For Awala, potential gains via averted losses were estimated over a 39 year period (to account for patrols not being fully operationalised between 2013 and 2023), with a 30% reduction in effectiveness (to reflect the greater hunting pressure in this concession). This resulted in a gain of 9 Forest Elephants over 39 years. In total, it is therefore estimated that **OPG can deliver gains of 125 Forest Elephants within set asides as a result of averted loss over a 49 year period. This leaves a deficit of 101 Forest Elephants that will require gains achieved via off-site**

[28] It is key to note that these numbers refer to recorded killings, and there are undoubtedly a significant number of additional killings that go unrecorded, so this figure is an underestimate. For example the Fairet (2012) study is 100 times as high and equates to 0.2 elephants per km^2 per year – although this figure only reflects villages and their agricultural land and so is not representative of a wider area that includes natural habitat and areas without human pressure.

[29] A lag time for Mouila Lot 1 and Lot 2 and Makouke is not included, since hunting levels are much lower in these concessions and it is considered that OPG's biodiversity team have been effective at reducing illegal hunting since operations began.

offset actions. Once OPG has collected baseline data for Forest Elephants, alongside SMART data from patrols, the above estimates may be adjusted.

It is important to note that as part of OPG's social actions they are developing a Livelihood Development Plan, which will include actions to mitigate human-elephant conflict (HEC) in villages around OPG concessions, such as assisting them in generating sustainable revenues (e.g., producing crops that are non-food for elephants), and livelihood enhancement measures. The issue of HEC for OPG is significant and it is important that they do not isolate conservation efforts from community issues. A combination of resources will be required to manage this impact, not only from OPG's social team but also the biodiversity team.

Developing ways to mitigate human-elephant conflict is currently a national priority in Gabon (DGFAP; DGEPN; Steeve Ngama, Steph Bourgeois pers comm), and the National Elephant Strategy is currently in revision (the first version did not sufficiently account for the priorities of rural residents). The strapline for the strategy is "Protect Plantations, Protect People". OPG's Livelihood Development Plan (LDP) will contribute to this national effort through research to understand elephant behaviour and migratory corridors (elephants have already been collared around Mouila in an OPG funded study), and through supporting local communities with HEC issues in more than 60 villages in proximity to OPG concessions. While there is a clear biodiversity link in HEC mitigation, (and while human-elephant mitigation will likely result in gains for elephants being achieved through reducing conflict and killings), for the purposes of this offset study, human-elephant mitigation falls under social actions, and the specific actions and associated costs will be included in OPG's LDP. Any potential gains are not included in this OFS because the actions have not yet been developed; there may be a possibility to estimate and include them in the future.

3.11 Estimating gains for other CH features

For other critical habitat triggering freshwater and terrestrial biodiversity, it is considered that the protection of freshwater and terrestrial habitats both onsite and off-site actions will effectively protect the habitats that are home to these species thereby delivering net gain for these species.

3.12 Summary of potential challenges to on-site offset feasibility, and mitigation to address them

Table 11 below provides a summary of any foreseeable technical, social and operational feasibility issues likely to impede success of offset actions in OPG set asides if not addressed, and proposed actions to mitigate the issues. Details and a timeline for all actions are included in the implementation roadmap (Section 6).

Table 11. Summary of potential challenges to on-site offset feasibility, and proposed mitigation

Potential challenge	**Mitigation to address potential challenges**
Long term protection of the set asides The set asides do not currently have any legal protection status, meaning their long-term preservation is not assured both within and beyond the lifetime of the Project.	OPG will explore the most appropriate designation in collaboration with DGFAP and DGEPN and ensure the set asides are given a recognized protected status by 2030.
Uncertainty in density estimate and hunting rates for Great Apes As outlined in Section 3.9 OPG still do not have baseline data on Great Ape densities in their set asides. A protocol was developed in 2022 but has yet to be implemented. In the absence of these estimates, there can be limited certainty around what gains can be achieved via avoided loss. If density is found to be lower than the predicted 0.59 weaned individuals/km^2, then gains will be lower. For example, if density is 0.35 then gains of only 38 individuals will be achievable via on-site action. Similarly, if hunting rates are lower than predicted, then fewer gains will be achievable via avoided loss. The Project needs to implement the BMEP and undertake bushmeat surveys (both household and roadside), as well as undertake systematic patrols of set asides for illegal activity, to obtain a measure of hunting rates for Great Apes.	OPG will implement the baseline monitoring based on the 2022 protocol, and the BMEP actions relevant to hunting (bushmeat surveys and systematic patrols of set asides) as key priorities, and ensure that results are available by April 2024.
Capacity of biodiversity team in scientific research Capacity of the biodiversity team to implement scientific research is limited, which will impact on OPG's ability to collect, store and analyze monitoring data, and to estimate ape density (and measure change over time). The team is yet to implement the ape monitoring protocol developed in March 2022, although this is planned for March 2024.	OPG will ensure they bring in external support when implementation of biomonitoring begins, with a particular focus on camera set up and video data management. OPG will sub-contract data analysis (DISTANCE, and potentially encounter rate), at least in the short term. OPG will also ensure a population baseline is established as an immediate priority post-disclosure.

Capacity of biodiversity team to patrol set asides Currently efforts by the biodiversity team are focused more on patrolling the perimeter of concessions and small patches of HCV between planted areas, when the key areas that require patrolling to ensure gains are throughout the larger set asides. The large blocks of savannah are also not regularly patrolled. A systematic approach to patrolling HCV's that ensures all areas are covered each month (based on grids) has been developed but is not being applied.	The Biodiversity manager will ensure that the systematic approach to patrolling HCV's is applied each month (with patrol effort (both days and km's walked) as summarized in Table 7), by checking raw SMART data. The Biodiversity Manager will also ensure the team are focusing on interior areas of large set asides (i.e., not walking only around the periphery), and will also flag any grid areas not visited regularly, and make sure they are covered the following month.
Maintaining the integrity of set asides Hunting of non-protected species (and within defined quotas) by local populations within set asides is a permitted activity. This means that potential for the forest to "recover" over time is reduced, since the natural community ecology will be disrupted by regular offtake of legally hunted species. In addition, in the absence of close surveillance from OPG, such hunters could be targeting CH species (e.g., giant pangolin or grey parrot). Furthermore, because there is not a blanket ban on access to the set asides, it creates a situation whereby those without access cards can more easily enter and hunt illegally. It also makes assessing levels of hunting more challenging – for example if shotgun cartridges or other hunting signs are found, it is impossible to confirm if these come from legal or illegal hunting. Similar challenges exist for illegal logging activity within set asides.	There is nothing to be done to prevent local populations hunting in set asides since this is their legal right. Therefore, the gain calculations have accounted for this impact by reducing effectiveness of patrols to mitigate hunting by 20% or 30% per concession. Closer future surveillance by OPG (using the systematic approach described above) that is planned for the offset should reduce the risk of CH species being hunted, as well as tackle illegal logging. To reduce illegal hunting by those without access cards in the most heavily hunted concession (Awala), OPG will work alongside ANPN, MINEF and Okala project to increase patrols and reduce hunting across the whole landscape. On the other hand, having a large group of permitted hunters who have a vested interest in maintaining a sustainable harvest of common and abundant species could and should provided a significant pool of expert support to OPG patrols. OPG could also harness the added value of having a group of permitted hunters with a vested interest in maintaining a sustainable harvest of common and abundant species, to provide a pool of expert support to OPG patrols.

3.13 Net gain position after on-site offsets

While significant gains can be achieved in on-site set asides, for all critical and natural habitat features, off-site offset actions will also be required to achieve a NNL/NG outcome. A summary of estimated gains from on-site offsets, and the NNL/NG position after considering only on-site offsets is provided in Table 12.

Table 12. Net gain position after on-site offset actions

Feature	Residual impact	Gains possible on-site	Remaining requirement
Savannah	27,647 QH	22,207 QH	5,441 QH
Lowland terra firma forest	10,935 QH	10,873 QH	at least 62 QH
Great Apes (Central Chimpanzee & Western Gorilla)	178 (range 106 – 247) weaned individuals	72 individuals	At least 106 individuals
Forest Elephant	226 individuals	125 individuals	At least 101 individuals

4 Off-site offset – the Sud Estuaire landscape

The Sud Estuaire landscape was identified in the early stages of offset development as it has large areas of natural habitat and associated biodiversity, low human population density, and stakeholders already present who could implement conservation actions. Multiple offset options outside of the Sud Estuaire landscape were explored in the preliminary stages of offset development, specifically whether:

(i) plans to create wildlife corridors between national parks (with one linking Moukalaba-Doudou and Waka National Parks traversing two OPG concessions) could provide adequate compensation for OPG's impacts;

(ii) Moukalaba-Doudou would be a suitable location to offset OPG's residual impacts to Forest Elephants, Great Apes, lowland terra firma forest and savannah;

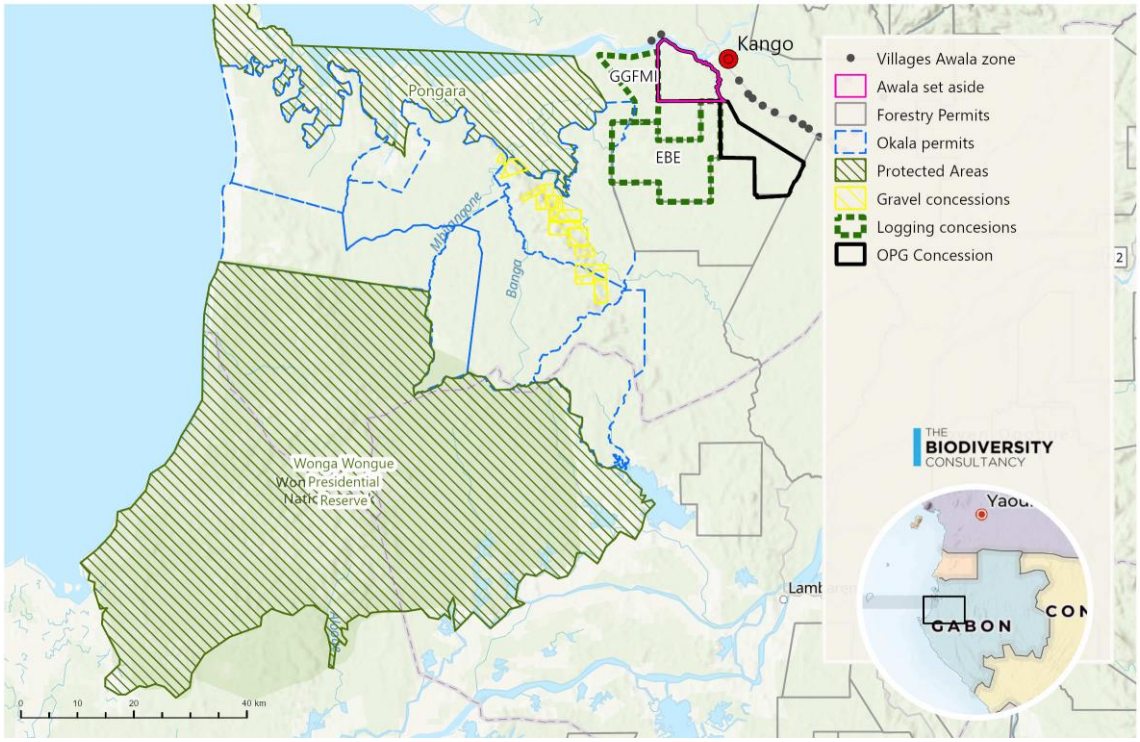
(iii) Other savannahs in the South of Gabon such as Mont Fouari would be suitable locations to offset residual impacts to savannah.

These options were ultimately rejected and a summary of the rationale is presented in Appendix 1.

4.1 Landscape overview, status, land use and stakeholders

The Sud-Estuaire landscape is an area of over 500,000 ha, located within the departments of Komo Ocean and Komo (Figure 7). The habitat comprises a mixture of lowland terra firma forest, mangrove, savannah, swamp forest and coastal forest, but is primarily lowland terra firma forest that has undergone varying levels of logging over past decades. It includes a nationally protected area (Pongara National Park), two logging concessions (Gabon Green Forest Management International (GGFMI) and Exploitation des Bois de l'Estuaire (EBE), and the Okala sustainable development concession. Directly to the south of the landscape lies the Wonga Wongue Presidential Reserve, which is an area of 500,000 ha managed by the Presidency of Gabon. To the West lies the Atlantic Ocean, and to the East are several other logging concessions.

Figure 7. The Sud Estuaire landscape and surrounding area. Source: TBC



4.1.1 Pongara National Park

Pongara National Park is located on the left bank of the Komo Estuary opposite Gabon's capital Libreville, and bordering the Atlantic coast. The Park covers an area of approximately 92,970 hectares, and is located in the province of Estuaire, Department of Komo Ocean. Access to Pongara National Park is mainly by sea (from the ports of Libreville: Port Môle, Michel Marine and Barracuda) or via the National Route 1, which connects Libreville to Ntoum Donguila, and then crossing the Komo by ferry or canoe. Pongara National Park is characterized by a high diversity of natural habitats, with varied vegetation cover that has been little modified by past logging. Habitats include mangroves, swamps and terra firma forest, coastal savannah, beach and many rivers. About 40% of the protected area is comprised of mangrove and swamp habitat, about 30% is terrestrial habitat (lowland terra firma forest and savannah/beach) and the remaining 30% is comprised of rivers and the coastal estuary, Inventories undertaken since the Park's creation in 2002 have confirmed the area is home to high plant and animal biodiversity, across marine, terrestrial and freshwater. The park is also recognised by IUCN as a critical site for conservation and has Ramsar status. The ANPN are active in the national park and undertake anti-poaching patrols both on foot and by boat.

4.1.2 Okala sustainable development concession

The Okala Project (commonly known as the Sud Estuaire concession) covers an area of circa 270,000 ha located between Pongara National Park and the Wonga Wongue Presidential Reserve. Okala is a partnership between Digital Forest UK (an entity focused on developing innovative digital solutions to enhance natural capital) and Gabon Wood Industries (who for

years has wanted to study an alternative scenario to industrial logging and focus on sustainable management of forest permits). The partnership was officially established in January 2023, and received funding from the African Transformation and Industrialization Fund (ATIF) to propose to the government of Gabon that the area comprised of 7 forestry permits (forestry permit numbers 13/16 to 19/16[30]) be converted to a sustainable development permit as per Gabonese law No. 002/2014[31]. Okala will be the first operation to be officially designated as a sustainable development permit under this law, and the first permit will be valid for a duration of 30 years with a "right to renew" clause (meaning that Okala has control of renewal and the permit cannot be revoked by the government unless Okala no longer want the permit)[32]. As holders of the lease of the concession, Okala will have exclusive rights to run Sustainable Development activities within the perimeter of the concession (such as generating revenue with Nature Based Solutions, developing ecotourism, valuation of NTFPs etc). However, in Gabon the government still remain the owner of all land, and they would have authority to re-open existing mining permits that are not currently exploited, but they should not be able to create new permits (except in the case of oil and gas, for which precedence is always given, even in Protected Areas.

