

THE LOWER ZAMBEZI REDD+ PROJECT



BCP

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GHG Accounting/Crediting Period	01-10-2009 to 31-09-2039 30 years
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History of CCB Status	21-06-2013
Gold Level Criteria	Climate Change Adaptation – diversification of income streams, farming adaptation, biodiversity corridors Community Gold – Benefits to the poorest of the poor Biodiversity Gold – Presence of endangered and vulnerable species

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) Carbon Sales Community Revenue Share	908 000 ZMK	4	908 000 ZMK
3) Snares removed	145	5	145

1.2 Standardized Benefit Metrics

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
GHG emission reductions & removals	Net estimated emission removals in the project area, measured against the without-project scenario	NA		
	Net estimated emission reductions in the project area, measured against the without-project scenario	179 602	3	5 614 411 tCO ₂ e
Forest cover	For REDD projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario	Data not available	4	40 126
	For ARR projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario	NA		
Improved land management	Number of hectares of existing production forest land in which IFM practices have occurred as a result of the project's activities, measured against the without-project scenario	484	3	484
	Number of hectares of non-forest land in which improved land management has occurred as a result of the	187	4	187

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	project's activities, measured against the without-project scenario			
Training	Total number of community members who have improved skills and/or knowledge resulting from training provided as part of project activities	1209	4	1209
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities of project activities	488	4	488
Employment	Total number of people employed in of project activities, expressed as number of full time employees	40	2	40
	Number of women employed in project activities, expressed as number of full time employees	7	2	7
Livelihoods	Total number of people with improved livelihoods or income generated as a result of project activities	1209	4	1209
	Number of women with improved livelihoods or income generated as a result of project activities	488	4	488
Health	Total number of people for whom health services were improved as a result of project activities, measured against the without-project scenario	0		
	Number of women for whom health services were improved as a result of project activities, measured against the without-project scenario	0		
Education	Total number of people for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	143	4	143
	Number of women and girls for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	68	4	143

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Water	Total number of people who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	783	4	783
	Number of women who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	451	4	451
Well-being	Total number of community members whose well-being was improved as a result of project activities	1213	4	1213
	Number of women whose well-being was improved as a result of project activities	489	4	1213
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation, measured against the without-project scenario	40 126 ha	2	40 126
	Number of globally Critically Endangered or Endangered species benefiting from reduced threats as a result of project activities, measured against the without-project scenario	1 African Wild Dog (<i>Lycaon pictus</i>)	5	1

2 GENERAL

2.1 Project Description

2.1.1 Implementation Description

The Lower Zambezi REDD+ Project (Project) is a reducing emissions from deforestation and degradation (REDD+) project on 40,126ha of privately-owned land in Rufunsa District, Zambia. The Project Area is known as 'Rufunsa Conservancy', and is owned by a Zambian company named Sable Transport Limited. The Conservancy is one of the last intact areas of forest within Lusaka Province (named after the nearby capital city), and provides a 60-kilometer buffer to Lower Zambezi National Park (NP), a strategic protected area in Zambia in a globally significant trans-frontier conservation area. Lower Zambezi NP is adjacent to Mana Pools National Park in Zimbabwe which is a UNESCO designated World Heritage Site. The population of the Project Zone is approximately 8,300 people living in 28 villages spread within 4 community zones.

The Project Proponent is BioCarbon Partners, which is responsible for certifying the Project and for early-stage Project finance.

This is an avoided unplanned deforestation project. A detailed list of project activities and technologies can be found in Table 12. The main activities implemented to mitigate deforestation are conservation agriculture that leads to improvement in agricultural output and reducing the need to deforest new areas for fields. Beekeeping has been rolled out at scale to supplement income and thus alleviate poverty and importantly, to assist with climate change adaptation by reducing reliance on activities such as cropping that are highly vulnerable to climate change. Sustainable eco-charcoal production has also been rolled out at scale to negate the impacts of traditional unsustainable charcoal production. Similarly infrastructure development such as boreholes assist with climate change adaptation. School support helps with upliftment of local communities. Communities also get a revenue share of carbon credit sales which are invested in pre-determined activities.

The core project climate activities undertaken include forest carbon inventorying, modelling cumulative deforestation patterns, and soil carbon assessments. Core community project activities include up to eighteen different types of community-based deforestation mitigation initiatives designed to create sustainable, scalable alternatives to deforestation, and strategic, meaningful incentives that comprise part of pay for performance programs that support forest conservation. Core biodiversity project activities include forest conservation systems, biodiversity monitoring and management, and fire management.

A security team ensures that there is no encroachment in the project area. The boundary is patrolled on a regular basis to ensure no illegal logging, charcoal making or farming takes place within the project area. There other mandate is protecting the biodiversity in the project area by removing snares and arresting poachers. Scouts conduct 20 day (cycle) long foot and motorized boundary monitoring patrols with strong working partnership with DNPW. One of RC highest point is being used as an Observation Post (OP). Scouts are assisted 2 members of the community to be on surveillance. There is a radio communication system in place with a dedicated radio operator.

The project area northern boundary is cleared every winter to act as a fire break and prevent runaway fires set by farmers and poachers. The road network has also been graded creating more effective fire breaks.

The Project is being developed to conform to the Climate, Community and Biodiversity Standard (CCBS, Second Edition) and the Verified Carbon Standard (VCS, Version 3.4). Furthermore, the Project is aligned with the Government of the Republic of Zambia's (GRZ) National REDD+ Program, implemented through the Forestry Department.

Leakage is monitored in an activity shifting leakage area in 30 permanent plots using standard forest enumeration techniques. Non-permanence risk factors are revised annually and scores updated.

The project start and implementation date is 1 October 2009 and will be operational until 1 October 2039. The total estimated Gross Emissions Reductions over the project lifespan are 5 614 411 tCO₂e at an average of 187,144 tCO₂e/yr and 179 602 tCO₂e for this monitoring period.

2.1.2 Project Category and Activity Type

VCS Sectoral Scope 14 – Agriculture, Forestry, and Other Land Uses (AFOLU), project activities Reduced Emissions from Deforestation and Degradation (REDD), using Methodology for Avoided Deforestation, VM0009 V2.1 and qualifies as baseline type U3, unplanned mosaic or frontier deforestation. This is not a grouped project.

2.1.3 Project Proponent(s)

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2.1.4 Other Entities Involved in the Project

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2.1.5 Project Start Date (G3.4)

1 October 2009

2.1.6 Project Crediting Period (G3.4)

The project crediting period starts on the project start date – 1 October 2009 and ends on 1 October 2039 and runs for a total of 30 years with the option to renew.

2.1.7 Project Location (G3.3)

The Lower Zambezi REDD+ project is located approximately 120 km southeast of Lusaka and falls within the miombo eco-region which is host to a plethora of endemic species. It falls within the recently declared Rufunsa district and borders the Lower Zambezi National Park to the east and south, Chiawa Game Management Area (GMA) to the west and the Soli Shamifwi Royal Establishment (Chief Unda Unda's Chieftdom) to the north (Figure 1). The project area is accessible by road via the small towns of Chinyunyu and Sinjela on all-weather dirt roads. The project area is the Rufunsa Conservancy, privately owned by Sable Transport Ltd, a local Zambian company. The project area consists primarily of intact, primary miombo woodland that has never been logged with some open grassland and deep ravines with dense Acacia woodland. The project area is 40,126 ha in size. A portion of Rufunsa Conservancy has been encroached by illegal charcoal producers and this area has been excluded from the project area (labelled Encroachment, Figure 1).

There are an estimated 8,300 people living in the project zone (Figure 2) which falls in the Rufunsa district which is further divided into four zones and 28 villages. The project zone is bound between -15° 16' 57.72"S – 28° 58' 25.68"E (NW Corner) -15° 16' 57.72"S – 29° 23' 43.4394"E (NE Corner), -15° 35' 51.3594"S – 29° 23' 43.4394"E (SE Corner), and -15° 35' 51.3594"S – 28° 58' 25.68"E (SW corner).

There has been no changes to the project area or project zone since CCB validation.

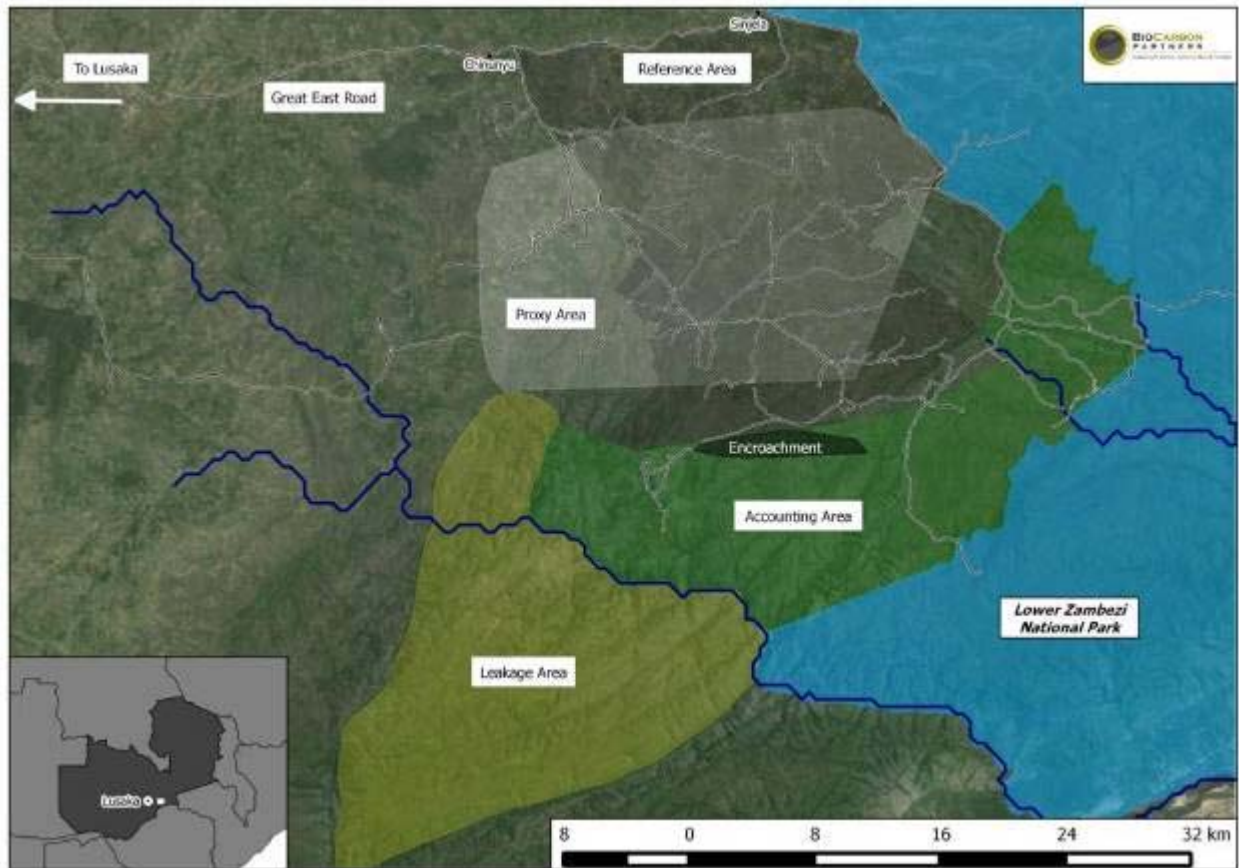


Figure 1. Location map of the Lower Zambezi REDD+ Project.



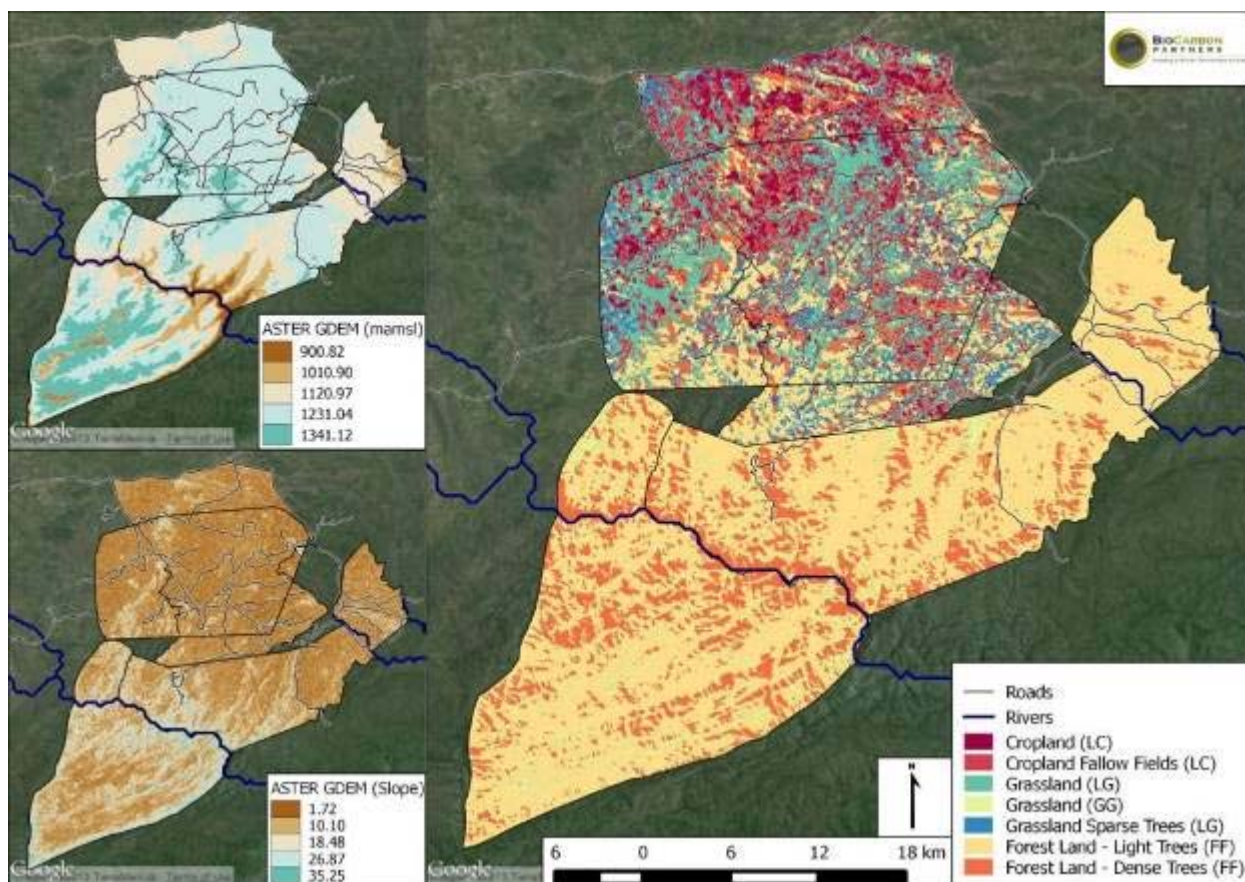


Figure 3. Land cover and topography of the Lower Zambezi REDD+ Project.

MR.6. A digital (GIS-based) map of the accounting areas with at least the above minimum requirements for delineation of the geographic boundaries.

The project accounting area is the boundary of Farm 10800, known as Rufunsa Conservancy, as shown in Figure 1 above. Sable Transport Limited, a Zambian registered and 100 percent Zambian citizen owned company, privately owns Rufunsa Conservancy under leasehold from the Government of the Republic of Zambia. This area was originally registered as a game ranch for wildlife tourism operations. Due to a lack of resources and wildlife poaching pressure, the area has not been used or promoted for eco-tourism or hunting and has been operated as a conservancy.

The accounting area was calculated by firstly excluding non-forested portions of the project area (bare earth and grassland). Then, all steeply sloped lands (greater than 20 degrees slope) which are inaccessible to agents of deforestation were excluded. The slope of 20 degrees was selected based on the assessment of the maximum slope of fields in the reference area.

For clarity, steep slopes were excluded only if the size of the polygon to be excluded is greater than 0.4 ha, in which case a 15 m buffer was created around these polygons. The accounting area comprises 33,338 ha of the total project area of 40,126 ha. A 30m Digital Elevation Model (ASTER Global Digital Elevation Model Version 2) was used in the slope calculation.

For the project accounting area boundaries it is important to note that while the title deed outlines the boundaries of the conservancy, the reader will see that a portion of this area has been removed along the northern boundary (Figure 1). This excluded area has been removed as this portion of the property has been encroached by illegal squatters currently undertaking charcoaling and subsistence agriculture activities. This illegal squatting resulted from confusion as to the exact location of the Northern boundary of the property. As a result of this confusion, a small number of households (approximately 19) had settled on private property within the boundaries of the Project Area. An additional 24 households live on communal land on or near to the boundary of the property. It is possible that some of these illegal squatters arrived prior to the project start date, but there certainly has been new occupation after the project start date. It has now been brought under control.

Due to the sensitive nature of land tenure in Zambia it was decided not to evict these people, but rather exclude this encroached area from the accounting area. It has been decided that the best option is to exclude the encroached area from carbon accounting as including it will most likely make it necessary to relocate the occupants which could lead to unnecessary conflict. It is a conservative exclusion, the area has not been included in emissions reductions accounting.

The boundaries of the exclusion area are based on a survey undertaken by BioCarbon Partners. Each illegal squatting household was surveyed with additional location data also collected using a hand held Global Positioning System (GPS). A convex hull was then generated around these points and used to adjust the boundaries of the conservancy.

There will be no BCP eco-charcoal production in the Project Area (Rufunsa Conservancy- boundaries as per title deed) or the accounting area or the excluded encroached area. All eco-charcoal production is taking place in a degraded patch of forest in the proxy area several kilometres from the project area (Figure 10).

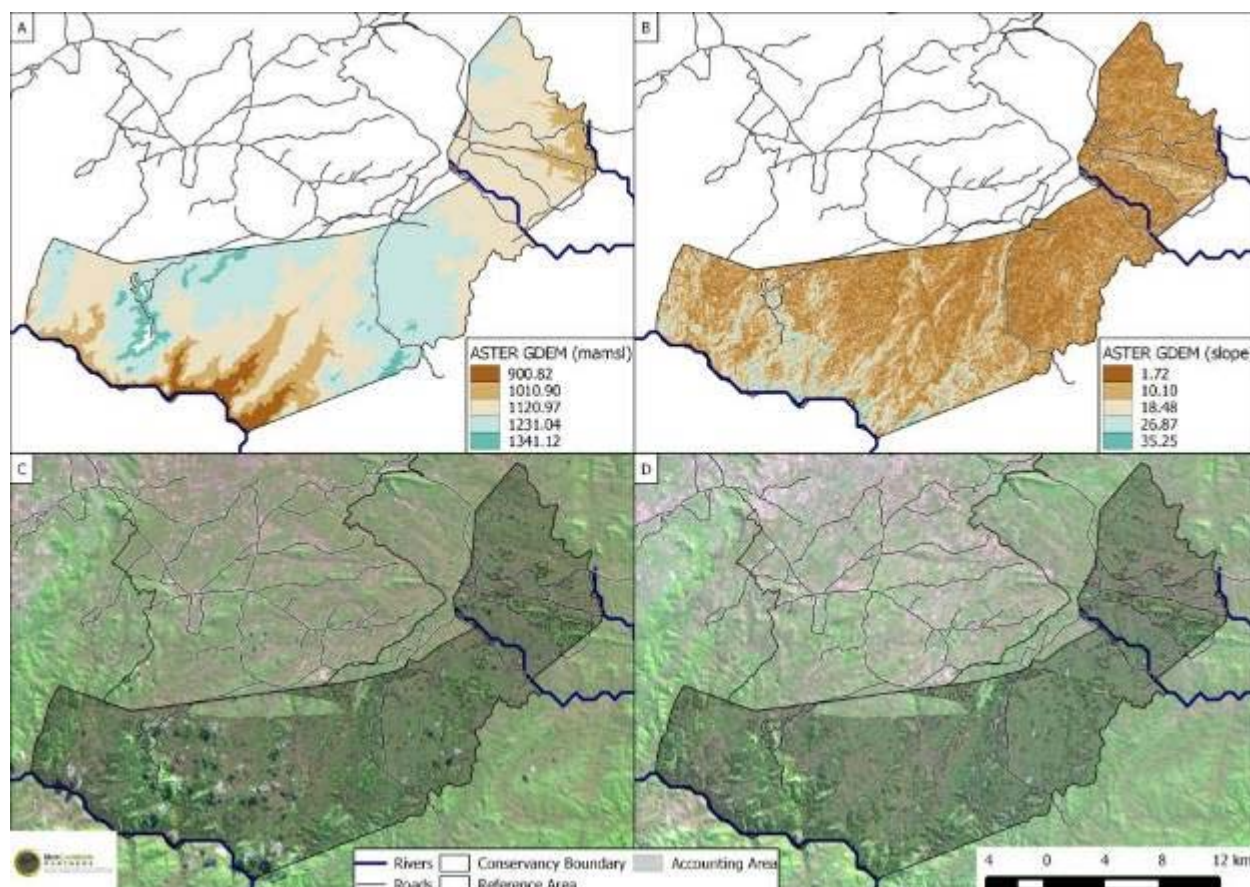


Figure 4. Topography (A), Slope (B), Accounting Area and forest cover in 1989 (C) and 2009 (D).

2.1.8 Title and Reference of Methodology

VM0009 – Methodology for Avoided Mosaic Deforestation of Tropical Forests, v2.1. Other tools include AFOLU Non-Permanence Risk Tool v3.2 and VT0001 Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities, v3.0.