Gabon Wood Industries (GWI) is a Malaysian company established in 2012 in the Gabon Special Economic Zone (GSEZ)**.** They manage 12 ha of industrial land within the GSEZ and 400,000 ha of forest near Mouila. Digital Forest UK is an entity that is focused on developing innovative digital solutions and economic models to enhance natural capital and promote biodiversity conservation. Digital Forest's staff have many years of experience working in biodiversity conservation and ecology in Central Africa and Europe and have worked in academia, for NGOs and for the private sector. They have expertise in ecological research design, statistical analysis, artificial intelligence and ecological sensor development.

A primary aim of the Okala project is to unlock private sector investment in conservation while supporting Gabon to become a leader in environmental technology and enhancement of natural capital. The objective is to enhance cultural heritage, the value of biodiversity and the potential for carbon storage in the landscape, and to set up activities that provide economic benefits for local people. The landscape comprises lowland terra firma forest (much of which has undergone heavy and repeated logging over the past 100 years), savannah, swamp and coastal forest and some mangrove (see Table 13 and Figure 8 below). Logging activities ceased in the landscape in

[30] Permit numbers are assigned based on a combination of year and area.

[31] Law No. 002/2014 is based on 19 fundamental principles of sustainable development, including responsible production and consumption; safeguarding and protection of the environment; preservation of biological diversity and ecosystems, and fair sharing of derived benefits; social equity; safeguarding cultural heritage; and protection and participation of local people and communities. Full details can be found here: Loi n° 002/2014 du 01 août 2014 portant orientation du développement durable en République gabonaise. | InforMEA

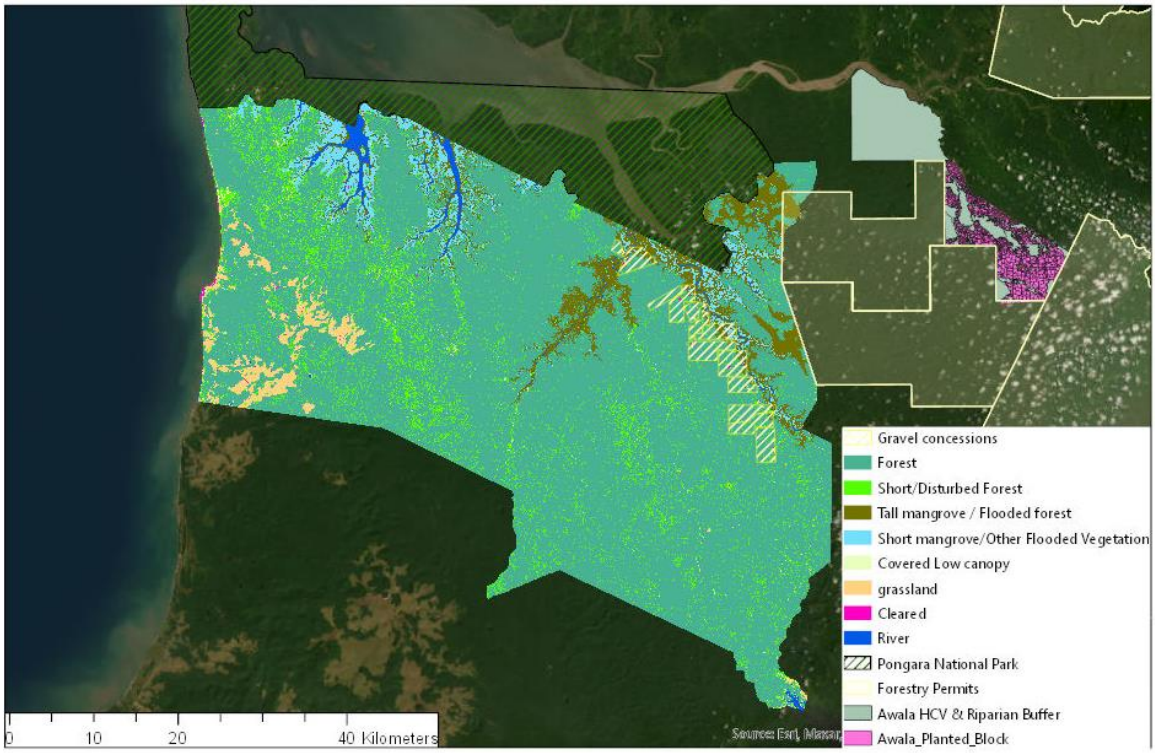
[32] Please note that the recent military coup in Gabon will impact on the timeline for the official recognition of the sustainable development permit. The agreement was 99% complete prior to the elections in August, but the recent change of government will require new negotiations and a delay.

2011, and Okala have already conducted flora and fauna inventories, in addition to assessing carbon stocks and undertaking community engagement and participatory mapping with local communities living in the landscape.

Table 13. Habitat classification Okala concession (Source: Space Intelligence Lidar Report 2022)

Habitat	**Classification**	**Area (ha)**	**Proportion of total area (%)**
Water	Water present in the dry season (river/lake/reservoir)	3,767	1.2
Tall lowland terra firma forest	>=30% canopy cover with vegetation height >=15m	239,198	77.3
Short /disturbed lowland terra firma forest	>=30% canopy cover with vegetation height >=5m and <15m	25,761	8.3
Tall mangrove / Flooded forest	Tall vegetation in areas which are likely to flood with the high tide (meeting forest definition)	20,105	6.5
Short Mangrove/Other Flooded Vegetation	Short vegetation in areas which are likely to flood with the high tide (not meeting forest definition)	12,149	3.9
Covered low canopy	>=30% canopy cover with vegetation height >=3m and <5m	863	0.3
Grassland	A continuous herbaceous layer with scattered woody plants, mainly shrubs	7,306	2.4
TOTAL		309,436	100

Figure 8. Land classification map of Okala concession. Source: TBC, with lidar data provided by Okala



4.1.3 Gabon Green Forest Management International (GGFMI)

GGFMI was created in 2017, and the company have multiple logging concessions all over Gabon. The GGFMI logging concession within the Sud Estuaire landscape covers an area of 15,000 ha and is located directly between the Northeast tip of the Okala concession and OPG's Awala set aside (i.e., it is the only area preventing a connection between the two conservation areas). The concession's Development Plan covers the period from 2021-2040 and was approved by the Ministry of Water and Forests (MINEF) in September 2021 and the management plan received the approval of the Forestry Administration in October 2021. The concession will operate on a 20 year rotation in accordance with the provisions of Article 34 of law 16/01 of the Gabonese Forestry Code (2001), and is split into two "plates" – the West (circa 7,600 ha) and South (circa 5,200 ha) – that will not be exploited at the same time.

The operator plans to begin active logging in the West plate in July 2023, and will be operational for 3 years, before moving on to a different concession in Gabon (not the South plate). Preliminary inventories have identified the North-East zone of the West plate (circa 2,000 ha) as an area of swamp and *Marantaceae*, making the exploitation of wood in the said area unlikely. The operator has proposed to exclude it from exploitation but notes that if during operations it is found to be accessible then they may exploit timber there. The plate also

contains a small "serie de conservation"[33] in the northern area (circa 600 ha). The General Director has verbally indicated that he would be willing to sell[34] circa 2,000 ha of this concession to OPG in order to create a wildlife corridor between the Awala set aside and Okala. Such a corridor would be circa 4 km wide. The land use designation of this corridor would then need to be converted from forestry permit to either agricultural permit that OPG would set aside as per its other set aside areas (and ensure recognised protection status) or else be designated some other kind of protection status such as a nature reserve. The preferred designation will need to be agreed upon with the DGEPN and DGFAP.

4.1.4 Exploitation des Bois de l'Estuaire (EBE)

The EBE logging concession (known as Bokoue-Lobe – permits 05/94 and 106/03) within the Sud Estuaire landscape covers an area of 18,132 ha and is located directly south of OPG's Awala set aside, and to the East of Okala concession. The concession's Management Plan was validated in 2011 and is operating on a 20-year rotation period (in accordance with the provisions of Article 34 of law 16/01 of the Gabonese Forestry Code), ending in 2030. The operators have not yet begun active logging in the concession, but plan to begin doing so in 2024. The concession is sub-divided into 5 "plates", each circa 3,700 ha and circa 6-7 trees in each plate can be cut each year. Trees cut are primarily Okoume, but they must be 70 cm DBH or greater. The concession has a "serie de conservation" that covers 11% of the total permit area (5,094 ha), located in the West of the concession, in a swampy area that is not easily accessible. In terms of operational controls, the operator confirms that hunting with guns or snares is forbidden, but that hunting is a big problem and his staff cannot apprehend armed hunters. They do a lot of outreach in surrounding villages, and are very open to working with OPG, ANPN and Okala to implement monitoring and anti-poaching in the concession, and think this would be a positive activity, because it's not something they can do on their own.

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[33] Gabon's Forestry Code states all logging concessions must include a "serie de conservation" or 'set aside' area where they do not exploit timber. While a few well managed companies may base this decision on areas of high biodiversity, the majority typically select the area that is least accessible to them (e.g., swampy, or steep terrain).

[34] GGFMI have already sold part of a different concession they manage in Gabon under very similar circumstances. In 2021, the Kinguele Aval Hydropower Project (located in proximity to Monts de Cristal National Park) sought to implement a biodiversity offset in circa 2,000 ha of forest under GGFMI management. In October 2021 a tripartite agreement was signed between the State of Gabon, Kinguele Hydropower and GGFMI in order to retrieve the designated area from logging and change its usage to biodiversity compensation purposes. Kinguele hydropower additionally signed two contracts with GGFMI in November 2021– one covered compensation for surface area relinquished and the second compensation for the cessation of forestry activities. The process was facilitated by the General Director of MINEF (for transfer of management rights between the companies) and also by ANPN (for conversion to a 'nature sanctuary', and subsequent ANPN monitoring / patrolling). At the end of November 2021 the Council of Ministers took place and the draft decree creating the 'Nature Sanctuary of the Begnoung upstream basin' was deliberated. The "sanctuary" is classified as a sanctuary for animal and plant species. The text set out the surface area, location and geographical coordinates of the area, alongside the conditions for conservation and the exercise of human activities. The decree aligns with Article 78 of Law No. 007/2014 of 01 August 2014 on the protection of the environment in the Gabonese Republic. Article 73 of Law n° 016/2001 of 31/12/2001 on the Forestry Code in the Gabonese Republic is also included.

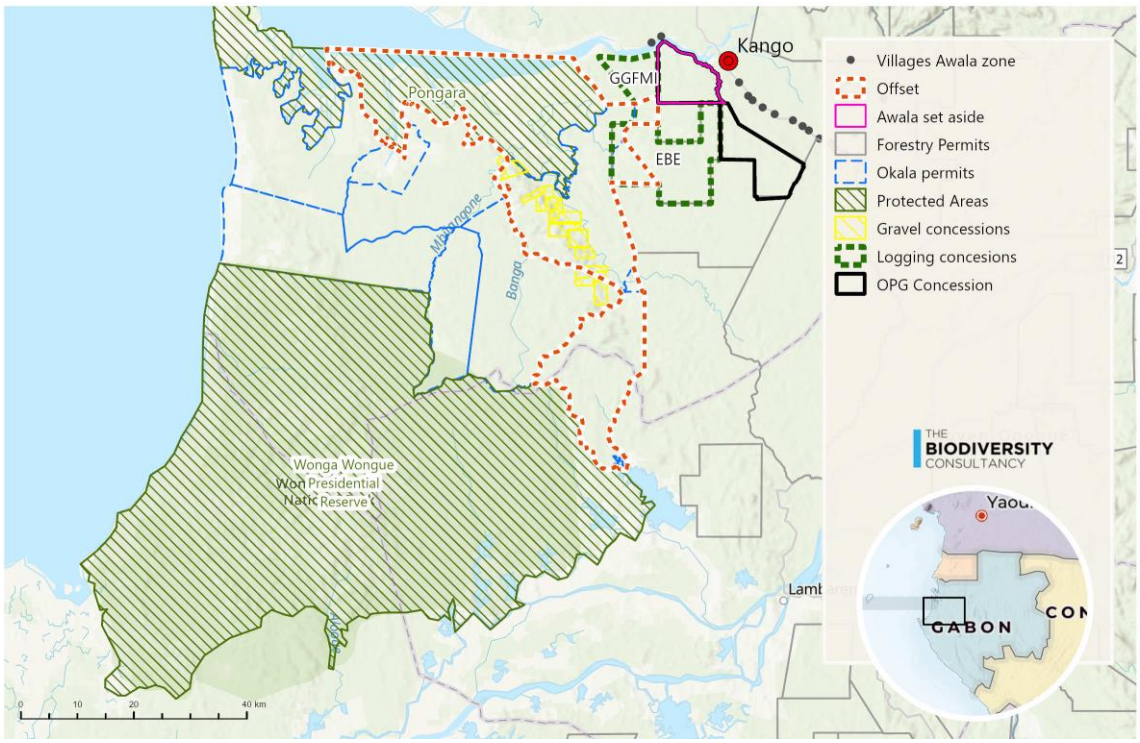
4.1.5 Gravel quarries

Within the Okala concession, in the North-eastern sector, there are several gravel concessions. While the map (Figure 9 below) shows these to be numerous and quite large, in fact there are just 6 small quarries in operation, each of which is circa 10-12 ha in size. The operation appears to be low impact, with a camera trapping study conducted by Panthera in 2017 capturing both chimpanzees and gorillas in very close proximity to the gravel quarries, as well as leopards and elephants. Further engagement is needed with the operators and with the ministry of mines to better understand their activities, operational procedures and length /scale of permit. The conversion of the concession from forestry to sustainable development will prevent further permits being granted in the future.

4.2 Proposed offset area within the Sud-Estuaire landscape

As stated in Section 4.1, the Sud Estuaire landscape covers an area of over 500,000 ha, a size that significantly exceeds the area required to meet the remaining deficit for achieving NNL / NG for NH and CH after on-site offset actions have been implemented. In addition, there is variation in habitat type and land use across the landscape and some areas are not suitable as part of the offset (e.g., coastal estuary in Pongara National Park). A smaller area within the landscape has therefore been identified for implementing the offset actions (see Figure 9 below). Specifically, 50,000 ha of Pongara National Park, 72,000 ha of the Okala concession (comprising the two permit areas in Eastern sector – 13/16 and 15/16), 2,000 ha of GGFMI forestry concession and 5,094 ha of the EBE forestry concession will be used for implementing offset actions.

Figure 9. Proposed offset area, and different land uses within. Source: TBC



4.3 Technical feasibility

The Sud Estuaire landscape is comprised of multiple land classifications that includes nationally protected areas, forestry development, agriculture and sustainable development. The area contains high biodiversity values but is under significant pressure from illegal hunting (including of Great Apes and Forest Elephants, Eyang Effa *et al*. 2022b), and many areas are not easily accessed by those tasked with protection (ANPN, Eaux et Forets and Okala). The proposed offset will operate in a sub-section of this landscape, primarily in the eastern sector, to ensure long-term biodiversity protection, and maintain connectivity between areas of high biodiversity importance (Figure 9). Specifically, protecting:

1. The eastern sector of Okala concession. Protection of this area will create significant connectivity for wildlife between the Wonga Wongue Presidential Reserve and Pongara National Park, two nationally protected areas. The Government of Gabon has already identified connectivity between protected areas as a national priority, and this offset would contribute significantly to this objective. The eastern area is identified as being the entry point for most illegal hunting activity, and as such is also under most pressure from illegal hunting (see Section 4.3.2.2). Overall, the habitat in the selected off-site landscape offers greater comparability with OPG areas (see Section 4.3.1), particularly Awala, as the western sector of the landscape comprises more savannah habitat and coastal scrub.