2.1.9 Other Programs (CL1.5)

Emissions trading and other binding limits

The Lower Zambezi REDD+ Project is not subject to binding emissions limits or emissions trading programmes.

Participation under other GHG programs

The project has not applied to any other GHG programmes.

Other forms of environmental credit:

The project was validated under the Climate, Community and Biodiversity Standards (Second Edition – Gold Level) on 21 June 2013 by Environmental Services Incorporated (CCBS, Second Edition, Project No. VO12079, <http://www.climate-standards.org/2013/03/13/lower-zambezi-redd-project/>).

2.1.10 Sustainable Development

Zambia subscribes to the UN Sustainable Development Goals, the contribution of the LZRP to the 17 goals is listed below. There is no requirement for any formal monitoring and reporting of activities that pertain to these goals.

No Poverty - End poverty in all its forms everywhere

Local communities benefit from a range of employment and income generating projects ranging from jobs as scouts to eco-charcoal production.

Zero Hunger - End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Sustainable farming and honey production projects contribute to this goal.

Good Health and Well-being - Ensure healthy lives and promote well-being for all at all ages

BCP has supported the upgrading of a clinic.

Quality Education - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

The LZRP supports an environmental education programme as well as the employment of additional teachers in schools.

Gender Equality - Achieve gender equality and empower all women and girls

All LZRP projects and activities specifically aimed at marginalized groups such as women and girls. Records illustrating this are kept by BCP.

Clean Water and Sanitation - Ensure availability and sustainable management of water and sanitation for all

Several boreholes have been refurbished and new ones installed, both within the neighbouring community and within Rufunsa conservancy.

Affordable and Clean Energy - Ensure access to affordable, reliable, sustainable and modern energy for all

In partnership with a solar company, LZRP has provided solar lighting for several households and schools. The eco-charcoal project is a prime example of a sustainable, green energy project.

Decent Work and Economic Growth - Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

The LZRP has created and will continue to create jobs and improve economic conditions within the surrounding community through activities such as honey production, conservation farming and eco-charcoal.

Industry, Innovation and Infrastructure - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Not applicable, this is not an industrial initiative.

Reduced Inequalities - Reduce income inequality within and among countries

One of the main aims of the project is the equal distribution of benefits as prescribed by the CCB Standard.

Sustainable Cities and Communities - Make cities and human settlements inclusive, safe, resilient and sustainable

Conservation Farming and Eco-Charcoal production contribute to this goal.

Responsible Consumption and Production - Ensure sustainable consumption and production patterns

Again, Conservation Farming and Eco-Charcoal production contribute to this goal.

Climate Action - Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy

This is a greenhouse gas mitigation project avoiding approximately 200 000 tCO₂e emissions annually.

Life Below Water - Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Not applicable

Life on Land - Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

The project protects 39 000 ha of intact Miombo woodland while ensuring sustainable charcoal production and conservation farming on several 100 ha.

Peace, Justice and Strong Institutions - Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Not applicable.

Partnerships for the Goals - Strengthen the means of implementation and revitalize the global partnership for sustainable development

Not applicable, this is a local level project.

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G3.4)

Date	Milestone(s) in the project's development and implementation
1 October 2009	Project start date
30 years	Project crediting period
30 years	Length of project
February 2012	First carbon stock monitoring
March 2012	First assessment and quantification of socio-economic indicators
February 2012	Start date of community projects
April 2013	CCB Validation, 21 June 2013
April 2015	CCB Verification – postponed to allow more time for impacts
October 2013	VCS Validation and 1 st Verification 23 April 2014
Annual	VCS verification interval
10 years after start date	Periodicity of baseline re-evaluation
Every five years	Community impact monitoring
Annually	Carbon Stock Monitoring
Annually	Leakage monitoring

2.2.2 Methodology Deviations

MR.90 Deviations from the measurement methods set out in Appendix B or the monitoring plan, per current VCS requirement.

There was a minor deviation of the visual approach for leakage monitoring (Appendix B, VM0009). Instead of Forest Inventory Team members estimating degradation, they were required to geo-reference every felled tree in the permanent plots and the total number of felled trees were compared against the average density of trees/ha in the project accounting area, again avoiding biased estimations/erroneous counting of trees in 1ha plots. This value was then placed in a degradation category as per VM0009. This approach removed all potential bias and greatly improves the robustness and repeatability of degradation monitoring.

There was also a minor variation with regards the monitoring of disturbances. VM0009 requires that disturbances in the project area must be monitored in plots. The very low density of disturbances experienced in the LZRP rules out the use of plots.

A very minor incident of illegal logging was experienced during the current monitoring period and the disturbance was quantified by searching for stumps and recording them in areas where illegal loggers were active. This was a highly localized event and was picked up very quickly by security patrols.

2.2.3 Minor Changes to Project Description (Rules 3.5.6)

There were no minor changes to the project description.

2.2.4 Project Description Deviations (Rules 3.5.7 – 3.5.10)

There were no project description deviations during this monitoring period for either VCS or CCB Standards.

During Monitoring Period 3 (VCS) there was a project description deviation due to a non-conformance regarding the measurement of multi-stemmed trees that resulted in an over estimation of carbon stocks in the project area and it was initially corrected with a project description deviation described in detail in the monitoring report.

2.2.5 Risks to the Project (G3.5)

Political Risk

Zambia is a stable and peaceful country with a well-established democracy. Human-induced political risks are therefore low and the project has the approval of central and local government, and traditional authorities. Zambia was one of the first nine UN-REDD Pilot Countries in the World and there is a high level of interest within government for REDD+ pilot projects. This project is significant in that it is the first REDD+ demonstration project in Zambia. It is therefore strategic as a sub-national project which aims to support and feed into the design of a national REDD+ program. The project benefits from solid government support and interest for learning reasons. The project proponent is investing significantly in ensuring that the GRZ is kept well informed of this project, and the project's goals to contribute to national development goals and the national REDD+ strategy.

It is thus reasonable to assume the longevity of the project from a political stability perspective. Zambia is a stable country and BCP has approval and support from all the relevant Zambian Government Departments to implement the project. It is thus reasonable to assume the longevity of the project from a political stability perspective. However, in order to mitigate political risks, BCP proactively consults, engages, coordinates and collaborates with various Government offices, in addition to keeping them regularly informed about the project to keep it in the spotlight.

Risk of Expropriation

The Rufunsa Conservancy has a free and clear title deed. The boundaries have been demarcated with full consultation with local leaders. Zambia has strong investment protection laws and the project proponent has been awarded an Investment License from the GRZ. This reduces the risk of expropriation. Rufunsa Conservancy has already been through a legal suit and the highest institutions of the Country upheld the integrity of this title. It is highly unlikely that this land risks expropriation again. In addition, the project will invest in publicizing the project locally and

internationally to ensure that the GRZ remains aware of the values that this project is providing the Nation as the country's first and currently only pilot REDD+ project.

To mitigate expropriation risks, the project will invest in publicizing the project locally and internationally to ensure that the GRZ remains aware of the values that this project is providing the Nation as the country's first and currently only pilot REDD+ project. In addition, the Project is building a positive, lasting relationship with neighbouring communities and the Government of Zambia to ensure that the land is productive and beneficial to the Nation.

Income Risk

Project financial viability and breakeven analysis is reported in detail in the non-permanence risk report. The project is set to break even in four to seven years.

Community Risks

BioCarbon Partners has consulted extensively with all community stakeholders in order to understand the drivers of deforestation within the project zone and to formulate the most efficient mitigation strategy. BCP has a highly qualified and experienced team that have worked on conservation and natural resource management projects in Zambia and across Africa. The project has clearly benefitted local communities (Section 4 and Appendix C). Only projects that have written approval from local residents are implemented, and the link between interventions and deforestation mitigation efforts is further cemented through the signing of Community Covenants that oblige both BCP and participants to comply with project guidelines and connect community benefits to forest protection efforts.

Substantial and repeated crop failure in surrounding communities could lead to increased poaching and charcoal production for financial benefit. More erratic rainfall and pests make this likely, and all of our alternative economic development efforts are aimed at mitigating this risk. This is particularly true of the Sustainable Eco-Charcoal Project, which is based on a strong business model and designed to become a stand-alone, self-sufficient project. It is envisaged that conservation farming training program will be similarly successful.

Although there are always (legitimate) concerns about corruption, in talking to local residents about the history of external involvement in their communities, BCP has learned that corruption is not the only risk that could potentially threaten projects: other difficult community dynamics (such as high alcoholism rates, internal jealousy and belief in witchcraft) have threatened or ruined other organizations' projects in the past.

However, BCP's extensive community engagement efforts and strong local presence have served as powerful tools against these problems. Local community members have explicitly told BCP representatives that we have already set ourselves apart from other organizations by conducting sensitization meetings and consulting local stakeholders prior to implementing our projects, and by closely involving the local community in our project activities. As a result, community members report that they feel greater ownership of the projects that we launch in partnership with them.

BCP has engaged in significant capacity-building efforts among our staff, local community members and local implementation partners, so that we can best avoid and respond to such problems. We are also managing the risk of corruption through the use of Zone Development Committees (ZDCs) and other BCP-supported community consultation and implementation structures (see Section G3.8 for more information about our Community Engagement Strategy).

Another key risk mitigation strategy is the development of substantial community benefit projects and systems (conservation community covenants).

Fire

The threat of fire to the project's carbon stocks – the Miombo woodlands and their associated biodiversity are discussed in detail in the non-permanence risk report (Appendix I) and fire impacts are monitored annually.

In addition, BCP has been implementing a fire management system on Rufunsa Conservancy, mainly in the form of firebreaks and early burns. In order to mitigate risks, BCP will be implementing a fire management system on Rufunsa Conservancy, in partnership with neighbouring communities, with the specific aim of preventing potentially damaging, hot, late season fires. This will be done through introducing a system of firebreaks and controlled, rotational early burns to mitigate potentially devastating late season fires.

The system has evolved with fire and if completely excluded from the conservancy as doing so would lead to the complete loss of the grass sward (Trapnell 1959), and would thus adversely impact the biodiversity through the loss of many grass species and large herbivores, as well as an entire suite of acridids (Prendini et al. 1996) and other insects.

Drought

Drought poses another potential natural risk to the ecosystem. However, just as with fires, the woody vegetation is adapted to drought as the region is exposed to periodic droughts. Droughts are thus not considered a serious natural risk to the project.

An early burning fire management program will mitigate the risks that drought poses in contributing to late season fires that are potentially very damaging to vegetation.

Elephant Damage

Although there are no elephants present in the project zone, adequate conservation measures may well see the return of this large pachyderm in moderate numbers. The impact of elephants on woody vegetation is a hotly debated topic in African conservation.

If large numbers of elephants do start entering the project area, this risk will be mitigated by managing the population by introducing a rotational grazing system by opening and closing access to artificial water points.

It is difficult to determine at what density elephants will start having a significant impact on woody vegetation as the impact is site-specific, however, it is safe to say that elephants do have some impact (Guldmond & Van Aarde 2008) on woody species density. What needs to be kept in consideration is that large tracts of miombo woodland remain intact, despite the presence of elephants (Ribeiro et al. 2008). It is unlikely that elephants will increase to such high numbers as to actually threaten the existence of the project. In the event that elephants do return to the project area, their foraging will more than likely result in a minor loss of vegetation but would not jeopardise the project in its entirety.

Natural Disasters

The project area is geologically stable and there are thus no significant threats from seismic activities. Similarly, the risk of flooding is very low as the project area is situated on top of an escarpment and the soils are mostly sandy, thus drain easily.

With a view to mitigating the risk of natural disasters, BCP's community projects are designed to promote and build local stakeholder resilience to disasters, including the negative effects of climate change.

Projects such as crop diversification, income diversification, and our conservation farming training program—which is designed to introduce improved farming techniques—are intended to mitigate the negative effects that disasters, such as the army worm pest that was declared a national emergency in 2012, do not destroy local livelihoods, and to ensure that households are more resilient in the face of changing rainfall patterns, including drought.

2.2.6 Enhancement of High Conservation Values (G3.6)

Maintaining areas of High Conservation Value is at the core of the aims of the Lower Zambezi REDD+ project. The protection of the miombo woodlands on Rufunsa Conservancy and associated species has been achieved by dramatically ramping up management. There has been a dramatic change in conservation efforts since project start date with regards the employment of professional staff, training of village scouts and improved anti-poaching efforts with numerous poachers arrested and convicted. Furthermore deforestation events have all been halted and there has been only limited incidences of illegal logging.

Important Bird Area

The fire management efforts maintain bird habitat, especially ground nesting and large terrestrial birds. This habitat component has been kept intact since the project start date. Please see section 5.3 below on southern ground hornbill monitoring.

Centre of Endemism

The corridor effect and improved management of the miombo woodlands on Rufunsa Conservancy will ensure that endemic species have a high survival chance.

High conservation value species potentially occurring on the property

The enhanced patrols and improved neighbour relations will lead to a decrease in poaching activities that have significantly impacted on HCV species. Large herds of sable and roan antelope are now seen fairly often indicating an upward trend in the populations. Southern Ground Hornbill are regularly monitored and we now estimate that there are currently a minimum of six family groups living within the project area and one nest site was found in the project zone (Figure 16)

Ecosystem services and other conservation values

The improved management of Rufunsa Conservancy, with the specific aim of maintaining it as a significant biodiversity and ecosystem services asset will ensure that it continues to act as an important catchment of the Zambezi River and act as a migration corridor for HCV and associated species. The improved management of the Conservancy adds valuable contiguous habitat in an ecosystem of global biodiversity significance, in which key resource anchors such as LZNP are under deforestation and encroachment threat.

The use of Community Covenants link project level investments to reductions in poaching. The proposed biodiversity banking scheme has been initiated, but revenue sharing has not been from tourism, but from other income streams. BCP's investment in two community schools includes environmental education that serves to raise awareness amongst children about the threats of poaching. Community engagement and job creation also assists intelligence networks that are effective in obtaining information that can contribute to better patrol deployment, and identification of poaching gangs. Anti-poaching efforts have been ramped up resulting in numerous arrests and removal of snares.

2.2.7 Benefit Permanence (G3.7)

There is a long-term contractual arrangement in place with the owner of Rufunsa Conservancy who, in turn holds a 99-year lease on the property. Furthermore, the project has been carefully planned to become self-sustaining in the long run. BCP anticipates that Rufunsa Conservancy will be able to attract eco-tourists due to its close proximity to Lusaka, although to date tourism visits have been minimal. Our monitoring efforts indicate that wildlife populations are increasing, although the data to date is insufficient to show significant trends.

There are a number of depleted areas in Zambia, yet few projects that aim to innovate products and strategies that are conservation compatible and rehabilitate areas with traditionally low value.

Deforestation mitigation activities, such as the eco-charcoal project and conservation farming initiatives, have been designed from the outset to become self-sustainable. The eco-charcoal project, for example, will be developed through an open and transparent consultative process, and contractual agreements have been put in place with all participants.

These projects are scalable, replicable and sustainable. They build upon existing livelihood activities that are forest incompatible, but improve them, and make them forest compatible. Thus, the chance of success of these projects is higher as BCP does not need to catalyze significant attitude or behaviour changes.

The project aims to ensure that all project activities implemented become self-sustaining. The deforestation mitigation and community development projects in the remainder of the project zone are all designed to become self-sustaining, commercially viable ventures. Some examples of this include the eco-charcoal project, conservation farming and honey production. BCP Trust is an entity which is designed to be able to leverage donor funds which are non-carbon funds. BCP has also promoted the development and support of local institutions, such as Zone Development Committees, which are being trained and empowered to manage projects and community natural resources more effectively on their own. The BCP Trust's long-term aims include community ownership and management of all projects; our ongoing training and capacity building efforts demonstrate this, as well as our significant community presence and heavy reliance on community-based decision-making practices.

2.3 Stakeholder Engagement

2.3.1 Community Consultation (G3.8)

With the permanent presence in the project zone, there is continuous communication with the local community and stakeholders. Appendix B outlines the communication and consultation plan. The plan and strategy was reviewed in 2015 (Appendix B) and the essence of the strategy is that there is open ongoing communication between the project proponent and the community regarding all project activities. No project activity is started before consultation with the local community. The project follows active adaptive management principles (Appendix A) and the overall management plan is reviewed on an ongoing basis.

There are several project activities that have changed or were stopped for various reasons. Projects that were stopped due to challenges were for example the village chicken scheme, the chickens were to prone to disease and was eventually stopped. A similar goat breeding project was also attempted but also did not take off.

2.3.2 Public Comment Period Publicity (G3.9)

All community leaders and government officials have been made aware of the public commenting period and copies of the monitoring report made available at public locations including BCPs local office for comment. All comments will be collected and submitted to the VCS.

2.3.3 Distribution of Project Information (G3.9)

BCP has a full time office within the project zone plus a full staff contingent within the project area. Staff interact with communities on a daily basis. Project results are presented to community members at meetings, particularly meetings where revenue sharing takes place. All the staff on site are local and all meetings are thus held in local languages. Records are kept of all meetings and will be made available to the VVB.

2.3.4 Conflicts and Grievances (G3.10)

The only grievances have bordered around encroachments in the project area and these have been addressed through community meetings and concerned community members, with involvement of the traditional leaders. This took place due to a misunderstanding of the boundary. Resolutions have been made to allocate land outside the project area to encroachers and all have agreed amicably.

2.4 Management Capacity and Best Practices

2.4.1 Required Technical Skills and Expertise (G4.2)

BCP has been running the project for more than five years. In this period the project has had four successful VCS verifications and the CCB validation. There has been staff turnover during this monitoring period. We have, however, ensured there is adequate training of new and existing staff (see section 2.4.2). The organization has all the relevant skills to undertake FPIC, baseline evaluations, greenhouse gas accounting, remote sensing, livelihoods development, forest enumeration, biodiversity monitoring, security work and data management.

We have relied on support from partners for capacity building in beekeeping, conservation farming and biodiversity monitoring.

2.4.2 Worker Training (G4.3)

Scout training

All scouts have undergone specialist tactical training, a multi-day course presented in 2017

Eco charcoal

All eco-charcoal practitioners undergo training on how to harvest sustainably and how to make the more efficient Casamance kiln.

Conservation farming

All participants in the conservation farming project receive training on improved farming techniques such as mulching and composting.

Bee keeping

All beekeepers and mentors receive training from Bee Sweet before embarking on the endeavor.

Biodiversity monitoring

In-house biodiversity monitoring training took place in January 2014. Members of the FMT and scouts were trained in animal identification and the use of Android devices for data capture.

A fixed line transect monitoring system was introduced in 2016 in partnership with Lion Landscapes (<https://www.lionlandscapes.org/>). They developed a grid system across the conservancy with 37 2k line transects that get monitored twice a year for HCV species. The distance sampling technique is used. Lion Landscapes trained members of the FMT and scouts in distance sampling techniques (use of range finders and bearing compass) and animal identification during June 2016. The monitoring is done twice a year and before each event the teams receive in-house refresher training.

Advanced driver training 2014 and 2017

All BCP staff eligible to drive vehicles have received advanced driver training from a recognized driving institute. The first training session took place in 2014 and was presented by Top Gear Driving School. The training included a lecture session which covered defensive driving and risk prevention. It was followed by vehicle inspection procedures, road driving tests and offroad driving. Offroad driving included safe vehicle recovery and four wheel drive systems.

Due to the expansion of BCP a second training course was presented for all eligible drivers by GT Adventure Academy and covered advanced 4x4 driving, particularly in mud, tire care and safe vehicle recovery.

Forest Monitoring

Training done by the Forest Monitoring Team to undertake forest inventory work is described in section 3 below.

FPIC Training

All members of the Community Engagement Team receive training in BCP FPIC protocol to ensure we adhere to the highest standard.

2.4.3 Community Employment Opportunities (G4.4)

BioCarbon Partners is an equal opportunity employer and prides itself in giving people from all walks of life an opportunity for employment. Furthermore, we abide by the relevant Zambian labour laws that prescribe equity.

BCP employs people living within the project zone wherever possible. When jobs cannot be filled from local communities, then the recruitment net is widened up within Lusaka Province (where the project occurs). The entire biomass plot sampling team, several scouts, building and roads maintenance teams, and the Community Coordinators are all local project zone residents. In an area that historically had very few sources of formal employment, BCP's policy of local employment first will likely result in the project becoming a key source of local employments and benefits.

BCP's job application process is straightforward and transparent. When announcing positions, BCP releases a job description that outlines the position, expectations and qualifications that are being sought after. All job descriptions clearly state that BCP is an Equal Opportunity Employer, and that we accept applications from members of all community groups. Job descriptions are physically distributed among communities, and public announcements are made in local languages at community meetings. To apply for a position, candidates are simply expected to submit a CV and cover letter/letter of interest to BCP. In the case of community applicants, BCP allows them to submit less formal lists of qualifications (in the place of a CV), and BCP staff members are instructed to notify relevant BCP managers in the event that an applicant has expressed serious interest but is unable to complete a written application (for example, if they are illiterate). In some cases, BCP will announce a trial day for interested applicants for a more practical position (for example, a field based Scout position): BCP will clearly disseminate information about the place, date and time at which interested applicants are expected to convene, and the hiring process and expectations will be clearly communicated to all interested applicants at that time.

BCP staff members are required to ensure that information about employment opportunities is clearly disseminated to members of all community groups. BCP staff members who are involved in hiring processes are expected to provide equal consideration to all applicants for a position, so long as they meet relevant criteria.

The project employs seven females from the local community including positions such as scouts.