2. The 5,094 ha 'serie de conservation' of the EBE logging concession, and 2,000 ha of GGFMI forestry concession (currently under logging management but planned to be sold to OPG). These two areas are included in the offset because implementing monitoring and conservation activities here will create a wildlife corridor circa 4 km wide between Okala and OPG's on-site HCV set aside in Awala, extending landscape connectivity and improving gene flow.

3. The central and eastern sectors of Pongara National Park.

These are the areas identified as the primary hunting hotspots that need support to tackle illegal incursions. The western sector of Pongara contains savannah and coastal habitat and less forest (making it unsuitable for a great ape offset), and the coastal sector is also a popular tourist destination that already has a lot of conservation stakeholder and economic activity, and it has been advised by multiple stakeholders to avoid offset activities in this area.

Forest Elephants, Central Chimpanzees and Western Gorillas are found throughout the offset landscape. While there is not yet a solid baseline to estimate their density, ANPN agents report regular direct and indirect sightings of these three species in Pongara National Park. A recent survey conducted across the entire Okala concession using a 6 x 6km grid approach (R. Whytock pers comm, 2023), detected Forest Elephants at 54 of 57 stations, and Central Chimpanzees at 33 of 57 sampling locations. Gorillas were only detected at 4 stations, however cameras were installed on elephant trails and gorillas are known to avoid such paths, preferring to use more closed vegetative areas, so these results are not representative of distribution or abundance. The

Okala team on the ground confirm that gorillas and their signs have been observed in all parts of the concession, and that it was the monitoring approach that affected capture rate (R Whytock pers comm). The north-eastern part of the offset area is predicted to be the most suitable habitat for Gorillas in the landscape (as it includes swampy areas and Marantaceae forest), while the south-eastern part is expected to be more suitable habitat for Chimpanzees (as it contains more mature open forest with many fruit trees), although both ape species are expected to be present throughout, just perhaps at different densities[35].

The **total offset area will encompass approximately 129,000 ha** of the Sud-Estuaire landscape, comprising sections of Okala, EBE and GGFMI concessions, and the eastern sector of Pongara National Park. Based on the remaining deficit for NNL and NG for NH and CH after on-site offset activities have been implemented (see Table 12), 129,000 ha is estimated to be a large enough area to ensure that sufficient gains can be generated within the timeframe of the offset (see Section 4.8 for gain metrics for each NH and CH feature).

The primary offset actions will be to implement biomonitoring and anti-poaching activities using mixed teams of Okala, ANPN and Eaux et Forets staff to promote collaboration and build capacity on all sides; and to support communities within the landscape in sustainable development activities. Under the direction of OPG, Okala will be the implementing partner and will lead on the biomonitoring (using camera traps) across their own concession, as well as within Pongara and the two logging concessions (EBE and GGFMI). Anti-poaching operations will be led by ANPN in partnership with OPG, Eaux et Forets and Okala, and will take place across the whole 129,000 ha offset landscape, and the Awala set aside. Because the gravel concessions are located within the area of the Okala concession that will be monitored as part of the offset, Okala will be responsible for ensuring regular dialogue with the gravel companies and working with them to develop an agreement that clearly outlines the area they will develop for gravel, and includes required operational controls in order to minimise their impact on the landscape and threatened species, and ensure that they do not expand beyond their current operational limits. Okala already have a good relationship with the operators and have visited the gravel pits on multiple occasions. The conversion of the Okala permit from logging concession to sustainable development permit will prevent further expansion[36] of the gravel pits in the future.

Table 14 provides a summary of the different stakeholders in the landscape, the area under their responsibility within the offset, and existing activities and proposed offset actions.

[35] Baseline studies using a denser grid approach (i.e 2x 2km) and including gorilla habitat are required to confirm the density and distribution of Great Apes and Forest Elephants in the offset area.

[36] Expansion refers to the footprint/limits of the current quarries (i.e. the quarry permit limits are larger than the area currently under extraction, and the conversion to sustainable development permit means these quarries will not expand further into their own predefined permit area).

Table 14. Different stakeholders present in the offset area, existing activities and proposed offset actions

Stakeholder	Land Use type / legal status	Size of area within offset	Existing Activities	Proposed offset actions
Okala Project	Sustainable Development Permit	72,000 ha	Baseline studies, patrols, community engagement / participatory mapping	Baseline studies, biomonitoring, patrols, community engagement / sustainable development
ANPN	Pongara National Park	50,000 ha	Law enforcement, Biomonitoring, tourism, community engagement	Baseline studies, biomonitoring, patrols, community engagement / sustainable development
GGFMI	Forestry concession valid until 2040	2,000 ha	Not active, logging of western sector to begin in July 2023	Sale of 2,000 ha to OPG, for biomonitoring and patrols
EBE	Forestry concession valid until 2032	5,094 ha	Not active, logging to begin in 2024	Facilitating OPG / Okala implementation of biomonitoring and patrols in 'serie de conservation'
Gravel concession owners/operators	Mining concession – gravel pits	8,725 ha. Currently cleared area is less than 100 ha, located within Northeastern sector of Okala concession	Active, there are 6 pits each circa 10 ha in size	Continued activity, Okala to establish agreements with company owners that detail operational mitigation measures

Eaux et Forets	All non-protected land	None - but jurisdiction in all parts of the offset	Law enforcement and community engagement	Eaux et Forets to participate in patrols across the offset area, and in OPG's Awala concession.

4.3.1 Comparability

The landscape appears to be very similar to habitat cleared by OPG, and furthermore is contiguous with the Awala concession. It comprises primarily lowland terra firma forest but also includes mangroves and swamps, all of which are present in OPG concessions.

Of the 11 Critical Habitat mammals, birds, reptiles and amphibians identified in the CHA, 10 are present in the Sud Estuaire landscape. The exception is the Ogowe River Frog, a little known species known from one location in Gabon, that has not been observed for many years. The one location within Gabon fell within the Makouke Area of Analysis. A further 6 species of stakeholder concern were identified in the CHA, of these, 4 are confirmed present in the Sud Estuaire landscape. The exceptions are the Black Footed Crowned Monkey (NT) and the Olive-backed Forest Robin (NT), both species have small ranges. From a terrestrial fauna perspective, the offset therefore offers a very high level of comparability. For flora, there is not enough data yet available to do a species comparison, but surveys in both Okala and Awala reveal a very similar forest composition and experts expect to find the same species across both forests (T. Stevart pers comm). From a freshwater perspective, only 15 of the 72 species of freshwater fish identified so far in the Sud Estuaire landscape are the same species as those found in OPG concessions, although there is a lot of overlap in genus (for example both locations are home to many of *Aphyosemion* and *Epiplatys* species). However, given that the residual impact assessment considered that impacts to freshwater biodiversity from the Project are negligible, this low level of comparability for freshwater species does not present an issue for the offset project, especially since freshwater habitat within on-site set asides is widespread.

In terms of the three CH species for which net gain is required with a species-specific approach – the landscape is home to Forest Elephants, Central Chimpanzees and Western Gorillas. Okala have undertaken an inventory across their concession which shows Forest Elephants and Central Chimpanzees are present throughout, while Western Gorillas appear more abundant in the Eastern Sector. More intensive baseline sampling is required to obtain a density estimate for the three species in the offset landscape, and this should be a high priority for the Project (see Section 6).

4.3.2 Additionality

4.3.2.1 Pongara

The proposed offset landscape and actions are additional to existing activities as ANPN lacks funding to tackle the significant hunting pressures reported within Pongara National Park. In

2022, ANPN's Pongara team only undertook patrols during 6 months of the year, and only achieved 30% of what they had planned for that year, due to financial constraints. Concurrently, ANPN's social team in Pongara did not receive a budget to undertake activities in 2022, even though outreach to reduce conflict with park authorities is needed. ANPN park staff in Pongara are currently undertaking more law enforcement activities than outreach activities and a greater balance is required to change people's perception of the park and the need for law enforcement (ANPN pers comm, 2023). While finances are lacking, there is a great deal of hunting pressure both within the National Park and also to the East (in forestry concessions and Awala set aside), and to the South (in Okala) and hunters are aware that ANPN park staff don't have capacity to patrol effectively across all areas.

Some of ANPN's annual funding comes from international donors (e.g., Central African Forest Initiative, United States Fish and Wildlife Service, Agence Francais de Developpement), but such donors tend to choose a particular Protected Area (PA) that they want to work in, and all their funds go to that PA. Pongara has never been a focus of donor attention and more 'charismatic' parks such as Lope and Moukalaba Doudou are typically the recipients of funds. Furthermore, donors typically dictate which activities they want to fund and all tend to focus on anti-poaching, scientific activities and park management, rarely choosing community activities. Despite this lack of funding, most Gabonese stakeholders (including the Directeur General de Faune et Aires Proteges-DGFAP, CENAREST and ANPN's scientific advisor) highlighted that Pongara should be a focus for intervention, because it is under so much pressure, and its value as a nationally protected area could be lost without targeted support. Therefore, developing an offset in this landscape that provides significant support to ANPN to scale up their activities and build capacity, would be additional to existing activities.

4.3.2.2 Okala

Okala lack resources and capacity to tackle illegal hunting within their concession due to the large area to cover. They are currently a team of 25 people to cover all gorilla habituation, social, biomonitoring and anti-poaching activity. A significant part of the workforce is focused on gorilla habituation in the West of the concession. In 2022 Okala undertook circa 4 anti-poaching patrols across the whole concession, but they are a small team covering a very large area. Furthermore, they do not have any legal mandate to apprehend illegal hunting, and so will require support from ANPN and Eaux et Foret to effectively reduce hunting pressure within their concession. This support will form part of the off-site offset activities.

Okala received 5 years of 'start up' funding from the African Transformation and Industrialisation Fund (ATIF) in 2021, and it is this that has enabled them to undertake multiple baseline surveys, participatory mapping, and begin gorilla habituation activities (for tourism) and some anti-poaching patrols. The primary role of this start up fund is to enable Okala to find longer term alternative funding mechanisms that can generate revenue for the landscape without the need

for extraction in the area[37]. Working with OPG to deliver a long-term offset in the landscape therefore aligns well with this need to secure long-term sustainable funding in order to continue their activities, and demonstrates that offset activities will be additional to existing activities.

4.3.2.3 GGFMI and EBE

The two logging concession holders do not currently have a human presence in the landscape. The EBE concession has one night watchman at its base headquarters, and GGFMI has no-one. There is therefore currently zero control over illegal hunting in either concession. OPG confirmed that most hunters found in Awala state they are on their way to the EBE concession. Even when both concessions become active later in 2023 and in 2024, they will not have the resources or capacity to control hunting and do not have a mandate to apprehend illegal hunters. Furthermore, their presence in the area will be transient over the next 49 years (circa 3-5 years every 20 years), and so each time they depart there will again be no controls on hunting activity. The support of OPG with ANPN or Eaux et Foret to regularly patrol these concessions will therefore be additional to existing activities.

4.3.2.4 Landscape level

In terms of landscape level hunting pressure, all stakeholders spoken to as part of the OFS confirmed that the Sud Estuaire is a hot spot and problem area for hunting and that hunting is carried out by commercial hunters. The national road that runs from North to South lies directly to the East of the landscape, and bushmeat is hung up for sale along this road on a daily basis. A road-based count between Ntoum and Bifoun (circa 120 km stretch) undertaken by J Bracewell on the 2nd March 2023, observed 27 items of bushmeat for sale, including several internationally and nationally protected species (white bellied pangolin, python and dwarf crocodile). The socio-economic study carried out by Okala in 2022 confirmed that Great Apes and Forest Elephants are both targeted for hunting in the offset landscape and were listed among the top 10 most frequently hunted[38] species (Eyang Effa *et al*. 2022b). Furthermore, even where Great Apes and Forest Elephants are not the primary target, the illegal use of snares threatens all species. A 2018 camera trapping study across the Okala concession filmed multiple elephants with the lower portion of their trunk missing – a typical snare injury. ANPN also found two elephant carcasses in Pongara in 2022, and highlighted that ivory hunting is practiced in the area, particularly in the Wonga Wongue landscape. In addition, a 2006 study (Latour, 2006) in the West sector of the Sud Estuaire landscape recorded 4 elephant carcasses associated with hunters camps over a 3 month period, and 2.34 hunting signs per km walked, including snares for small and large mammals, and shotgun cartridges. There are clear hunting pressures across

[37] To comply with the legal requirements of the sustainable development permit according to the Gabonese forestry code, Okala will need to implement minimal level, very low impact selective logging within their concession. Okala will ensure that such activity does not take place in the offset area.

[38] It should be noted that interviewees stated that killing of elephants was typically not for food or sale, but for protection as a result of human-elephant conflict.

the landscape and as outlined the authorities and private companies with management concessions do not have the resources and capacity to control hunting pressures. There is therefore a case that OPG funded patrols and activities in this landscape would be additional and would bring benefits for multiple species, particularly Great Apes and Forest Elephants, and improve landscape connectivity which is a priority for Gabon and in alignment with national plans to develop wildlife corridors between protected areas.

4.4 Socio-economic assessment of offset feasibility in the landscape

This section describes and analyses the social feasibility of the proposed off-site offset landscape. Assessing the social feasibility of the off-site offset is required to identify if offset implementation:

- Is aligned with community interests
- Is likely to exacerbate existing community conflicts
- Is possible with existing governance structures

Biodiversity conservation actions are more likely to be feasible:

1. If they support local socio-economic and cultural values of the land/natural resources and are aligned with community interests.

2. If they are developed in contexts without conflict, or with clear mechanisms to resolve conflict.

3. If they are developed in contexts with clear institutional arrangements and good governance.

This section describes whether conservation gains could be generated in a way that is equitable and sustainable, appropriate to the cultural and economic context, and acceptable to stakeholders and wider rights holders. It also provides a high level assessment of potential social impacts resulting from offset implementation, but a social impact assessment is required to fully understand this, and to identify any required compensation for loss of livelihoods (see Section 6).

4.4.1 Sources of information to assess social feasibility

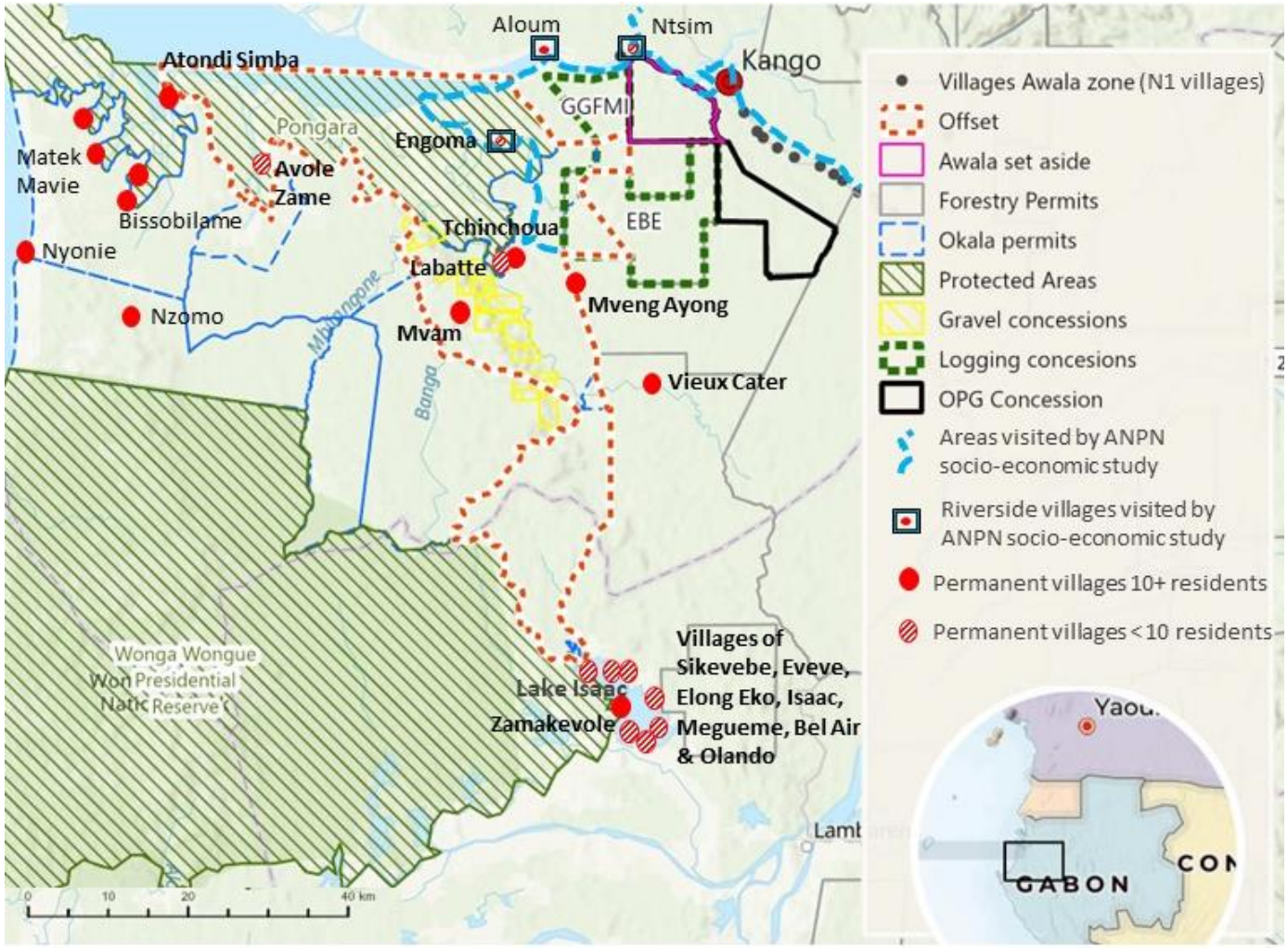
In 2023, ANPN were subcontracted to undertake a socio-economic study in the Sud Estuaire off-site offset landscape to inform this OFS. The goal of the study was to undertake a preliminary assessment to determine the feasibility of developing an offset in the landscape, in terms of the potential social opportunities, risks and impacts. The study identified the socio-anthropological and economic characteristics of each village, and explored the needs, and the difficulties encountered by different villages in the implementation of social projects or income-generating activities.

ANPN's socioeconomic study covered eight villages (three along the Komo river north of Awala / Pongara, and five on the main road (N1) side to the East of Awala) of the department of Komo Kango in January 2023 (See Figure 10 below). Of the three along the Komo river, only one (Engoma) falls within the offset landscape. While the villages along the N1 road are outside the offset area and located too far away for the offset area to be considered their community land, they were included because they were anticipated to be contributing to pressures on the Sud-Estuaire landscape by hunting in the area, and so it was important to understand their attitude and activities. In addition, these 5 villages are OPG's partner (meaning OPG has long-term social commitments to these villages to implement actions that will support them in livelihood development). There are no communities living within the logging concessions (beyond those on the Komo riverbank and included in this study). ANPN's study was also informed by numerous other socio-economic surveys and bushmeat consumption surveys that have previously been conducted in and around the offset landscape (e.g., WCS Gabon 2007; Sounguet *et al.* 2010).

Alongside the ANPN study, Okala concession have also undertaken their own social studies in the villages located within their concession – both participatory mapping (Eyang Effa *et al.* 2022a) and a socio-economic study (Eyang Effa *et al.* 2022b; see Figure 10 below). Only five villages from this study fall directly within the off-site offset area (Mvam, Tchinchoua, Labatte, Avole Zame and Atondi Simba), but there are others in proximity to the South (eight around lake Isaac) and East (Vieux Cater) that could be impacted by the offset actions. It is therefore considered that a total of 16 villages could be directly affected by the offset Project - 3 in the Okala area, 3 in Pongara, 8 around Lake Isaac and one to the East of Okala (Vieux Cater).

While the two surveys gathered data in a broader array of villages than will be impacted, the activities and dependencies of inhabitants across the landscape are considered comparable, and information gathered from these different studies considered sufficient to enable an accurate assessment of the social feasibility of the proposed offset site. The surveys undertaken focused on communities in and around the Pongara National Park and the Okala concession, as well as villages located on the N1 road to the East of OPG's Awala concession.

Figure 10. Location of villages in the offset and wider Sud Estuaire landscape, including those visited by Okala social teams, and areas visited by ANPN during their socio-economic study (blue dotted line). The 16 villages affected by the offset are in BOLD (Source: TBC, adapted from ANPN, 2022, and Okala 2022).



4.4.2 Social Context

Local communities found within the off-site offset landscape are rural and depend mainly on the natural resources of the areas surrounding their villages for their livelihoods. The need for these resources for local livelihoods are reflected in the major threats indicated to the natural values of the area which are indicated as:

- **Logging** for construction purposes by communities but also for economic purposes;
- **Hunting**, both subsistence and also motivated by the sale of game on the Libreville market[39]; and
- Increased **fishing** activity on the rivers for commercial purposes.

4.4.3 Demography

The socio-economic surveys undertaken by Okala (Eyang Effa *et al.* 2022a) and ANPN (ANPN 2022) surveyed a total of 36 villages across the wider landscape. The total population of these villages is 1,451 permanent inhabitants (see Table 15); of these, 194 inhabitants are resident in one of the 16 villages that may be affected by the offset project. In the Komo-Ocean Department, the main ethnic group of villages is Fang whereas in the Lacs Du Nord Department the predominant ethnic group is Myénés. There are various other ethnic groups noted in the villages, including: Punu, Nzébi, Vungu, Bakota, Massango and Puvi.

Table 15. Populations of villages surveyed during the ANPN and Okala socio-economic surveys (Eyang Effa et al. 2022a; ANPN, 2022), highlighting those likely to be impacted by the offset.

Department	Village name	Population	Likely to be impacted by the offset
Komo-Océan	Vieux Cater	10	X (Okala)
	Chinchoua	43	X (Okala)
	Mveng Ayong	4	X (Pongara)
	Labatte	6	X (Okala)
	Mvame	40	X (Okala)
	Avole Zame	3	X (Pongara)
	Mbant tang	2	
	Atondi Simba	20	X (Pongara)
	Djego Agnido	1	
	Zamaligue	5	
	Bissobilame	20	
	Odoko	10	
	Meteck Mavi	22	
	Tsimi	2	
	Nyonié	31	

[39] Note that non-residents hunting for commercial purposes will be the primary target of patrols as part of off-site offset activities, as will local residents who are hunting beyond the remit of subsistence, or hunting protected species.

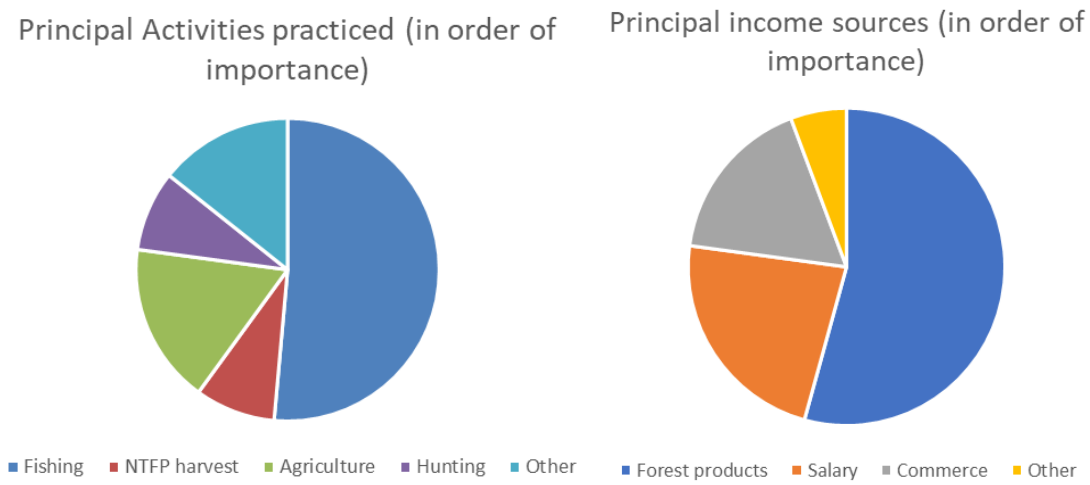
Department	Village name	Population	Likely to be impacted by the offset
	Ndzomoé	20	
	Alarmeké	2	
	Oveng	4	
	Obélo	6	
	Ayem Ebel	3	
	Ayeme Bokoue 1	300	
	Ayeme Bokoue 2	150	
	Woubélé 1	319	
	Woubélé 2	230	
	Nsile	120	
	Alloum	18	
	Engoma	5	X (Pongara)
	Ntsim	2	
	Sub-total	**1398**	
Lacs Du Nord	Sikevebe	6	X (Okala)
	Eveve	8	X (Okala)
	Elong Eko	4	X (Okala)
	Isaac	6	X (Okala)
	Megueme	4	X (Okala)
	Bel air	3	X (Okala)
	Olando	2	X (Okala)
	Zamakevole	20	X (Okala)
	Sub-total	53	
TOTAL		**1451**	

The overall population density for each of the departments surveyed is between 0.1 and 4.9 people/km^2. These figures fall well beneath Gabon's national average population density of 9.4 people/km^2.

4.4.4 Subsistence activities and main sources of income

The principal subsistence activities in the communities that live in and around the proposed offset sites include agriculture, hunting, fishing and collection of Non-Timber Forest Products (NTFPs). The Okala socioeconomic study identified that fishing was both the principal activity and primary source of income for local inhabitants (Eyang Effa *et al.* 2022a see Figure 11 below).

Figure 11. Principal activities and sources of income for inhabitants of the Sud Estuaire landscape (Source: Eyang Effa et al. 2022a)



However, the main income generating activities of each community depend on the locality of the village. If a village is located near to a river, the main income generating activity of that community will be related to fishing. Whereas communities located by roads are more likely to be focused on selling agricultural products such as vegetables. Activities such as NTFP collection are more likely undertaken to add additional income to families rather than as a primary means of subsistence. Limited quantitative information is available on income generating activities, but qualitative descriptions of the different income generating activities is provided below.

4.4.4.1 Agriculture

Intensive agriculture is not well developed in Gabon. Instead, primarily subsistence agriculture is practised mainly in rural areas, it is essentially made up of food crops intended to satisfy subsistence needs (plantain, cassava, tarot, and yams). The marketing of surplus production is the only source of income linked to agricultural activities for the farming population.

Market gardening is generally not practiced by rural populations. It is estimated that one producer in 10 combines some vegetables (okra, tomato, aubergine, chilli and basil) with food crops on small plots. Specifically in the villages to the East of Pongara National Park, a more intensive survey of agricultural products was undertaken. In villages which are situated near to roads, agricultural production is no longer abundant, as human wildlife conflict (HWC) with elephants has increased significantly. Agricultural production was previously a main income generating activity for these villages located along the road, but now agricultural products are consumed rather than sold. In communities located along the rivers, agricultural products such as plantain, bananas and fruit trees are cultivated, 50% of these products are consumed by the farmer and 50% are sold. These products are sold in front of the houses and sometimes taken to local towns for sale. The plantations of the villages on the rivers tend to be smaller than those of the villages on the roads.

4.4.4.2 Fishing

Fishing is the main village activity in the villages located on the rivers and can be profitable with an average catch of 40 kg of fish per person, per day. It is also the main income-generating activity of the people in these villages. Fishing is a commercial activity for many of the communities located next to rivers and more than 70% of the fish caught are sold either locally or transported to the nearest town for sale in the market. The average income of a fisherman is 250,000 CFA francs per month, but this income is at the higher end of the scale and is reliant on access to motorised boats to travel large distances on the rivers. For villages located on the road, fishing is not an activity with commercial potential and the fish caught are intended for household consumption.

4.4.4.3 Non-timber forest product (NTFP) collection

NTFP collection is considered a daily activity in rural communities and can provide additional income to households that are engaged in other livelihood activities (such as agriculture, fishing and hunting). Products such as fruits and vegetables, ingredients for medicines, materials for shelter and household equipment are collected. From engagement during the socio-economic surveys the most popular products collected are:

- Odika (indigenous chocolate) – which comes from the nuts of the wild mango fruit (*Irvingia gabonesis*)
- Wild atanga (*Dacryodes buettneri*)– Type of oleaginous fruit
- Nuts (such as *Coula edulis*)
- Leaves of plants in the Marantaceae family – which are used in cooking and storing processed cassava
- Palm sap from *Elaeis guineensis* and *Rapia vinifera* – which is used to make wine.

For communities located by rivers, their lack of access to markets means that the majority of forest products collected are consumed locally. Communities located close by to roads tend to sell collected products along the side of the road. Communities to the East of Pongara National Park and located along the road stated that they were limited in their collection of NTFPs due to the presence of elephants in the forests, which are feared by the local residents (see conflict section below).

4.4.4.4 Hunting

The Okala socio-economic study confirmed that small-scale, subsistence hunting is practiced in the forests surrounding the studied villages, primarily using traps, and often as a means to protect plantations from crop raiding (Eyang Effa *et al*. 2022b). The hunted animals are generally intended for household consumption, but any surplus may be sold. Commercial hunting is generally done with a rifle, and this activity constitutes an important source of income for the local population. Hunting is practiced throughout the year, although it is more frequent in the rainy season (interviewees state that fauna seems more abundant in this season, although it is also likely easier to track). Great Apes and Forest Elephants are both targeted for hunting in the

offset landscape and were listed among the top 10 most frequently hunted[40] species in the socio-economic survey (alongside duiker, monkeys, bush pig, buffalo, porcupine, sitatunga, snake and pangolin.