2.4.4 Relevant Laws and Regulations Related to Worker's Rights (G4.5)

Labour and Social Security

There are various legislations that have been enacted to protect the workers in Zambia. Some of these laws are:

The Employment Act (CAP. 268):

Establishes guidelines on employment of an employee in Zambia to be read together with the Minimum Wages and Conditions of Employment (General) Orders. It provides for dismissal of employees and the grievance procedures to be followed as well as basic employment rights relating to leave, working hours, maternity leave, minimum contents to be included in written contracts of service; retirement and redundancy benefits etc.

Minimum Wages and Conditions of Employment Act (CAP. 276) (Statutory Instruments (SI) No. 2 & 3) SI No. 46 of 2012 and the General Order, 2011:

Establishes minimum guidelines for remuneration and conditions of service for employees in Zambia setting out a minimum wage for specific sectors and basic rights and conditions of service.

Industrial and Labour Relations Act (CAP. 269):

Establishes guidelines on employee and employer organisations and on the process of collective bargaining and dispute resolution. It provides for the formation of trade unions and employers representative organisations and recognises the right to strike under specified circumstances. It provides for the settlement of disputes, strikes and lockouts as well as for the use of the Industrial Relations court at which employees can have their grievances and cases heard and determined.

BCP has a professional human resources and administration management team in place in Zambia that is familiar with Zambian labour law and ensures strict compliance to these laws. The project meets or exceeds all applicable laws and regulations covering workers' rights. An example of this compliance is related to minimum wage. In 2012, the GRZ increased base minimum wages by approximately 67%. Rural agricultural land units (such as game ranches) in other parts of Zambia are reported to pay some staff according to lower agricultural "rates". BCP met or exceeded urban minimum wage requirements for project area staff, many of whom are from the local community, in some cases doubling what staff made under previous employers. BCP has also introduced benefits such as staff rations (removing food costs from staff), a benefit which previously was not in place.

Carbon finance will enable the project to build out improved and more comprehensive incentive structures to attract and retain (not to mention, expand the size of the workforce) the best staff.

2.4.5 Occupational Safety Assessment (G4.6)

In the unfortunate case of a crisis, BCP has a reaction plan in place. Additionally, ever since BCP took over management of Rufunsa Conservancy, scout teams have access to transport and communication, as do all other teams. All scouts are equipped with suitable boots and protective uniforms. Scouts have also been issued with strict official rules of engagement procedures to minimize risk and exposure to armed poachers and have undergone training (section 2.4.2).

The implementation of fire management also has safety risks. As in the case of anti-poaching patrols, all controlled burning and firefighting will take place under management of Darlington Chipita. He has received training in forest fire management with the United States Forest Services.

Participants in other activities, such as eco-charcoal and conservation agriculture projects, are not employed by the REDD+ project, but their safety is nonetheless a concern. All participants in the eco-charcoal project are seasoned producers and are aware of the risks of cutting wood, packing kilns and removing charcoal. We will, however, equip association members with safety clothing, gloves and boots, and invest in additional training to ensure safe production practices.

Prior to participating in any company supported activity, the company requires participants to openly discuss any potential risks involved in the activity. Staff members are also expected to communicate any potential risks involved in the activity, and to provide participants with any necessary Personal Protective Equipment (PPE), such as work gloves or safety boots. Participants in BCP-supported projects are explicitly instructed not to take unnecessary risks with their personal safety. BCP staff members are expected to provide regular oversight of project activities, and they are required to communicate any concerns about safety to BCP's management team.

Vehicle accidents are a risk to worker safety. Risks will be minimized through maintaining a high standard of vehicle maintenance, and ensuring that drivers are current, well-trained and adequately monitored. BCP drivers sign onto a comprehensive vehicle policy (Copy to be made available to VVB upon request) which strictly outlines company vehicle policy, intoxicants, limits of geographical use, speed limits set internally and an un-authorized passenger policy. Most of our vehicles are tracked which aides in monitoring unsafe driving and abuse.

In spite of the inherent risks of vehicle accidents in Zambia and on rural dirt roads, BCP is confident that we have taken as many measures as possible to reduce this risk. Organizational management, Project-level management, partners, and our F&A team responded immediately to a life-threatening situation which resulted in the employee being checked out of a government hospital and checked into a private hospital (at company expense). The employee received professional healthcare and was fit for work a month after being discharged.

The Human Resources Manual contains a section concerning Occupational Health and Safety. Since all new employees receive an induction that includes HR orientation, it is expected that all BCP employees will be aware of their rights and responsibilities insofar as promoting workplace safety is concerned. We will, however, equip association members with safety clothing, gloves and boots, and invest in additional training to ensure safe production practices.

The Ndubulula Eco-Charcoal Association has been equipped already with the following safety equipment:

1. Safety boots;
1. Protective full-length work uniforms;
2. Full length leather protective gloves;
3. Face masks.

The Field Plot Team has been issued with the following safety equipment:

2. Work boots;
3. Protective full-length work uniforms;
4. Reflective safety vests;
5. ID Cards to reduce risks when encountering armed anti-poaching patrols or poaching gangs;
6. Communications equipment;
7. Modern mosquito proof tents;
8. First aid kit.

Forest scouts have been issued the following safety equipment:

1. Work boots;
2. Protective full-length work uniforms;
3. Cold weather and rain gear (clothing and sleeping bags);
4. Mosquito proof tents;
5. First aid kit;
6. Communications equipment (VHF radios);
7. GPS Navigation equipment;
8. Headgear.
9. Military style rucksacks designed to carry loads safely.

2.4.6 Financial Health of Implementing Organization(s) (G4.7)

Financial health is discussed in the non-permanence risk report (Appendix I). Project breakeven point is between four and seven years from the current monitoring period.

2.5 Legal Status and Property Rights

2.5.1 National and Local Laws (G5.1)

Environmental Management Act No. 12 of 2011

This Act was passed in the year 2011 and is the Principal Act governing and regulating environmental issues in Zambia. The Act provides for the establishment of the Zambia Environment Management Agency (ZEMA) whose main functions constitutes the protection of the environment and control of pollution in particular so as to provide for the health and welfare of persons, animals, plants and the environment in general.

The Act conforms with the philosophies set out in the Rio and Stockholm Declarations i.e. precautionary principles, polluter-pays principles and transparency and dissemination of information to the general public and public participation (the Act states that the public has the right to participate in decisions concerning the formulation of environmental policies, strategies and plans and to participate in the preparation of laws and regulations on the environment). It states that the Minister shall strive to attain the conservation of biological diversity and fair and equitable sharing of the benefits arising from utilisation of biological diversity. The Government commits itself to cooperating with other governments and local and international organisations in order to protect the regional and global environment. The Agency has various obligations which include *inter alia* conducting surveys on the state of the environment and researching and forecasting environmental changes and undertaking other studies which might contribute to the formulation of policies and preparation of action plans and strategies. In addition, the Agency shall create and maintain an environmental information registry and an environmental fund. The Act provides that forestry resources will be managed in accordance with the Forests Act.

Note SI No. 28 of 1997 relating to the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997 which sets out in which circumstances an EIA or a Project Brief will be required and how these are to be conducted.

The Zambian Environmental Management Agency has no objection against the implementation of the Lower Zambezi REDD+ Project and has exempted it from any EIAs (Appendix F).

Mines and Minerals Development Act (No. 7 of 2008)

The legal framework for mining and mineral resources development in Zambia is the Mines and Minerals Act of 2008. The Act stipulates regulations in acquiring prospecting licenses and mining and mineral rights.

The Act provides for the Director of Mines to give consideration to the need to conserve and protect the air, water, soil, flora, fauna, fish, fisheries and scenic attractions and features of cultural, architectural, archaeological, historical or geological interests when deciding whether or not to grant any mining right. In the event that a mining right is granted it shall be granted under such conditions as may be prescribed by the Minister in relation to the conservation and protection of air, water, soil, flora, fauna, fish, fisheries and scenic attractions and features of cultural, architectural, archaeological, historical or geological interests. The Act provides for the creation of an Environmental Protection Fund. It further provides that a holder of a license shall be strictly liable for any harm or damage caused by mining operations and shall compensate any person to whom the harm or damage is caused. Where damage is caused to the environment or biological diversity, compensation shall include the cost of reinstatement, rehabilitation or clean-up measures which are incurred and where applicable the costs of preventative measures.

Note too that any person, group of persons or any private or state organisation may bring a claim and seek redress in respect of a breach or threatened breach of any provision relating to damage to the environment, biological diversity.

Note that a holder of a licence who requires the exclusive or other use of the whole or any portion of the prospecting or mining area for the purpose of the licence, in accordance with the laws relating to such acquisition, may acquire a lease or other right to use the same upon such terms as may be agreed between the holder and owner/ occupier of the land. A holder of a licence shall on demand made by the owner or lawful occupier of the any land subject to a mining right, promptly pay the owner fair and reasonable compensation for any damage done to the surface of the land by the operations. Where compensation is not paid or the owner of the land is dissatisfied with the compensation offered, the dispute shall be determined by arbitration.

It also deals with environmental issues pertaining to prospecting and mining. Reference is made to the Statutory Instrument No. 29 of 1997, a subsidiary legislation of the 2008 Mines and Minerals Act that specifically addresses environmental issues.

The act is relevant to the project due to that activities related to large scale mining will take place within the license area. The act provides for regulations concerning environmental protection during construction, operation and closure of mine sites.

This law is applicable to the project as there are prospecting licenses that overlap part of Rufunsa Conservancy (Appendix G).

Zambia Wildlife Act 2015

The Act provides a legal framework for the Zambia Wildlife Authority to establish, control and manage National Parks, conserve and protect wildlife and objects of interest in National Parks, establish Game Management Areas, licensing of hunting, control of possession of trophies and to control bush fires.

Water Resources Management Act

The Act came into force in 2011 and repealed the Water Act of 1949 and provides for the control, ownership and use of water. The Act defines the functions and powers; provide for the management, development, conservation, protection and prevention of pollution of water resources and its ecosystem. It provides for the issuance of water licences and permits and rules relating to the construction of dams on existing rivers. In addition it provides for a right of easement over land under specified circumstances, which shall include the right of access to any piece of land contiguous to the water which is the subject of a permit. Note there is a difference between public and private water.

Forests Act, 2015

BCP has been instrumental in the operationalisation of the Forest Act 2015 by developing guidelines that secure statutory rights like the Forest Carbon Stock Management guidelines and also the Community Forest Management Statutory Instrument. these will guide and secure statutory rights. The act allows for the establishment of forest carbon projects and harvesting of timber and non-timber forest products.

Zambia Tourism and Hospitality Act No. 24 of 2007

Enacted in 2007, the Act provides for the control of tourism enterprises. The Act, though making no direct reference to environmental protection, does provide for appeals against authorization of tourism projects which are deemed to negatively affect Zambian tourism.

National Heritage Conservation Commission Act No. 23 of 1989

Enacted in 1989, the Act provides for the conservation of ancient, cultural and natural heritage, relics and other objects of aesthetic, historical, pre-historical, archaeological or scientific interest.