In terms of commerce, the transport of bushmeat to Libreville takes place once or twice a week, based on a fairly regular schedule per village. Hunters are dependent on intermediaries, most often traders from Libreville, to facilitate this transport. There are thought to be around twenty bushmeat traders operating in the Sud-Estuaire landscape, mostly Gabonese (Fang ethnicity) and Cameroonian (Eyang Effa *et al*. 2022b). There are two ways in which traders operate. Either the trader buys the game as it comes off the boats upon arrival in Libreville or Lambaréné, or the trader travels to Sud Estuaire themselves and selects hunters that they then provide with supplies (firearms / cartridges, machetes, lamps, metal sheet, old fridge etc) to hunt specifically for them. In this case they would pay less for the bushmeat because of their own investment.

Bushmeat is typically transported very early in the morning, and both the Oloumi market (located on the edge of the Estuary in the Lalala district in Libreville) and the Isaac market (in Lambaréné), are the main bushmeat outlets in the Sud-Estuaire landscape. These markets are open six days a week.

4.4.5 Conflict and other initiatives in the landscape

Potential conflicts in the area were evaluated using results from the socio-economic surveys performed in communities along the Komo River and next to the main road to the East of Pongara National Park.

4.4.5.1 Inter/intra village conflicts

Within the buffer zone of the Pongara National Park, there is some tension within villages due to in-migration of different ethnic groups into communities that were historically predominantly made up of Fang people (ANPN, 2022). In the villages surrounding Pongara National Park, an influx of people from the Punu ethnic group which now make up the hierarchy of some villages has led to increased tension between the Fang and the Punu. This tension has not spread into any form of violence between the groups, but it something to note when planning offset activities which involve any form of support to communities or require community involvement in various governance structures. It is highly unlikely that the offset activities would further fuel tension between different ethnic groups as the activities will not extend the boundaries of any protected/concession areas.

4.4.5.2 Human-Elephant Conflict (HEC)

From the surveys, villagers mentioned that the presence of elephants limited their agricultural yields due to crop raiding activity and the presence of elephants also prevented them from

[40] It should be noted that interviewees stated that killing of elephants was typically not for food or sale, but for protection as a result of human-elephant conflict.

entering the forest to collect NTFPs. HEC can often lead to a reduction in the tolerance of local communities towards elephants and in some cases to retaliatory killing of elephants (Terada *et al.* 2021). Although there are no quantitative statistics from Gabon relating to the number of elephant killings related to HEC, Gabon is home to the largest remaining population of Forest Elephants which suggests that HEC could be a significant issue for rural communities located in and around the proposed offset areas. As the Forest Elephant is a CH qualifying species for which Net Gain is a requirement, activities which relate to reducing HEC will not only promote livelihood activities in affected communities but will also help the project achieve the required gains for Forest Elephants. The idea of supporting actions to reduce HEC was mentioned as a potential activity by some stakeholders to support the offset and many mentioned aligning with already existing initiatives which are in development in Gabon (e.g., the national elephant strategy). Given that the population in communities surrounding the proposed offset area is so low (estimated to be less than 1,500 people in communities in and around Pongara National Park and the Okala concession), the scale of these activities would not need to be significant in comparison to other areas of Gabon/Africa with significantly greater populations.

4.4.5.3 High productivity zone agriculture program (ZAP)

Another large-scale development project which is planned to the East of the existing Awala concession is the ZAP program. ZAP (or high productivity zones) is part of a government led initiative for Gabon to produce at least 50% of its own food. Kango is one of 5 sites selected for this initiative, and longer term the government aims to create 40 such agricultural zones, with 15,000 - 20,000 associated employment opportunities. The idea behind the programme is that business minded individuals can subscribe to the project for plots of land for commercial agricultural development, choosing between plots of one, five, 100 or 1,000 ha. Such individuals would not need to be residents of / local to Kango, and feedback from ANPN's socio-economic survey suggests that communities have expressed their reservations about this program, with village leaders suggesting they are unaware who would benefit locally from this initiative, and there is a fear that outsiders will buy up the land. Communities feel that with the existing protected areas, the Olam concessions and the potential additional loss of land due to the ZAP program, there will be additional pressure on their access to suitable agricultural land and natural resources (ANPN, 2022). The ZAP program would affect villages along the N1 road (i.e., to the East of Awala concession) and these residents are considered to be outside the impact area for the offset project. However, if their opportunities for agriculture are further restricted by the ZAP, then cumulative impacts may occur and hunting pressure in the landscape may increase and / or extend further towards the offset landscape.

4.4.5.4 Additional development projects

The socio-economic survey undertaken by ANPN also identified a potential carbon project and also some prospecting activity for petrol which is taking place within the landscape. Limited information was provided on these projects, but general feedback from the communities suggests that this will put additional pressure on the land they have available to them within their villages. As above, these development projects would primarily affect villages along the N1 road (i.e., to the East of Awala concession) and these residents are considered to be outside the impact area for the offset project.

4.4.6 Overall summary of social feasibility

It is anticipated that a total of 16 villages will be directly affected by the implementation of the offset. Primary impacts among these villages would be restriction of access to land for hunting and Non-Timber Forest Product (NTFP) collection. The participatory mapping that has already been carried out can be used to avoid such impacts by ensuring that residents of the identified villages still have the right to livelihood-based activities within specific areas that form part of their community lands. In addition, many livelihood generating activities (including beekeeping, cosmetics, tourism and research, and fruit tea) are being explored, that should result in an overall positive impact of the offset project on the livelihoods of affected villages.

However, as has been observed around OPG plantations, there is also a risk that other more distant villages located along the N1 main road East of Awala (e.g., Kango, Ayeme, Wouboule) will believe that the off-site offset area is part of their community land and that their access to it should not be restricted, causing conflict between these communities and the off-site offset project (ANPN, 2022). Given that these communities already feel that the presence of OPG, the proposed ZAP program and carbon project (see above) have significantly reduced their access to natural resources, such conflict should not be underestimated. It will be important to understand and manage this risk carefully, as part of the social impact assessment.

With the exception of this potential risk, the implementation of the proposed offset project presents a limited social risk and is deemed to be feasible for the following reasons:

- **No change in governance/status related to offset implementation**: All of the proposed offset sites are already existing protected areas/concessions. There are no boundary line changes of proposed land-use changes which would impact communities who live in and around the proposed offset areas.
- **Small local population surrounding proposed offset area**: The total population density in the areas surrounding the proposed offset site is between 0.1 and 4.9 people/km^2 (and within the impacted villages it is circa 160 individuals) and there is evidence to suggest that populations in these communities are declining and aging.
- **Already existing agreements/regulations for proposed offset area**: The Okala sustainable use concession will be the first of its kind in Gabon and there has been a detailed creation process including participative mapping and a socio-economic survey. There has been no conflict with communities relating to the creation of this concession and the objectives of the concession clearly align with the aspirations of the local communities located within it.

Nevertheless, to ensure that potential impacts have not been overlooked and fully understand what social impacts are likely to result from offset implementation, and any required compensation for loss of livelihoods, a social impact assessment is required as a priority action.

4.5 Required activities

Table 16 provides an overview of the required activities to meet the offset objectives in OPG's off-site offset landscape, responsibility for each action, and means of verifying the action has been completed. With the exception of 'Mandji savannah', all actions refer to the Sud Estuaire landscape (including Pongara National Park). More detailed explanation of the different workstreams and activities is provided in the sections below.

Table 16. Required activities in off-site offset landscape.

Workstream	Activities	Responsible	Verification
Anti-poaching patrols	• Undertake regular anti-poaching patrols to tackle illegal hunting and logging activities in the landscape. Work with the Eaux et Forets to ensure offenders are apprehended and prosecuted. • Create two base camps – one at Isaac Lake (in the south of the offset area) and one on the Remboué Estuary (in the north of the concession). • It is not yet decided whether activities will include the set up of 7 x "smart bridges" on camera traps at key entry and exit points to the offset landscape that provide real time information on incursions by illegal hunters, that can inform patrolling effort.	• ANPN to organize and manage patrols, in collaboration with Okala and OPG. Patrols to be undertaken by ANPN teams, with option for including Okala staff for capacity building.	• Monthly reports from ANPN and/or Eaux et Forêts of a) km of patrols walked; b) number of patrol days; c) number and location of grid cells covered by patrols (to ensure systematic coverage over time); to ensure that they are aligned with targets. • Annual reporting on: 1. Total number of patrols and kms walked. 2. Number, type and location of signs of illegal activity, including via smart bridges 3. Number and location of people apprehended
Biomonitoring	• Implement a 2 x 2km camera trapping approach across the whole landscape (that can incorporate the 6 x 6 km grid that Okala is already using throughout) to obtain a more precise estimate of density. This approach will also be used to obtain a	• Okala and ANPN to lead implementation of biomonitoring in their respective landscapes (with technical support to ANPN from Okala	• **Data collection**: Verification by OPG that the camera trap survey is implemented twice per year in line with protocol. Verification that Okala has centralised all camera trap

	baseline estimate as soon as possible. • Create / maintain a central database for all actions, activities and data to facilitate effective biodiversity management. • Regular analysis of data to assess changes in distribution and abundance (undertaken by Okala project). • Undertake bushmeat surveys (both household and road/ riverside) to assess threat level to different species (especially Great Apes) • Remote sensing of carbon and forest classification to assess forest extent and condition both within and outside the offset area (to assess for leakage), undertaken every 5 years	to implement in the first 10 years). • Okala to be responsible for all databases and data analysis of biomonitoring data (with sub-contracting for remote sensing as required)	footage and data sheets, and done quality control check to ensure data is accurate. Verification that Okala has undertaken bushmeat surveys. • **Data analysis:** Written report from Okala on an annual basis, summarising camera trapping effort, encounter rate with CH species, and population dynamics (e.g. distribution, party size, male/female and adult/infant ratio, health / injury etc) alongside density estimates using DISTANCE and SECR, on an annual basis. Written report by Okala on results of bushmeat study (both from surveys and from patrol data). Written report by Okala or sub-contractor on results of remote sensing every 5 years, summarizing changes in forest extent and condition.
Community engagement and support for livelihood development	• Undertake community engagement (including a social impact assessment prior to offset implementation) in the 16 villages within and adjacent to the Sud-Estuaire landscape to continue participatory mapping and support sustainable livelihood development	• Okala to organize and lead community engagement activities and implement livelihood development. ANPN to participate in social actions of	• Transcripts and participation lists from community engagement meetings. • Annual reports on progress of sustainable livelihood activities (including information on collection/catch weights/volumes and agricultural yields).

	(fishing, agriculture, NTFP's etc) as well as reduce human-elephant conflict and hunting. • Ensure a community grievance mechanism is in place so that communities have various channels (e.g., phone line, community grievance box that Okala checks every 2 weeks) to be able to communicate with the offset managers.	offset (under Okala management) • Okala to develop grievance procedure and OPG to verify it	• Annual report on instances of human-wildlife conflict in the six villages. • Grievances addressed in a timely and transparent manner, verified by OPG
Scientific research	• OPG will support PhD students undertaking studies relevant to the offset (e.g., movement patterns of Elephants and Great Apes; hunting; human-wildlife conflict etc).	• OPG to provide funding to support Masters and PhD students and propose study topics; Okala and OPG to be technical advisors and facilitate access and data collection for students	• Results of Masters and PhD studies
Mandji savannah	• Understand the dynamics of savannah fire setting in the region (i.e., locations, causes, area affected etc) • Undertake community engagement, participatory mapping and co-design and implement a savannah management plan with local residents, including fire management and a fire response program	• OPG to lead this action, in alignment with on-site offset management of savannahs, bringing in expert sub-contractors if required.	• Results of participatory mapping, and savannah management plan • Fire management and fire response plans
Auditing	• Annual IFC and 3rd party auditing of actions and activities	• OPG to lead this action	• IFC and 3rd part auditing report on an annual basis

4.5.1 Anti-poaching patrols

The main mechanism for creating gains for CH values (not only for Great Apes and Forest Elephants, but also other CH values for which residual impacts remain such as Red Capped Mangabey and Black Bellied Pangolin) is via averted loss. The offset landscape was selected specifically because hunting pressure is high, and so implementing anti-poaching action is a key activity to create the required gains for CH values. Achieving a significant level of averted loss will require a high level of patrol effort in the landscape.

The off-site offset area is 1,290 km^2 and based on the threat profile, staff capacity and planned offset activities, it is estimated that 8 ANPN field staff will be required to effectively manage hunting in the offset landscape[41]. Their activities will be focused on anti-poaching patrols, but they may also accompany the Okala team for biomonitoring and community engagement that takes place in Pongara National Park (to promote collaboration and build capacity).

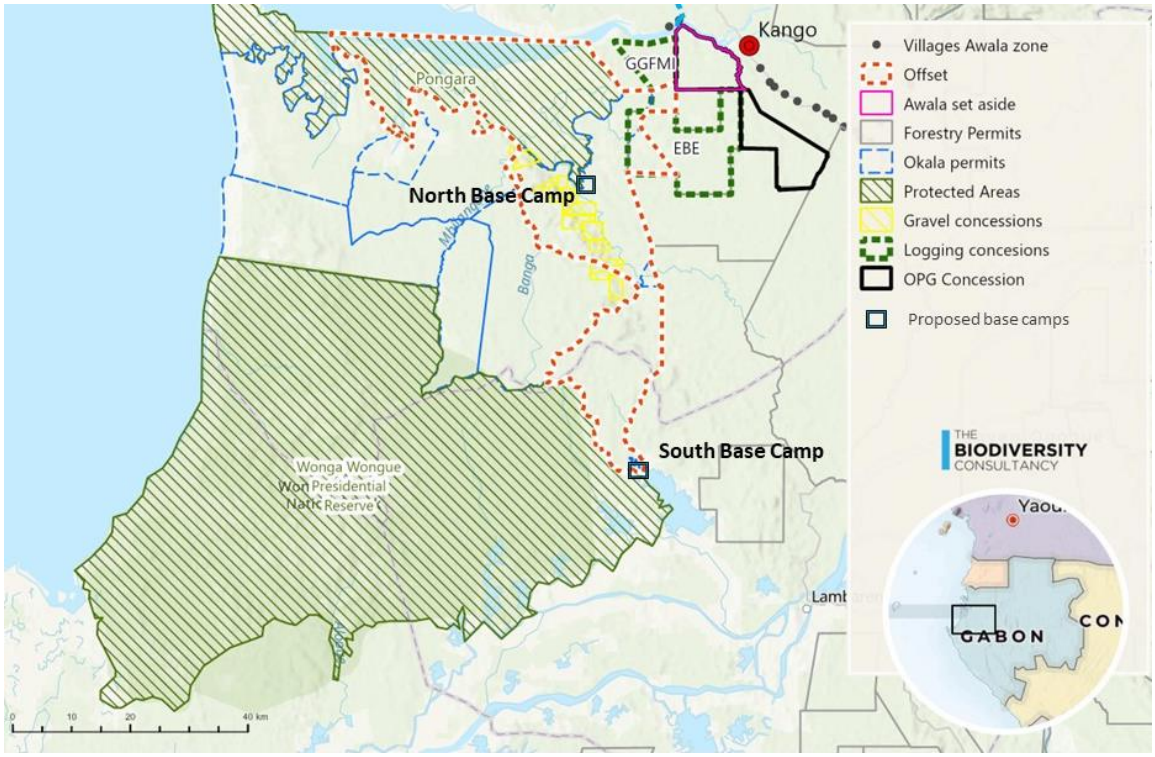
In terms of patrols, ANPN teams will undertake 12 x 15 day patrols each year across the landscape[42], for a total of 180 patrol days per year. It is estimated that circa 10 km can be covered each day on patrols, so circa 1,800 km of patrolling will be undertaken each year in the landscape. At least 2 members of the team for each patrol will be ANPN staff, who have the necessary mandate to apprehend individuals engaging in illegal activity. Patrol teams will collect data on any signs of illegal activity and identify where possible which species are affected by hunting (i.e., identification of any carcasses found or seized, type of snare used etc). The results of this data should be summarised in a report every year, to get a measure of hunting pressure and species targeted.