Labour and Social Security

There are various legislations that have been enacted to protect the workers in Zambia. Some of these laws are:

The Employment Act (CAP. 268):

Establishes guidelines on employment of an employee in Zambia to be read together with the Minimum Wages and Conditions of Employment (General) Orders. It provides for dismissal of employees and the grievance procedures to be followed as well as basic employment rights relating to leave, working hours, maternity leave, minimum contents to be included in written contracts of service; retirement and redundancy benefits etc.

Minimum Wages and Conditions of Employment Act (CAP. 276) (Statutory Instruments (SI) No. 2 & 3) SI No. 46 of 2012 and the General Order, 2011:

Establishes minimum guidelines for remuneration and conditions of service for employees in Zambia setting out a minimum wage for specific sectors and basic rights and conditions of service.

Industrial and Labour Relations Act (CAP. 269):

Establishes guidelines on employee and employer organisations and on the process of collective bargaining and dispute resolution. It provides for the formation of trade unions and employers representative organisations and recognises the right to strike under specified circumstances. It provides for the settlement of disputes, strikes and lockouts as well as for the use of the Industrial Relations court at which employees can have their grievances and cases heard and determined.

The Land Acquisition Act, Chapter 189 of the Laws of Zambia

The Act makes provision for the compulsory acquisition of land. The President can compulsorily acquire land where he is of the opinion that it is desirable or expedient in the interest of the Republic to do so subject to various obligations which include *inter alia* the requirement to give notice of intention to acquire property and the payment of compensation. Adequate compensations shall be paid and any disputes shall be determined by the courts.

The Lands Act, Chapter 184 of the Laws of Zambia

This Act provides for the continuation of leasehold tenure and the continued vesting of land in the President and the statutory recognition and continuation of customary tenure and it provides for the conversion of customary tenure to leasehold tenure. The Act also provides that a person shall not without lawful authority, continue to occupy vacant land and any person who does shall be evicted. Note that customary land existed in Zambia before the advent of colonialism – under the unwritten indigenous law of tribes. Customary law can be resorted to in the settlement of disputes involving members of tribes and is vital in the settlement of land disputes that may arise in respect of land held under customary tenure.

The project will fully comply with these aforementioned laws.

2.5.2 Free, Prior and Informed Consent (G5.3)

The Lower Zambezi REDD+ Project is taking place on private property—Rufunsa Conservancy—with the full consent of the owner. There is a legally binding “Carbon Rights Covenant” between the landowners and BCP (Appendix D). This easement agreement transfers the carbon and conservation rights of the project area to BCP. Given the additional history of this land unit, and as the landowner is a key beneficiary of this project, it is highly unlikely that this easement agreement will be challenged by the landowners. All necessary documentation regarding the landowners free, prior and informed consent for the project to take place on the project area is in place and will be provided to the Validator.

The Lands and Deeds Act, Cap 185 of the Laws of Zambia does permit the registration of easements over land. In particular, Section 50 of the Lands and Deeds Act generally provides that whenever any easement in or over land comprised in a provisional certificate or certificate of title is created, for the purpose of being annexed to, or used and enjoyed together with other land, the Registrar shall enter a memorial of the instrument creating such easement upon such Provisional Certificate or Certificate of Title and such memorial shall as from the date of entry thereof have the effect of including such easement in such provisions certificate or Certificate of Title of such other land as appurtenant to the land therein described.

Although the project area is on privately titled land, the project team went an extra step and in the course of six months prior to any agreement being signed, sought consent from communities in the project zone to implement a REDD+ project on Rufunsa Conservancy. This was not a necessary step, but as the project zone is on adjacent communal land where activities would be implemented, and community support for the project is central to its sustainability, we felt that this was an important step. The overwhelming response from community members for a REDD+ project being implemented on Rufunsa Conservancy was positive approval.

In addition, all project activities taking place within the Project Zone are similarly proceeding with the full consent of all local residents, in line with the principle of obtaining Free, Prior and Informed Consent (FPIC) from community stakeholders.

The project is not being conducted on government land, and will not encroach uninvited on government property.

Section 2.3.1 provides a very detailed overview of the project FPIC process, and more information is available in the Standard Operating Procedures concerning FPIC and Community Engagement, both of which will be made available to the Validator. We have pursued a robust community sensitization and consultation process (Section 2.3.1), which has resulted in sensitization of the majority of households living within the project zone. We have also received approval (consent) from the majority of these households, as the table 15 and 16 below demonstrate. This consent was received prior to the implementation of REDD+ project activities, and has continued even after BCP began project implementation. In fact, between October 2012 and January 2013, our community approval rate has jumped from 92% to 95%. BCP believes this increase in approval can be linked to the numerous community projects that were launched during this time, including: a borehole refurbishment project, school support program and the pilot phase of the Sustainable Eco-Charcoal Project and Conservation Farming Training Program. During this time, BCP's community presence has grown and deepened, as we hired additional members from local communities and based additional staff members in village locations.

In addition to BCP's formal community sensitization and consultation efforts, community-based CET members are able to respond to local concerns or requests for more information. By strengthening our community ties, BCP is able to provide further sensitization and to solicit additional feedback from local communities, contributing to our community consultation and approval-seeking efforts.

Table 1 provides a summary of all official community sensitization meetings that have been held within the project zone to date. All meeting "minutes" (records) provide a detailed overview of the project FPIC process, and Table 16 includes a summary of attendance and approval rates from all the community meetings that have been held within the project zone to date. All meeting minutes have been counter-signed by community attendees at the meetings and will be made available to the Validator.

Table 1. Date and location of Lower Zambezi REDD+ Project FPIC meetings.

Meeting	Date	Meeting Type (Zone/Village)	Village
1	23-Feb-12	Zone	Mweenshan'gombe
2	14-Mar-12	Zone	Chilimba
3	21-Mar-12	Zone	Chilimba
4	22-Mar-12	Zone	Mweenshan'gombe
5	11-May-12	Zone	Namanongo
6	11-May-12	Zone	Ndubulula
7	29-Jun-12	Zone	Mweenshan'gombe
8	4-Jul-12	Zone	Ndubulula
9	5-Jul-12	Zone	Namanongo
10	11-Jul-12	Zone	Chilimba
11	22-Jul-12	Zone	Ndubulula
12	3-Aug-12	Village	Mulimba
13	9-Aug-12	Village	Kanyetu
14	12-Aug-12	Village	Chuundu
15	24-Aug-12	Village	Chikuse
16	24-Aug-12	Village	Shimaluba
17	13-Sep-12	Village	Nyamakau
18	17-Sep-12	Zone	Mweenshan'gombe
19	18-Sep-12	Village	Chikoloma
20	24-Sep-12	Village	Malilakufa/Mweenshan'gombe
21	3-Oct-12	Zone	Mweenshan'gombe
22	4-Oct-12	Zone	Mweenshan'gombe
23	19-Nov-12	Village	Musanshika
24	19-Nov-12	Village	Shatunka
25	20-Nov-12	Village	Kabandi
26	26-Nov-12	Village	Sunta
27	3-Dec-12	Village	Mwachombela
28	4-Dec-12	Village	Chifita
29	5-Dec-12	Village	Mulilwa

30	6-Dec-12	Village	Kasumba
31	10-Dec-12	Village	Mulimba
32	10-Dec-12	Village	Mwalilanda
33	17-Jan-13	Village	Muyobe

Table 2 provides a summary of the participants in community meetings that BCP has held, including 18 meetings that were held outside of the project zone before the zone boundaries were finalised. It should be noted that this table documents total attendance at meetings, but does not account for double counting, which our overall sensitization statistics have accounted for. As such, this table documents 2,110 participants in meetings, although BCP calculates that 1,160 heads-of-household have been sensitized in total (the discrepancy in numbers can be explained by certain participants who have attended multiple community meetings).

BCP representatives take a voluntary vote at the end of each meeting. This allows us to calculate the overall approval rate among community stakeholders for our project activities. In the project zone, 95% of meeting attendants consented to the Lower Zambezi REDD+ Project occurring on Rufunsa Conservancy. Interestingly there were no objections from outside of the project zone, indicating that there is no perceived threat from the project. These approval votes were taken in large part before the project started and approval rates are increasing as the project activities are implemented. The 3% who disapproved of the project cited concerns such as village charcoal production would be stopped. The eco-charcoal project has helped to illustrate that the project encourages sustainable, value added charcoal production. The remaining percentage was people who did not know and opted not to vote for or against the project. Based on the project's investment of resources into thorough community engagement and mitigation projects, individual Headmen along have indicated an interest to include community forest within the project under REDD+. This would increase the benefit flow to communities, as they own the forest, while setting a strong precedent in Zambia for communities to positively engage in REDD+ on communal land.

Table 2. Summary of FPIC meeting attendance and support for the Lower Zambezi REDD+ Project.

Parameter	Activity	Inside Project	Outside Project	Total
Attendance	Meetings Held	34	18	52
	Males	758	686	1,444
	Females	336	330	666
	Total Attendance	1,094	1,016	2,110
Votes	Yes Votes	558	111	669
	No Votes	22	0	22
	Unknown Votes	10	0	10
	Total Votes	590	111	701
Consent to	Approval Rate	95%	100%	95%
REDD+	Disapproval Rate	4%	0%	3%
	Unknown Rate	2%	0%	1%

In light of the widespread sensitization efforts and our comprehensive community REDD+ training curriculum (as described in Section 2.4.2), we strongly believe that our social data demonstrate our ongoing compliance with the principles of FPIC.

Minutes from the meetings we have held (which will be made available to the VVB) clearly document that BCP has fully described the purpose and potential implications of REDD+-related activities to local community stakeholders, in ways that are accessible and appropriate for all community members.

This includes: presenting information in local languages seeking to include members of under-represented groups in sensitization efforts and following up with villages and households that have not yet attended the community meetings. The content of the Standard Operating Procedures (Appendix B) has been presented to local communities in locally appropriate formats such as participatory meetings where feedback was solicited and received. Community Engagement Team members have organized meetings in which the content and implications of company procedures, policies and projects has been explained and discussed in local languages, so as to include illiterate members of the community. Community stakeholders are regularly given the opportunity to provide feedback to BCP, and they have been informed of our grievance mechanism which is always available to them in the event that they have serious concerns.

2.5.3 Property Rights Protection (G5.4)

No involuntary relocations have taken place. The PDD describes encroachments that took place on the conservancy due to confusion of the location of the boundary (Section 1.6 and 5.4). None of the people were involuntarily removed and given the option to stay. Subsequently there have been other minor encroachment incidents in remote parts of the conservancy (described in previous VCS monitoring report submissions) and the households agreed to relocate voluntarily after they were allocated other land in the project zone.

There was one case of a farmer (Josam Chiyakamba) whose farm was inside the project area and was allowed to stay on the condition that deforestation activities should not be conducted. However, he could not manage live by the condition and voluntarily decided to shift to project zone. The land owner was involved and he compensated the farmer and help him with transportation of his properties to the project zone

2.5.4 Identification of Illegal Activity (G5.5)

The following illegal activities have or are taking place in the project zone:

- Charcoal production without permits – BCP has initiated the eco-charcoal project to bring illegal charcoalers into a legal charcoal production program
- Illegal logging in the project area – described in detail in previous VCS monitoring reports and section 3. There has been illegal timber harvesting in the conservancy and it is mitigated through active patrolling. Perpetrators have been apprehended in the past but not convicted.
- Poaching of wildlife – Curtailed through active security patrolling, several perpetrators have been apprehended and convicted (see section 5).

No project benefits are derived from illegal activities.

3 CLIMATE

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation

Data / Parameter	α
Data unit	unitless
Description	Combined effects of β and θ at the start of the historic reference period
Source of data	Reference area and historic reference period
Value applied:	0.5791768
Justification of choice of data or description of measurement methods and procedures applied	Time and place in which the logistic model is fit. BioCarbon Partners Carbon Accounting department. Analysis undertaken in 2013.
Purpose of Data	Calculation of baseline emissions
Comments	α is one of the results of applying the cumulative deforestation model but is not used in baseline type U3 as it is replaced with r_u

Data / Parameter	β
Data unit	unitless
Description	Effect of time on the cumulative proportion of deforestation over time
Source of data	Reference area and historic reference period
Value applied:	0.000365

Justification of choice of data or description of measurement methods and procedures applied	Time and place in which the logistic model is fit. BioCarbon Partners Carbon Accounting department. Analysis undertaken in 2013.
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	

Data / Parameter	γ
Data unit	Days
Description	Time shift from beginning of historic reference period to project start date
Source of data	Historic reference period
Value applied:	10957
Justification of choice of data or description of measurement methods and procedures applied	Time and place in which the logistic model is fit. BioCarbon Partners Carbon Accounting department. Analysis undertaken in 2013.
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	

Data / Parameter	λ_{soc}
Data unit	proportion (unitless)
Description	Exponential soil carbon decay parameter
Source of data	VCS AFOLU default for tropical regions
Value applied:	0.2
Justification of choice of data or description of measurement methods and procedures applied	Conservative default based on IPCC value.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	$\hat{\sigma}_{EM}$
Data unit	standard deviation (unitless)
Description	The estimated standard deviation of the state observations used to fit the logistic function
Source of data	Remote sensing image interpretation
Value applied:	0.455

Justification of choice of data or description of measurement methods and procedures applied	Time and place in which the logistic model is fit. BioCarbon Partners Carbon Accounting department. Analysis undertaken in 2013.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	<i>B</i>
Data unit	Set
Description	The set of all selected carbon pools in biomass. Is a subset of <i>C</i>
Source of data	PD
Value applied:	2
Justification of choice of data or description of measurement methods and procedures applied	The project accounts for AGOT and BGOT. All other biomass pools are conservatively excluded and were found to be insignificant. AGMT and BGMT pools are not applicable to the project as there are no commercially valuable timber trees that occur in the accounting area.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	<i>C</i>
Data unit	Set
Description	The set of all selected carbon pools
Source of data	Monitoring records
Value applied:	3
Justification of choice of data or description of measurement methods and procedures applied	The project accounts for AGOT, BGOT and SOC. All other pools are optional, were found to be insignificant and have been conservatively excluded.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	<i>J</i>
Data unit	Set
Description	The set of all observations of deforestation. When superscripted with a monitoring period, the deforestation observations are taken for leakage analysis.
Source of data	Remote sensing image interpretation or field observations in the reference area.
Value applied:	15600

Justification of choice of data or description of measurement methods and procedures applied	VM0009 V2.1 section 6.6 onwards. The number of observations of forest state in the reference area and minimum sample size calculated using equation F.12. Originally quantified as 3120 but some points removed due to complications with forest state interpretation or non-forest at start of historic reference period.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	$\mathcal{M}$
Data unit	Set
Description	The set of all monitoring periods
Source of data	Monitoring records
Value applied:	27
Justification of choice of data or description of measurement methods and procedures applied	There will be 27 monitoring events over the project crediting period of 30 years. The project proponent has decided on annual monitoring following
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	A_{PAA}
Data unit	ha
Description	Area of Project Accounting Area
Source of data	GIS analysis prior to sampling
Value applied:	33338
Justification of choice of data or description of measurement methods and procedures applied	See GIS data in Appendix J. BioCarbon Partners, Carbon Accounting Department. Data used to generate this value include the title deed, GIS layers, several tiles from the ASTER Global Digital Elevation Model, Land cover classification undertaken using Landsat imagery - 2013 - Appendix J
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	A_{PX}
Data unit	ha
Description	Area of proxy area
Source of data	GIS analysis and participatory rural appraisal prior to sampling
Value applied:	42794

Justification of choice of data or description of measurement methods and procedures applied	GIS layers and expert knowledge - BioCarbon Partners Carbon Accounting department - 2013 - Appendix J
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	A_{AS}
Data unit	ha
Description	Area of activity-shifting leakage area
Source of data	GIS analysis
Value applied:	27805
Justification of choice of data or description of measurement methods and procedures applied	GIS layers and expert knowledge - BioCarbon Partners Carbon Accounting department - 2013 - Appendix J. Fulfils criteria stipulated in VM0009.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	n_d
Data unit	Set
Description	Number of spatial points in the reference area
Source of data	Remote sensing image interpretation
Value applied:	2600
Justification of choice of data or description of measurement methods and procedures applied	Number of points defined as per the methodology VM0009 to adequately quantify forest state in the reference area - BioCarbon Partners Carbon Accounting department - 2013 - Appendix J
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	o_i
Data unit	Binary
Description	State observation for the i^{th} sample point in the reference area
Source of data	Cumulative Deforestation Model - BioCarbon Partners Carbon Accounting Department - 2013 - Appendix J
Value applied:	0 or 1

Justification of choice of data or description of measurement methods and procedures applied	Data collected as per the methodology.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	p_{LME}
Data unit	Proportion (unitless)
Description	Portion of leakage related to market effects
Source of data	Leakage monitoring data - See Appendix E and Appendix H
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied	Market effect and activity shifting leakage are the same as the same agents are clearing forest for commodities and for agricultural purposes. They are not separate entities as is often the case in planned deforestation scenarios.
Purpose of Data	Calculation of leakage
Comments	

Data / Parameter	q
Data unit	Days
Description	Lag between start of degradation and deforestation
Source of data	Consultation with local agents of deforestation – 28 farmers were questioned to determine how long they usually wait after clearing an area before ploughing it.
Value applied:	620
Justification of choice of data or description of measurement methods and procedures applied	Based on observations in the reference area, hence applicable to the project area.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	r_{RS}
Data unit	Unitless
Description	Expansion factor for above-ground biomass to below-ground biomass (root/shoot ratio)

Source of data	Chidumayo, E. N. 2013. Forest degradation and recovery in a miombo woodland landscape in Zambia: 22 years of observations on permanent sample plots. Forest Ecology and Management 291:154-161.
Value applied:	0.54
Justification of choice of data or description of measurement methods and procedures applied	The root-shoot ratio was determined within a study site that overlaps the project reference area
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	r_D
Data unit	Unitless
Description	Onset proportion of deforestation immediately adjacent to project area
Source of data	GIS analysis and image interpretation
Value applied:	0.126
Justification of choice of data or description of measurement methods and procedures applied	Positions the baseline emissions models relative to the instantaneous rate of deforestation. Measurement was undertaken using GIS analyses described elsewhere in the document. BCP Carbon Accounting Department - 2013 - Appendix J
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	t
Data unit	Days
Description	Time since project start date
Source of data	Calendar
Value applied:	1461
Justification of choice of data or description of measurement methods and procedures applied	Project start date is 1 October 2009 and first monitoring period ended 1 October 2013.
Purpose of Data	Calculation of project emissions
Comments	

Data / Parameter	t_i
Data unit	Days
Description	The point in time of the observation made at point i

Source of data	Remote sensing image interpretation
Value applied:	1 - 9072
Justification of choice of data or description of measurement methods and procedures applied	The historic reference period stretches from 1984 to 2009, the exact dates of the first and last images are 1984-06-29 and 2009-05-01, the time span is thus 9072 days in total.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	t_{PL}
Data unit	Days
Description	Length of project crediting period
Source of data	Project Document
Value applied:	10957
Justification of choice of data or description of measurement methods and procedures applied	The project crediting period stretches from 1 October 2009 to 1 October 2039. This complies with the minimum project lifespan of AFOLU projects as stipulated by the VCS.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	w_i
Data unit	Unitless
Description	weight applied to the i^{th} sample point in the reference area
Source of data	Remote sensing image interpretation based on six time steps in the historic reference period which is related to availability of suitable imagery.
Value applied:	0.0000641
Justification of choice of data or description of measurement methods and procedures applied	GIS layers and expert knowledge - BioCarbon Partners Carbon Accounting department - 2013 - Appendix J. Quantified using equation A.6 of VM0009 V2.1
Purpose of Data	Calculation of baseline emissions
Comments	

3.1.2 Data and Parameters Monitored

MR.78 List of parameters, their values and the time last measured.

Data / Parameter	$A_{P1}^{[m=0]}$
Data unit	ha
Description	Area of project accounting area stratum 1 prior to first verification event
Source of data	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied	Supervised land cover classification employing the Support Vector Machine algorithm (Landsat 5 TM Image). Classification accuracy was 76.84% with a kappa value of 0.745
Frequency of monitoring/recording	First monitoring period / 10 years
Value monitored:	27322
Monitoring equipment	Landsat TM satellite
QA/QC procedures to be applied	Classification accuracy using training and validation data. Classification error matrix
Purpose of data	Calculation of baseline emissions
Calculation method	$K = \frac{N \sum_{i=1}^r x_{ii} - \sum_{i=1}^r (x_{i+} * x_{+i})}{N^2 - \sum_{i=1}^r (x_{i+} * x_{+i})}$ Quantification of the Kappa statistic to determine that classification is non-random.
Comments	The statistic adjusts overall accuracy to account for chance agreement

Data / Parameter	$A_{P2}^{[m=0]}$
Data unit	ha
Description	Area of project accounting area stratum 2 prior to first verification event
Source of data	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied	Supervised land cover classification employing the Support Vector Machine algorithm (Landsat 5 TM Image). Classification accuracy was 76.84% with a kappa value of 0.745
Frequency of monitoring/recording	First monitoring period / 10 years
Value monitored:	6016
Monitoring equipment	Landsat TM satellite
QA/QC procedures to be applied	Classification accuracy using training and validation data. Classification error matrix

Purpose of data	Calculation of baseline emissions
Calculation method	$K = \frac{N \sum_{i=1}^r x_{ij} - \sum_{i=1}^r (x_{i+} * x_{+i})}{N^2 - \sum_{i=1}^r (x_{i+} * x_{+i})}$
Comments	The statistic adjusts overall accuracy to account for chance agreement