Two base camps will need to be created to support implementation of the offset project (Figure 12). One large camp will be constructed in the far north of the Okala concession – on the Remboué Estuary. This camp will be the principal base for the offset project, where staff and vehicles will be lodged, and where there is easy access for provisions from Libreville. The camp will also be located at a well-known entry point for hunters and so will act as deterrent for illegal activity. A second, smaller, satellite camp will be constructed at the southernmost point of the offset landscape – near lake Isaac. This camp will facilitate patrols and biomonitoring in the south of the landscape and will also be located at a well-known entry point for hunters, and so will act as deterrent for illegal activity.

[41] Based on: field staff doing 12 x 15 day patrols per year, plus biomonitoring and social activities in collaboration with Okala; and 6 x Okala offset agents doing all patrol, biomonitoring and social activities required for the offset. Based on doing 12 x 15 day patrols per year - equal to 180 person days for each team member.

[42] Limited data on patrol effort in other protected areas in Gabon (i.e. national parks) was available, but this information should be sought from ANPN, and if significantly higher than proposed here, then patrol effort on the off-site offset should be increased accordingly.

Figure 12. Map showing proposed base camps in north and south of the offset area. Source: TBC.



Okala may also deploy "smart bridges" at key entry and exit points to the forest[43] to inform patrolling effort and identify those carrying out illegal activities. These bridges can be moved around in response to human activity. OPG have not yet decided whether the use of smart bridges will form part of offset activities, and so they are included as "to be determined" costs in the budget that is currently being reviewed.

4.5.2 Biomonitoring

The biomonitoring will be led by Okala across the whole offset landscape, but ANPN will be responsible for implementing the camera trapping within Pongara National Park, with technical support from Okala on this for the first ten years. Camera trapping is a widely used technique which enables information gathering on the presence, distribution and density of animals. Camera traps will be installed across the offset landscape using a 2 x 2 km grid cell, and one video camera trap placed within 30 m of the centre point of each grid cell, in an area free of obstruction (e.g., large tree, bush). Cameras will be set to video mode and will remain in place for 9 weeks at each identified location (during which time they should not need to be checked for battery life / SD card capacity). The approach will be complementary with the Gabonese

[43] Smart bridges consist of software that are integrated into camera traps, that can provide Okala with real time information on incursions by illegal hunters (in the form of a Whatsapp alert and sharing of the camera trap video via satellite).

national monitoring approach that uses a 6 x 6 km grid cell design[44], and data from the relevant cameras should be shared with the relevant authority.

Each grid cell will be sampled for 9 weeks in the rainy season and 9 weeks in the dry season, but each cell will not need to be sampled at the same time. Thus, to optimise number of cameras the offset landscape will be split into two roughly equal halves (e.g., into a North section and a South section), and cameras will be placed in one half for 9 weeks, followed by the other half. In total, the camera trap monitoring will be in operation for 36 weeks (18 weeks in the rainy season and 18 weeks in the dry season), and a total of 160 cameras will be required (to cover the 320 grid cells of 2 x 2 km). Five Okala field staff will be required to implement camera deployment, monitoring and data input[45]. The camera trap survey will be repeated on an annual basis to monitor changes in population status of the Central Chimpanzees, Western Gorillas and Forest Elephants.

The principal aims of the remote video camera trapping will be to systematically monitor the offset landscape and enable annual assessment of:

1. Density, using the recently developed camera trap DISTANCE sampling approach (based on Capelle *et al*. 2019) and / or SECR (Head *et al*. 2013), every 12 months.

2. Population structure including number of males and females, number of adults and infants, group size and composition, and population viability.

3. Population health in terms of presence of injured / malnourished / diseased individuals.

4. Support identification of core areas (especially for chimpanzees).

5. Provide data on the presence and occupancy of other elusive Critical Habitat-qualifying terrestrial species (e.g., Red Capped Mangabey, Giant Ground Pangolin and White Bellied Pangolin) in addition to species of stakeholder concern possibly present (e.g., Mandrill; African Golden Cat; Leopard; Yellow Backed Duiker; Sitatunga; Servaline Genet and Red River Hog).

[44] A 6 x 6 km grid is not considered granular enough to detect small-scale changes in population size required to demonstrate progress towards NG, hence why a 2 x2km grid will be applied.

[45] Based on camera deployment and monitoring of 320 cams put up 2 times per year (totalling 1280 cam checks per year), and assuming 3 cameras can be checked per day (so 426 "camera check" days per person). Additional field staff time is required (circa 90 days) for uploading all camera trap footage and storing in database. Staff time also required for social engagement activities in the offset landscape - participatory mapping and supporting sustainable livelihood development (fishing, agri, NTFP etc). Based on the above requirements, a team of at least 5 people will be required to meet FTE requirements of camera checks and data storage, when accounting for holiday / sickness / rotation.

6. In addition, data from camera traps will provide a measure of abundance /encounter rate of Great Apes and Forest Elephants every 6 months (i.e., after each seasonal survey).

Every five years, the Project will also implement remote sensing of carbon stocks and landscape classification, to assess forest extent and condition both within and outside the offset area (to assess for leakage). This work will be sub-contracted to experts (Okala have previously contracted Space Intelligence for this work).

4.5.3 Community engagement and support for livelihood development

Okala concession have already undertaken social studies in 37 villages located within and around their concession and Pongara National Park – both participatory mapping (Eyang Effa *et al.* 2022a) and a socio-economic study (Eyang Effa *et al*. 2022b)[46]. Six of these villages fall directly within the off-site offset area (Mvam, Tchinchoua, Labatte, Avole Zame, Mveng Ayong and Atondi Simba), while nine others are in proximity to the South (eight around lake Isaac) and East (Vieux Cater) and considered to potentially be affected by the offset actions. The other village within the landscape (Engoma) was assessed during the ANPN study.

The socio-economic survey explored many population parameters including population size and trend, age sex structure and ethnic group, health and education, infrastructure and transport, primary activities, and income sources and socio-political structure. The survey also assessed to what degree the activities of each village would be impacted by the presence of a sustainable development permit. In terms of livelihood development activities, residents expressed an interest in developing agriculture, fishing, raising pigs and chickens, ecotourism, creating fruit orchards, and bee keeping. In February 2023 the Okala project installed 50 beehives in three villages (Matek Mavi, Tchinchoua and Bissobinam). There has been limited success in getting bees to colonise the hives so far, and the Okala team are now working to build capacity among the local population in proper maintenance of the hives to promote colonisation. Okala have also implemented a gorilla habituation program (in partnership with CENAREST), and the majority of staff employed for this program come from the surrounding villages. Other activities being explored include production of tea from local fruits, NTFP collection and use, and development of cosmetics from sustainable harvest of active compounds.

In terms of specific activities that should be the focus of the offset, a lot of progress has already been made by Okala on assessing likely impacts to local communities of a sustainable development project, and the ANPN study complimented this work by including some additional villages in socio-economic assessment. Nonetheless, a priority prior to offset implementation should be to undertake a Social Impact Assessment (SIA) that encompasses all the villages likely to be impacted by the Project, clearly defines how people use the area of the offset project, and what offset activities should be included for livelihood development. The SIA

[46] The only village not assessed as part of the Okala socio-economic and participatory mapping surveys that falls within the area of impact is Engoma village (located within Pongara National Park). This village was however assessed as part of ANPN's socio-economic study in December 2022.

should be informed by existing studies (e.g., participatory mapping and livelihood assessment work carried out by Okala in 2022).

4.5.4 Scientific research

Okala concession seeks to be a centre of research excellence, and as such wants to encourage scientific research in the landscape. Okala already have an agreement in place with CENAREST – the National Centre for Scientific Research and Technological Development – which hosts many Masters and PhD students on a wide variety of topics. OPG have also demonstrated their interest in supporting scientific research – most recently through their collaboration with ANPN to radio collar elephants in the Mouila landscape.

As part of the offset, OPG will financially support Masters and PhD students undertaking relevant studies in the offset landscape. For example, studies that explore movement patterns of Elephants and Great Apes; assess the important of connectivity, the presence and impacts of human-wildlife conflict; measure changes in habitat condition; or the impact of logging on food availability for and distribution of CH species. Okala and OPG will be the technical advisors, support the development of relevant research questions, and facilitate access in the landscape, and data collection for students.

4.5.5 Mandji savannah

As described in detail in Section 4.8.2 below, NNL for savannah will not be achieved in the Sud Estuaire landscape, but in the Mandji region, within a 27,000 ha area of savannah adjacent to Mouila Lot 2 (note that only 11,000 ha of this area will be required for the offset). OPG will undertake community engagement, participatory mapping and co-design with existing residents to understand the dynamics of savannah fire setting in the region (i.e., locations, causes, area affected etc), and develop a savannah management plan that includes a fire management and a fire response program.

4.6 Governance and management feasibility

The offset will involve multiple partners and stakeholders (ANPN, Eaux et Forêts, Okala, OPG, EBE, GGFMI and the local population), and multiple land use classifications: Nationally Protected Area, Sustainable Development Permit, logging concession, and HCV forest, which complexifies the offset. As such it will be important that the roles and responsibilities between each stakeholder is clearly established, and that all operational, logistical and financial responsibilities are clear to all stakeholders. The governance and management approach has been discussed with key stakeholders and the following approach is proposed.

OPG-Okala-ANPN partnership: OPG will be take the role of overarching offset manager, and the OPG offset manager will manage the relationship with both ANPN and with Okala. A 41-year overarching framework agreement will need to be developed between OPG and each of the two organisations (i.e., two separate frameworks), that sets out the commitment on both sides to implement the offset, alongside the key objectives and intended outcomes. Okala and ANPN will each develop five-year management plans, and annual implementation plans with

associated budget. OPG will retain executive decision making around methodology, workplan and Key Performance Indicators (KPI's), and will review and sign off on Okala and ANPN's five-year management plans and annual workplans. Okala and ANPN will provide regular feedback and progress reports, 6 monthly for the first couple of years, and if the offset is progressing well, annually thereafter. Every five years, OPG will undertake a full review of the progress and impact of the offset to date, including commissioning an independent biomonitoring review. If OPG are happy with the outcomes to date and the partnerships are working well, then the next five-year workplans will be signed off.

Okala will have primary responsibility for the development / approach to biomonitoring, social development and community engagement activities in the offset landscape, but ANPN will lead the implementation of these activities in Pongara National Park, with technical support from Okala for the biomonitoring for the first ten years. ANPN will have primary responsibility for implementing anti-poaching activities in the offset landscape. Operational funds for both Okala and ANPN will be provided to them directly by OPG, on an annual basis.

Okala will also support OPG's biodiversity team to implement biomonitoring within the Awala set aside, while OPG will coordinate with ANPN to undertake mixed-group (i.e., ANPN, Eaux et Forets, OPG) patrols as required by OPG. Okala will also be responsible for maintaining dialogue with existing permit holders (i.e., gravel miners) to ensure a collaborative relationship that does not conflict with the objectives of the offset.

OPG-GGFMI and EBE partnerships: OPG will be responsible for setting up an agreement with GGFMI logging concession to a) acquire the corridor of land that links Awala and Okala; b) undertake patrols and implement biomonitoring across their whole concession when they are no longer actively exploiting (and possibly during active exploitation if GGFMI are open to this). A similar agreement will need to be established by OPG with EBE logging concession to a) undertake patrols and implement biomonitoring in their 'serie de conservation', and also explore the possibility of a small extension to the serie de conservation to further improve landscape connectivity; b) undertake patrols and implement biomonitoring across their whole concession when they are no longer actively exploiting (and possibly during active exploitation if EBE are open to this).

Figure 13 provides an overview of the proposed governance and management structure of the offset. The different levels of governance within the structure have different roles and responsibilities with regard to authorizing/approving annual work plans and budgets, ensuring the quality of activities undertaken in the field, maintaining relations between the various stakeholders and the guarantee of transparent financial management. The structure will include a steering committee comprised of OPG, the expert advisory panel and Okala. The roles and responsibilities of the various committees are as follows:

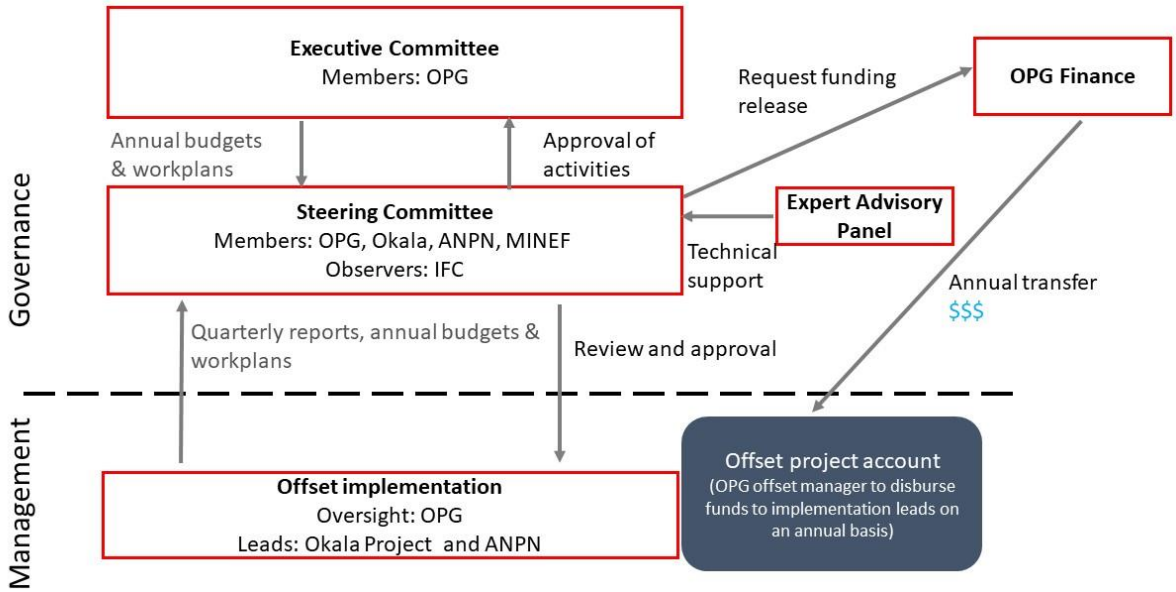
Executive Committee: This would be composed of executive-level representatives of OPG. The executive committee has the ultimate decision-making authority over annual finances, audits and work plans. This committee does not need to have technical knowledge of offset implementation, instead it will be informed on the basis of the recommendations made by the

steering committee. This committee will also act as a mediator to resolve any disputes arising in any of the other governance committees.

Steering Committee: This is made up of relevant staff from OPG, Okala. MINEF and ANPN. IFC will have an "observer" role on the steering committee but will not have decision making powers, unless requested. The role of the steering committee is to provide advice to the implementation team and ensure the scientific rigor of offset activities. It will review workplans, methodology and reports and ensure that the compensation project meets its objectives. It will also provide recommendations to the Executive Committee on technical aspects of work plans and budgets. The Steering Committee will be provided technical support by the Project's existing expert Advisory Panel (a group of independent biodiversity, social and protected area specialists) to ensure that good practice standards are applied in the implementation of the offset.

Implementation team: The implementation team is led by OPG, who will oversee all the offset activities and the implementing partners – Okala and ANPN. This team will be responsible for performing and reporting on activities related to achieving the gains required for compensation. They will regularly report back to OPG and to the steering committee.

Figure 13. Diagram showing governance and management structure of OPG's offset in the Sud Estuaire landscape



Establishing a governance and management structure is standard practice for offset projects and the above structure is considered feasible to implement based on discussions with key partners and stakeholders. However, further discussions are still required to develop the details and to sign the required agreements.

4.6.1 Finance mechanisms

As an offset represents a significant financial commitment, some companies have chosen to finance offsets based on the profits made by the company. This is a strategy that carries many risks and could lead to the failure of the offset to deliver the required gains, e.g., if the company does not achieve the expected levels of profit, it is often the offsets that lose their funding, which clearly limits the effectiveness of the offset in delivering the required gains. It is normally recommended that all offset costs be guaranteed in advance and transferred to a separate account so that the implementation of offset activities is guaranteed from the outset and without delay or suspension of activities. In this way, the offset will receive continuous funding to operate and will have the best chance of delivering the required gains for the project.

In the case of OPG, the company works on annual budgets, and putting aside the offset budget in its entirety in a separate account is not feasible. Instead, OPG will ensure they include a budget line with a specific code that is uniquely for the offset program each year in their annual budget. In this way, all expenses can be tracked, retraced and assessed yearly. As outlined above, OPG will also sign a long-term framework commitment between themselves and Okala, the implementing partner, for the off-site offset.

Additionally, the offset gain should last at least as long as the impact being addressed which in many cases means in perpetuity. It would be recommended that in the case of OPG, that some financing is earmarked for the offset implementation team to develop a sustainable financing mechanism which will provide suitable financing for the off-site offset area beyond the life of the offset. Examples of such mechanisms include trust funds and carbon/biodiversity credit approaches (which Okala are already exploring), which will bring both social and biodiversity benefits.

4.7 Summary of potential challenges to off-site offset feasibility and mitigation

Table 18 below provides a summary of any foreseeable technical, social and operational feasibility issues likely to impede success of achieving NG in the Sud Estuaire landscape and NNL in the Mouila landscape, for CH and NH features respectively, and the proposed actions to overcome such challenges.

Table 17. Summary of potential challenges to success of off-site offset feasibility

Potential challenge	Action to address challenge	Responsibility
Political landscape The military coup that took place in Gabon after the August 2023 elections presents a risk to the offset project. The interim government will be in place for at least two years. There has been a complete changeover of ministry staff, and new relationships will need to be forged with new ministers. Okala's sustainable development permit had not yet been officially issued by MINEF before the coup. Risks from the current political landscape include: (i) there will be delays to issuing the permit since the process will to some degree need to start again (this is not necessarily an issue as they are continuing business as usual) (ii) there may be changes to the requirement of the permit (e.g., requirement to do some low level logging) (iii) the new MINEF may not see sustainable development as a high priority, and might not grant the permit (iv) the new Minster of Mines may prioritize the area for mining, oil or gas (v) any changes to the CNAT could also impact on Mouila savannah acquisition (see last row of table, below).	Seek to engage with all new relevant ministers as soon as possible to understand their priorities. Attempt to get the sustainable development permit officially granted. Ensure that any low level logging requirement does not affect the offset area.	Okala and OPG
Stakeholder complexity The offset involves multiple stakeholders (ANPN, Okala, OPG, EBE,	Ensure that the role of and partnership mechanism between each stakeholder is clearly established e.g., via agreements with each key	OPG to lead conversations with the different partners to define the governance and management mechanism

GGFMI, local population), and multiple land use classifications (Sustainable Development Permit, logging concession), which complexifies the offset. The offset was chosen despite its complexity because it represents an opportunity to provide significant additionality and create real positive impact in the landscape.	stakeholder, and that all operational, logistical and financial responsibilities are also clear to all stakeholders. It would be advisable to have a steering committee.	and set up agreements / contracts and processes.
Unproven partnership The Okala project is a new development in the landscape, and while the current team has a great deal of experience in biomonitoring, ecology, and the Gabon context, they have limited experience in conservation management, since the project has only been operational for 2 years. The partnership with Okala is therefore unproven and this does present a risk, given they will be the primary implementing partner.	Undertake due diligence including a capacity assessment, with a focus on financial management and conservation management. Minimise risk by implementing checks and balances on outputs and payments in the early stages of project implementation. For example, payments could be made every quarter or every 6 months in the first couple of years with payment triggered by completion of implementing all the required program of activities.	OPG to undertake appropriate due diligence capacity assessment, or sub-contract an expert to do so. OPG to develop checks and balances approach as part of the governance and management mechanism.
Lease duration for logging concessions, and engagement of current owners. The EBE logging concession permit is valid until 2032, and GGFMI until 2040. However the offset will be active until 2065. There is therefore a risk that a different operator may enter the landscape after these dates, who is not open to collaboration. In addition, while both companies have given verbal acceptance of desire to engage, there has been no formal engagement, and in the case of GGFMI to sell the land, there is a risk they could change their minds. If both	Given that OPG will aim to purchase the GGFMI corridor area, then ownership will be given to them, presumably until 2065 in line with the rest of their concessions. For EBE, it will be important to engage at an early stage with any new operator that may arrive after 2032. Risks are considered to be low because the EBE serie de conservation is swampy terrain that is not easily logged, and is likely to be avoided by any future developer. Agree with Okala that if one or both of the current operators change their mind about engaging with the project, an additional area of circa	OPG to remain abreast of any changes in lease / ownership, and ensure they engage with MINEF prior to 2032 and 2040 to understand what the future status of these two logging concessions will be. OPG to discuss with Okala to agree a caveat on an additional 8,000 ha if both

changed their minds, the overall size of the offset would be reduced by 8,000 ha (or 6%).	8,000 ha of Okala concession could be given over to the offset.	operators change their mind about engaging.
Uncontrolled development Oil 'exploration' permits cover all of Gabon, and three such permits exist within the Sud Estuaire landscape. One of these is actively exploring for oil and may have found some within the EBE logging concession (according to a cement post observed by the socio-economic team). Oil takes precedent in Gabon, and so if found then active exploitation will follow. The Centre Nationale des Affectations de Terre (CNAT) stated that even if oil is found within a National Park, the permit will be accorded, so the absence of national protection does not actually represent a greater risk from oil exploration. Loango National Park is a good example of this – in 2008 SINOPEC were granted rights to explore and exploit oil here, despite it being a RAMSAR site and National Park.	Maintain active and ongoing dialogue with existing permit holders to ensure a collaborative relationship that does not conflict with the objectives of the offset. Engage regularly with the Ministry of Mines to remain abreast of any potential developments, and engage at an early stage with any new landscape stakeholders to explain the project and its objectives, and the importance of working in synergy as much as possible.	Okala project to be responsible for leading on active dialogue with existing permit holders, and OPG to be responsible for regular dialogue with the Ministry of Mines and other relevant ministries.
Uncertainty in density estimate and hunting rates for Great Apes As outlined in Section 4.8.3 Okala do not yet have baseline data on Great Ape densities in their set asides. In the absence of these estimates, there can be limited certainty around what gains can be achieved via avoided loss. If density is found to be lower than the predicted 0.67 weaned individuals/km^2, then gains will be lower. Similarly, if hunting rates are lower than predicted, then fewer gains will be achievable via avoided loss. The Project needs to	Okala will implement baseline monitoring (using OPG's 2022 protocol as a guide), and once the BMEP is developed, implement actions relevant to hunting (bushmeat surveys and systematic patrols of set asides) as key priorities. Ensure that results are available by April 2024.	OPG to sub-contract external expert to develop BMEP for the off-site offset project.

develop and implement a BMEP that includes bushmeat surveys (both household and roadside), as well as undertake systematic patrols of the offset area for illegal activity, to obtain a measure of hunting rates for Great Apes.		
Mouila savannah acquisition The identified savannah is currently under mixed management and is a combination of community savannah, CBG forestry permit and unallocated savannah (i.e., no permits or community allocations on this land). While acquiring the CBG portion should be straightforward, there may be more complexity with the community savannah, due to existing tensions between OPG and local residents.	To avoid potential conflict with local communities, OPG will focus on acquiring management of unallocated and CBG savannah only, and will leave existing community savannah under community management. However, OPG will work closely with local residents to develop an appropriate management plan for OPG and community managed savannahs (including burning regime), that can improve habitat quality in the long term whilst not affecting livelihoods.	OPG to discuss with CBG about acquiring the savannah currently under their management. OPG to submit a request to CNAT for the two unallocated portions of savannah OPG to engage with Mandji residents to assess appetite for developing a management plan.

4.8 Estimate of gains via off-site actions

As summarised in Table 12, the net gain position after actions in on-site set asides is that 5,441 QH savannah, at least 62 QH lowland terra firma forest, at least 106 individual Great Apes and at least 101 Forest Elephants is still required.

4.8.1 Lowland terra firma forest

The Okala concession has undergone heavy logging over the past 100 years and parts are heavily degraded. Therefore, the outstanding required gains for lowland terra firma forest (62 QH) are expected to come from restoration of the forest in the absence of continued logging[47]. Okala have already undertaken carbon mapping of the landscape and recently assessed current total above and below ground biomass against a 2007 baseline to measure what the change has been and develop projections for the future. The analysis revealed that between 2007 and 2022,

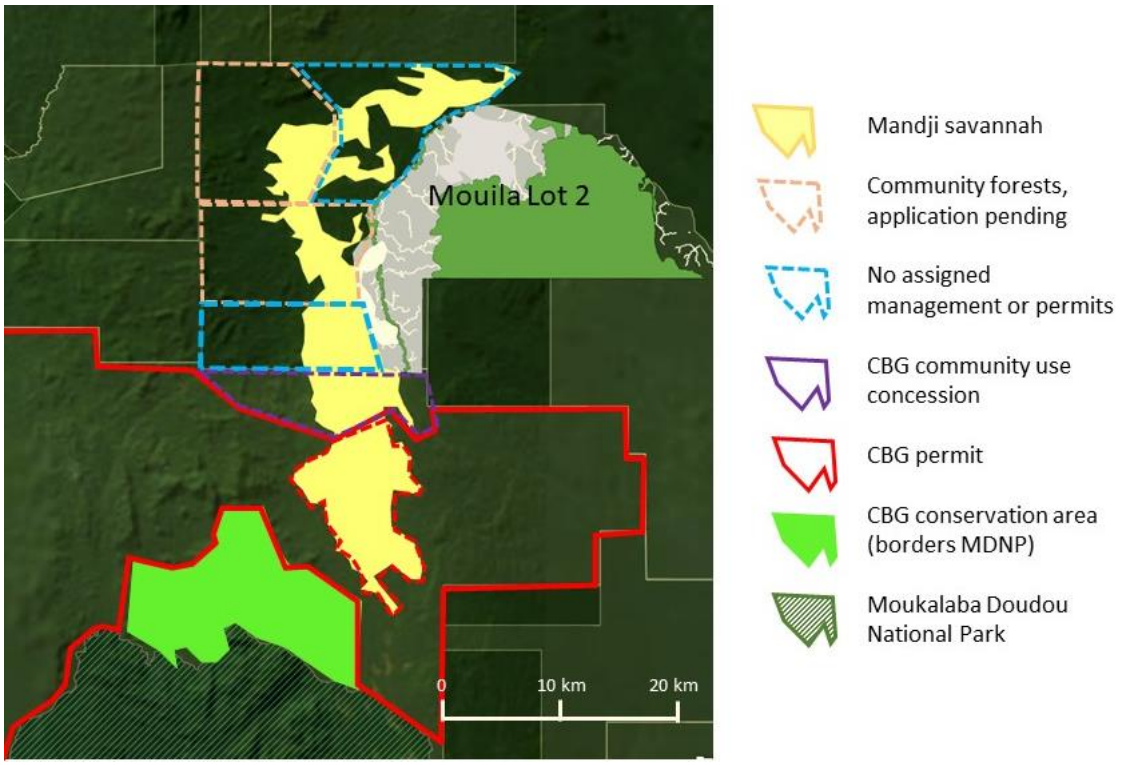
[47] Note that in the absence of the OPG off-site offset project, Okala would implement very low level logging across the whole concession, hence the restoration in the absence of logging is considered additional.

total biomass (above and below ground combined) across the whole 270,000 ha concession had increased from 76 million tonnes to 114 million tonnes. For forest areas, mean carbon storage increased from 318Mg/ha to 506 Mg/ha over the same period. Given circa 45% (122,000 ha) of Okala's concession (and specifically only forested areas, so equal to more than 45% of the carbon in the forest estate) is going to be protected as part of offset activities, the expected gains over 49 years will exceed the 62 QH requirement by several orders of magnitude. It is important to note though, that Okala have plans to develop carbon credit schemes within the landscape, and plan for only the gains required to achieve NG for lowland terra firma forest to be assigned to OPG, and any excess to be available for Okala's carbon credit schemes. Whether this meets additionality requirements for a carbon credit scheme remains to be evaluated given that OPG will be paying for protection within the 122,000 ha and carbon financing is not needed for protection (i.e., carbon activities would not be additional as OPG will already be funding them).

4.8.2 Savannah

As summarised in Table 12, the net gain position for savannah after action in on-site set asides is that an additional 5,441 QH is required to achieve no net loss. The Okala concession includes circa 6,000 ha of savannah habitat, but this is located in the West of the concession and outside of the proposed offset area. Furthermore, it is unlikely to be the same type of savannah as that developed by OPG for palm. It is therefore not considered to contribute to the required gains for savannah. Instead, an area of circa 27,000 ha of savannah directly to the West of Mouila Lot 2 has been identified as an additional offset site (See Figure 14 below). According to the Centre Nationale d'Affectation de Terre (CNAT), this savannah is currently a combination of community savannah, CBG forestry permit and unallocated savannah (i.e., no permits or community allocations on this land). If OPG were to acquire 11,000 ha of this land, and applying the same assumptions as with on-site set asides (that gains equivalent to a total of 50% over the 49-year concession period, via a combination of averted loss and natural restoration is feasible), gains of 5,500 QH for savannah habitat could be achieved, which exceeds NNL requirements by 59 QH. Relevant stakeholders were encouraging in expressing that if Olam were to express an interest in acquiring management of the savannah areas marked in blue and red dotted lines in Figure 14 below (both unallocated and CBG savannah), that this would be met with positivity by both the CNAT and CBG (P. Bongolo and M. Lee pers comm).

Figure 14. Map showing location of Mandji savannah adjacent to Mouila Lot 2, and different land use allocations. OPG should seek to acquire management of the areas marked by blue and red dotted lines.



4.8.3 Great Apes

Central Chimpanzees and Western Gorillas are confirmed as present across the Sud Estuaire landscape, although robust density estimates are not yet available. A 2007 study (Petre *et al.* 2007) estimated density at 0.67 per km^2 in the western part of the landscape; in the absence of other data, this is the figure used to estimate that the current population size of Great Apes may be circa 860 Great Apes across the proposed landscape (excluding Awala which is already accounted for in on-site actions). A first action of the offset will be to undertake baseline monitoring to establish density, and net gain potential should be revised once this data is available. As with on-site calculations, gains for Central Chimpanzees and Western Gorillas are combined to estimate a "Great Ape" gain, and potential for gains is based on averted loss through mitigating hunting. The exact same approach that combines data of estimated tonnes of bushmeat harvested per year per km^2 in Gabon, with the average proportion of offtake that is apes in Gabon and controlling for sex ratios in both chimpanzees and gorillas, is also used. As

outlined in Section 3.9, it can be inferred that 0.208kg of Great Ape is harvested per km^2 per year in Gabon[48].

With an average ape weighing 63 kg (see Table 10), it can therefore be estimated that circa 4.3 apes are lost across the 129,000 ha offset landscape each year (129,000 ha is the entire landscape minus Awala, for which calculations are already included in on-site actions). Over 41 years this is equal to gains of 175 Great Apes. However, such an estimate assumes that efforts to prevent hunting of Great Apes are 100% effective, a situation unlikely given that hunting pressure in the landscape is intense and for commercial purposes (increasing the risk to Great Apes since commercial hunters are more likely to target apes than subsistence hunters), and it is unrealistic to think this can be completely avoided.

Therefore, potential gains via averted losses are estimated with a 20% reduction in effectiveness (as reducing hunting will not be 100% effective). **This results in a gain of 140 Great Apes over 41 years, which exceeds the 107 Great Apes required to achieve net gain.** Given the inherent uncertainties both in estimating current Great Ape densities and hunting impacts as well as in the success of conservation intervention, exceeding the NH requirement (by 30% in this instance) is advisable in order to reduce the risk of the offset project failing to achieve NG.

As highlighted in the on-site gain estimation for Great Apes, it is key to note that Okala do not yet have baseline data on density of Great Apes in the off-site offset, and without this information there can be limited certainty of gains that can be achieved via avoided loss. For example, if density is found to be very low, then fewer Great Apes are 'available' to be hunted. This study assumes density is circa 0.67 weaned individuals/km, which is equivalent to circa 860 weaned Great Apes present across the offset landscape. But this estimate comes from one short term and outdated study, and real densities may differ significantly. Using the current estimate, the OFS estimates that circa 16% of Great Apes would be lost from set asides in the absence of protection, over the 41 year duration of the offset (this is less than the 20% estimated in on-site set asides due to the shorter timeframe off the off-site offset). If density is significantly lower then fewer gains will be achievable over the 41 year duration of the offset. Similarly, if hunting rates of Great Apes are found to be lower than average (i.e., less than 4 individuals per year across the offset landscape), fewer gains via avoided loss will be achieved.

The **value of increased connectivity within this landscape also confers gains** by increasing the chances of survival of Great Ape populations over the long-term by maintaining dispersal corridors and their genetic variability. Such gains via improved gene flow are not easy to measure in terms of individuals, but they certainly exist, and are clearly recognised by key stakeholders given that the development of wildlife corridors is seen as a key national priority.

[48] It should be noted that this is considered a conservative estimate since in the Froese *et al.* (2021) paper – 34 Great Apes were hunted over a 12 month period across an area of 8,400km^2. It is therefore possible that across the 1,280km^2 proposed offset area (i.e., an area 15% of the size) the number of Great Apes hunted each year could be 5 or more.

This value adds further confidence to the supposition that net gain for Great Apes is feasible via off-site actions.

4.8.4 Forest Elephants

Forest Elephants are confirmed as present across the Sud Estuaire landscape, although robust density estimates are not yet available. A 2006 study (Latour, 2006) estimated density at 0.89 per km^2 in the western part of the landscape, while a 2021 nationwide genetic survey estimated 0.9 per km^2 in the nearby Wonga Wongue Presidential reserve. In the absence of other data, these are the figures used to estimate that circa 1,068 Forest Elephants are present across the landscape (excluding Awala which is already accounted for in on-site actions). A first action of the offset will be to undertake baseline monitoring to establish density. As with on-site calculations, potential for gains is based on averted loss through mitigating hunting and reducing human-elephant conflict, and as outlined in Section 2.6 and 4.6, available MIKE data implies at least 0.0026 Forest Elephants killed per km^2 per year in Gabon. This equates to circa 3.38 Forest Elephants lost across the 129,000 ha offset landscape each year (129,000 ha is the entire landscape minus Awala, for which calculations are already included in on-site actions). Over 41 years this is equal to gains of 140 Forest Elephants. However, such an estimate assumes that efforts to prevent hunting of Forest Elephants are 100% effective, a situation unlikely given that hunting pressure in the landscape is intense and for commercial purposes (increasing the risk to Forest Elephants since commercial hunters are more likely to target this species than subsistence hunters), and it is unrealistic to think this can be completely avoided.

Therefore, potential gains via averted losses are estimated with a 20% reduction in effectiveness (as reducing hunting will not be 100% effective). **This results in a gain of 112 Forest Elephants over 41 years, which exceeds the 102 Forest Elephants required to achieve net gain.**

The **value of increased connectivity within this landscape does confer gains** by increasing the chances of survival of Forest Elephant populations over the long-term by maintaining dispersal corridors and their genetic variability. Such gains via improved gene flow are not easy to measure in terms of individuals, but they certainly exist, and are clearly recognised by key stakeholders given that the development of wildlife corridors is seen as a key national priority. This value adds further confidence to the supposition that NG for Forest Elephants is feasible via off-site actions.

5 Roadmap for offset implementation

Based on the findings in Sections 1-5 of this summary report, it is considered likely that the Project will be able to align with PS6 requirements to deliver no net loss for impacted natural habitat and net gain for impacted critical habitat features, via the proposed offset actions. No insurmountable risks have been identified to date that pose a threat to the realisation of the proposed offset; mitigation measures have been identified for risks for both on-site and off-site offset implementation and risks are therefore considered to be manageable.

This section presents the roadmap for offset implementation, and key steps that need to be taken to ensure offset feasibility.

Action	Onsite	Off-site	Responsibility	Timeframe
1. Technical				
1.1 Update OPG's BMEP and BMPs to ensure they are aligned with monitoring protocol, BAP, Great Ape and Elephant Monitoring and Management Plan, and offsite – offset actions	√	√	OPG to sub-contract TBC for BMEP, OPG to update BMPs	By 28th Feb 2024
1.2 Implement actions to monitor hunting – specifically household and roadside bushmeat surveys (as per BMEP)	√	√	OPG (OPG to implement in their own concessions; and OPG to direct / finance Okala to do so in the off-site offset)	By 31st March 2024
1.3 Obtain baseline density data on great ape and elephant population size in both on-site and off-site offsets, using the protocol developed in 2022	√	√	OPG (OPG to sub-contract WWF to implement in their own concessions; and OPG to direct / finance Okala to do so in the off-site offset)	ToR and survey plan by 31st Dec 2023; Evidence that surveys are underway by 31st March 2024
1.4 Engage with ANPN and Eaux et Forets to set up regular (at least 3 per month) joint patrols in the Awala set asides	√		OPG	By 31st March 2024
1.5 Develop Great Ape and a Forest Elephant monitoring and management plans	√		OPG to subcontract TBC	By 30th April 2024
1.6 Implement systematic patrols of set aside interiors (particularly large HCVs) to monitoring illegal hunting activity, checking raw	√		OPG	By 31st May 2024

SMART data to a) ensure effort (both days and km's walked) is sufficient, and b) ensure the team are focusing on interior areas of large set asides (i.e., not walking only around the periphery), and visiting all grid cells regularly				
1.7 Once baseline data for Forest Elephants and Great Apes is collected in both on-site and off-site offsets (action 1.3), redo averted loss gain metrics to ensure they are appropriate, and revise offset targets as appropriate	√	√	OPG to sub-contract	By 30th Jun 2024
1.8 Analyse data from baseline biomonitoring, patrols and bushmeat surveys	√	√	OPG (OPG to analyse patrol and bushmeat data in their own concessions; and OPG to finance Okala to analyse biomonitoring data in both on-site and off-site offsets)	By 30th June 2024
2. Social				
2.1 Set up a community grievance mechanism for villages within the Okala offset landscape and the Mouila savannah		√	Okala	By 30th April 2024
2.2 Undertake a Social Impact Assessment in and around the off-site offset (note that the cost for this assessment is not included in the main budget since it is considered part of feasibility rather than implementation).		√	OPG to direct / finance Okala to implement. ToR to be shared with IFC prior to study implementation.	By 31st March 2024
3. Governance				

3.1 Engage with relevant ministries including the Ministry of Mines to understand any potential developments in the off-site offset landscape		√	OPG	By 31st Mar 2024 (and regularly thereafter)
3.2 Undertake appropriate due diligence capacity assessment of Okala		√	OPG, or sub-contracted expert	By 31st March 2024
3.3 Formally engage with GGFMI and EBE logging concessions to agree purchase (of GGFMI) and partnership (with EBE). Concurrently, obtain Okala agreement that an additional 8,000 ha of Okala concession can form part of the offset if both operators decline to engage.		√	OPG	By 31st March 2024
3.4 Establish governance and management structures and financing mechanisms for the off-site offset, and set up agreements / contracts and processes, including checks and balances approach.		√	OPG, in discussion with IFC, ANPN, Eaux et Forets and Okala	By 31st March 2024
3.5 Develop a framework agreement with Okala for overarching 41 year commitment		√	OPG, in discussion with Okala	By 31st March 2024
3.6 Engage with CBG about acquiring the Mandji savannah currently under their management, and submit a request to CNAT for acquisition of the two unallocated portions of savannah. Engage with Mandji residents to assess appetite	√		OPG	By 31st March 2024

for developing a management plan.				
3.7 Engage with DGFAP and DGEPN to decide on the most appropriate designation for set asides, and ensure they are given a recognized protected status by 2030, that will assure their long term protection.	√		OPG	By 31st July 2024
3.8 Develop an offset management plan, including a framework for monitoring progress in offset road-map implementation (actions 3.1 – 3.7 should be implemented by OPG prior to commencing action 3.8, so that they can be integrated into the offset management plan).	√	√	OPG and TBC	By 31st August 2024
Develop five year management plans and one year annual implementation plans (that include activities, budget and key milestones/ performance indicators)	√	√	OPG to develop five year and one year plans for on-site offsets, Okala to develop for off-site offset.	By 31st August 2024

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Appendix 1 Alternative offset options considered

This appendix provides a summary of why three alternative offset options were rejected in favour of the Sud Estuaire landscape. The three alternative offset options were:

(i) plans to create **wildlife corridors** between national parks (with one linking Moukalaba-Doudou and Waka National Parks traversing two OPG concessions) could provide adequate compensation for OPG's impacts;

(ii) **Moukalaba-Doudou** would be a suitable location to offset OPG's residual impacts to Forest Elephants, Great Apes, lowland terra firma forest and savannah

(iii) **Other savannahs** in the South of Gabon such as Mont Fouari would be suitable locations to offset residual impacts to savannah

Wildlife Corridors

After stakeholder discussion in March 2022, this option was considered as an ineffective approach for generating substantial gains for several reasons.

(i) most of the corridor will be situated in logging concessions over which OPG has no control, and OPG could not ensure that effective protection occurs. Similarly, any gains for apes, elephants and lowland terra firma forest in these areas would be attributable to the logging concession owners and not OPG.

(ii) It is currently planned (although not confirmed) that the nationally protected part of the corridor may only be 1km wide, with an additional buffer on each side where certain activities are permitted. Given that gains are calculated per km^2, such a narrow band will not provide many gains for CH features, and as above any such gains will not be attributable to OPG.

(iii) The ecological effectiveness of the proposed corridor from Moukalaba-Waka has been questioned by several senior experts in Gabon (including from the Ministry of Environment). The national "N1" road bisects this proposed corridor to the East of the Mouila Lots and forms a significant barrier to wildlife.

(iv) There is no clear timeline for the implementation of the wildlife corridors between protected areas in Gabon, and stakeholders suggested it may be up to 8 years before they are in place, which does not fit with OPG's need to begin offsetting impacts as soon as possible. OPG is keen to engage with national plans to maintain biodiversity connectivity through the creation of the wildlife corridor between Moukalaba Doudou – Waka that will bisect set asides in Mouila Lot 1 and 2, and will ensure they are involved in the process, but the corridors will not be the focus of the offset.

Moukalaba- Doudou National Park

Moukalaba-Doudou National park was assessed in some detail and was originally the preferred option for OPG's off-site offset, given that it included all 5 CH features for which compensation was required (savannah, lowland terra firma forest, Central Chimpanzees, Western Gorillas and Forest Elephants). Assessment included a detailed literature review of published studies on great ape and elephant abundance, hunting pressure, forest ecology, savannah fire management, and stakeholder activities in the landscape, including scientific research, tourism and WWF's PROLAB (Programme Lutte Anti-Bracconage). ANPN's social team also completed a socio-economic study using the same approach as in Pongara, in Dec 2022. They visited 14 villages and undertook focus groups with circa 10 people from each village. Remote stakeholder engagement with ANPN, WWF, IRET, PROGRAM and Kyoto University was also undertaken by TBC.

Based on the outcomes of these remote and in person assessments, it was concluded that while the area was rich in CH species and other biodiversity, and included appropriate habitats (lowland terra firma forest and savannah), there was little additionality to be achieved via OPG support. This is because hunting pressure is relatively low in the landscape, human population density is decreasing as people move to urban centres, and in the absence of logging the forests are progressively being restored without active protection. Furthermore, the park already receives significant external funding from WWF, and there are a lot of stakeholders already working effectively in the landscape on research, anti-poaching and tourism. Moukalaba-Doudou was therefore excluded as a potential off-site offset for OPG.

Southern savannahs

Botanical inventory found that these savannahs were not the same type as those impacted by OPG, and furthermore, there were some competing land-use interests for these savannahs, making them a risky prospect as an offset. They were therefore excluded.

Appendix 2

Patrol data for 2022 from all six OPG concessions, highlighting significantly higher hunting pressure in Awala compared to other concessions.

	Awala	**Makouké**	**Mouila lot 1**	**Mouila lot 2**	**Mouila Lot 3**	**Ndendé**
Number of kms walked on patrol	1321	1176	1844	1988	1130	479
Total number of illegal hunting activity observations	34	2	5	0	11	2
Signs per km	0.026	0.002	0.003	0	0.009	0.004