Data / Parameter	$C_B^{[m]}$
Data unit	tCO2e/ha
Description	Baseline carbon stocks at the end of the current monitoring period
Source of data	Proxy area sampling
Description of measurement methods and procedures to be applied	Proxy area sampling as per the protocol Appendix G.
Frequency of monitoring/recording	20% of plots measured annually. Entire inventory revised for this monitoring period
Value monitored:	6.7
Monitoring equipment	See Appendix G. Standard vegetation quantification equipment.
QA/QC procedures to be applied	See Appendix G and description in monitoring report.
Purpose of data	Calculation of baseline emissions
Calculation method	Using standard vegetation ecology plot sampling techniques and subsequent quantification of biomass using allometric equations.
Comments	Parameter corrected following materiality error

Data / Parameter	$C_{B\ BGB}^{[m]}$
Data unit	tCO2e
Description	Carbon not decayed in BGB at the end of the current monitoring period
Source of data	Default equation F.10 VM0009 applied to AGB.
Description of measurement methods	Ongoing forest monitoring as per Appendix G

and procedures to be applied	
Frequency of monitoring/recording	Based on peer reviewed literature and prescribed equation in VM0009
Value monitored:	153
Monitoring equipment	See Appendix G
QA/QC procedures to be applied	See Appendix G
Purpose of data	Calculation of baseline emissions
Calculation method	Applied equation F.10 in VM0009 V2.1
Comments	The project proponent has suggested a correction to equation F.10

Data / Parameter	$C_{B\ SOC}^{[m]}$
Data unit	tCO ₂ e
Description	Carbon not decayed in SOC at the end of the current monitoring period
Source of data	Default equation F.7 VM0009 applied to SOC quantified in the project accounting area and proxy area.
Description of measurement methods and procedures to be applied	Proxy area sampling as per the protocol in Appendix G and application of equation F.7, VM0009 V2.1
Frequency of monitoring/recording	Fixed once off sampling, not repeated as per VM0009
Value monitored:	34896
Monitoring equipment	See Appendix G standard soil sampling procedures and equipment.
QA/QC procedures to be applied	See Appendix G. The soils were analysed at a reputable laboratory – The Institute of Soil, Water and Climate in South Africa.
Purpose of data	Calculation of baseline emissions
Calculation method	Application of equation F.7 Vm0009 V2.1 using SOC values from the project accounting area and proxy area.

Comments	
Data / Parameter	$c_{Bb}^{[m]}$
Data unit	tCO2e/ha
Description	Baseline scenario average carbon stock in selected carbon pools
Source of data	Proxy area sampling
Description of measurement methods and procedures to be applied	Proxy area sampling as per the protocol in Appendix G
Frequency of monitoring/recording	Inventory revised this monitoring period.
Value monitored:	6.7
Monitoring equipment	See Appendix G
QA/QC procedures to be applied	Review of monitoring records and re-sampling of 20% of plots
Purpose of data	Calculation of baseline emissions
Calculation method	Using standard vegetation ecology plot sampling techniques and subsequent quantification of biomass using allometric equations.
Comments	Adjusted following materiality error

Data / Parameter	$c_{B BM}^{[m]}$
Data unit	tCO2e/ha
Description	Baseline carbon stocks in biomass at the end of the current monitoring period
Source of data	Proxy area sampling
Description of measurement methods and procedures to be applied	Proxy area sampling as per the protocol in Appendix G
Frequency of monitoring/recording	At first verification and baseline revision
Value monitored:	6.7
Monitoring equipment	See Appendix G.
QA/QC procedures to be applied	Review of monitoring records as described in Appendix G and re-sampling of 20% of plots

Purpose of data	Calculation of baseline emissions
Calculation method	Using standard vegetation ecology plot sampling techniques and subsequent quantification of biomass using allometric equations. Averages calculated as per equation B.9 VM0009 V2.1
Comments	

Data / Parameter	$c_{B SOC}^{[m]}$
Data unit	tCO ₂ e/ha
Description	Baseline soil carbon stocks at the end of the current monitoring period
Source of data	Proxy area sampling
Description of measurement methods and procedures to be applied	Proxy area sampling as per the protocol in Appendix G
Frequency of monitoring/recording	Once off measurement as per VM0009 V2.1
Value monitored:	131.7
Monitoring equipment	See Appendix G, standard soil sampling equipment
QA/QC procedures to be applied	Review of monitoring records at next baseline re-evaluation
Purpose of data	Calculation of baseline emissions
Calculation method	Quantification of SOC done according to Annex B, VM0009
Comments	

Data / Parameter	$c_P^{[m]}$
Data unit	tCO ₂ e/ha
Description	Project carbon stocks at the end of the current monitoring period
Source of data	Project accounting area sampling
Description of measurement methods and procedures to be applied	Appendix G describes the plot based monitoring procedure.

Frequency of monitoring/recording	20% of plots monitored annually. Inventory revised during this monitoring period.
Value monitored:	180.1 Dense Tree Stratum, 166.7 Light Tree Stratum
Monitoring equipment	See Appendix G, standard vegetation sampling equipment
QA/QC procedures to be applied	Review of monitoring records, see Appendix E.
Purpose of data	Calculation of baseline emissions
Calculation method	Standard plot sampling techniques to quantify vegetation and application of allometric equations. Averages calculated using equation B.9 VM0009 V2.1.
Comments	

Data / Parameter	$c_p^{[m-1]}$
Data unit	tCO ₂ e/ha
Description	Project carbon stocks at the beginning of the current monitoring period
Source of data	Project accounting area sampling
Description of measurement methods and procedures to be applied	See Appendix G, standard vegetation sampling equipment.
Frequency of monitoring/recording	20% of plots monitored annually. Inventory revised this monitoring period.
Value monitored:	180.1 Dense Tree Stratum, 166.7 Light Tree Stratum
Monitoring equipment	Review of monitoring records, see Appendix E.
QA/QC procedures to be applied	Review of monitoring records, re-sampling of 20% of plots
Purpose of data	Calculation of baseline emissions
Calculation method	Standard plot sampling techniques to quantify vegetation and application of allometric equations. Averages calculated using equation B.9 VM0009 V2.1.
Comments	

Data / Parameter	$c_p^{[m=0]}$
Data unit	tCO ₂ e/ha

Description	Project carbon stocks prior to first verification event
Source of data	Project accounting area sampling
Description of measurement methods and procedures to be applied	Appendix G describes the plot based monitoring procedure.
Frequency of monitoring/recording	20% of plots monitored annually.
Value monitored:	233.8 Dense Tree Stratum, 225.0 Light Tree Stratum
Monitoring equipment	See Appendix G, standard vegetation sampling equipment
QA/QC procedures to be applied	Review of monitoring records, see Appendix E.
Purpose of data	Calculation of baseline emissions
Calculation method	Standard plot sampling techniques to quantify vegetation and application of allometric equations. Averages calculated using equation B.9 VM0009 V2.1.
Comments	Adjusted due to measurement error

Data / Parameter	$C_{P1BM}^{[m=0]}$
Data unit	tCO ₂ e/ha
Description	Project carbon stocks in biomass in stratum 1 prior to first verification event
Source of data	Project accounting area sampling
Description of measurement methods and procedures to be applied	Appendix G describes the plot based monitoring procedure.
Frequency of monitoring/recording	20% of all plots sampled annually
Value monitored:	225.0
Monitoring equipment	See Appendix G, standard vegetation sampling equipment
QA/QC procedures to be applied	Review of monitoring records, see Annex C.

Purpose of data	Calculation of baseline emissions
Calculation method	Standard plot sampling techniques to quantify vegetation and application of allometric equations. Averages calculated using equation B.9 VM0009 V2.1.
Comments	

Data / Parameter	$C_{P\ 2\ BM}^{[m=0]}$
Data unit	tCO ₂ e/ha
Description	Project carbon stocks in biomass in stratum 2 prior to first verification event
Source of data	Project accounting area sampling
Description of measurement methods and procedures to be applied	Appendix G describes the plot based monitoring procedure.
Frequency of monitoring/recording	20% of all plots sampled annually
Value monitored:	233.8
Monitoring equipment	See Appendix G, standard vegetation sampling equipment
QA/QC procedures to be applied	Review of monitoring records, see Appendix E.
Purpose of data	Calculation of baseline emissions
Calculation method	Standard plot sampling techniques to quantify vegetation and application of allometric equations. Averages calculated using equation B.9 VM0009 V2.1.
Comments	

Data / Parameter	$C_{P\ BM}^{[m=0]}$
Data unit	tCO ₂ e
Description	Project carbon stocks in biomass prior to first verification event
Source of data	Project accounting area sampling
Description of measurement methods	Appendix G describes the plot based monitoring procedure.

and procedures to be applied	
Frequency of monitoring/recording	20% of all plots sampled annually
Value monitored:	7,554,258
Monitoring equipment	See Appendix G, standard vegetation sampling equipment
QA/QC procedures to be applied	Review of monitoring records, see Appendix E.
Purpose of data	Calculation of baseline emissions
Calculation method	Standard plot sampling techniques to quantify vegetation and application of allometric equations. Averages calculated using equation B.9 VM0009 V2.1 multiplied by area of each stratum.
Comments	

Data / Parameter	$c_{Pb}^{[m]}$
Data unit	tCO ₂ e
Description	Average carbon in biomass in the project accounting area
Source of data	Project accounting area sampling
Description of measurement methods and procedures to be applied	Appendix G describes the plot based monitoring procedure.
Frequency of monitoring/recording	20% of all plots sampled annually, revised this monitoring period
Value monitored:	5,639,153
Monitoring equipment	See Appendix G, standard vegetation sampling equipment
QA/QC procedures to be applied	Review of monitoring records, see Appendix E and Appendix G.
Purpose of data	Calculation of baseline emissions
Calculation method	Standard plot sampling techniques to quantify vegetation and application of allometric equations. Averages calculated using equation B.9 VM0009 V2.1 multiplied by area of each stratum.
Comments	

Data / Parameter	$C_{P\ SOC}^{[m=0]}$
Data unit	tCO ₂ e/ha
Description	Project soil carbon stocks prior to first verification event
Source of data	Project accounting area sampling
Description of measurement methods and procedures to be applied	See Appendix G
Frequency of monitoring/recording	Once of monitoring as per VM0009 V2.1
Value monitored:	192.6
Monitoring equipment	See Appendix G, standard soil sampling equipment.
QA/QC procedures to be applied	Soil analysed at a reputable laboratory – Institute for Soil, Water and Climate in South Africa.
Purpose of data	Calculation of baseline emissions.
Calculation method	Standard soil sampling techniques. Averages calculated using equation B.9 VM0009 V2.1
Comments	

Data / Parameter	$E_{\Delta\ GER}^{[m]}$
Data unit	tCO ₂ e
Description	GERs (NER according to VCS terminology) for the current monitoring period
Source of data	Area measurements
Description of measurement methods and procedures to be applied	See Appendix G
Frequency of monitoring/recording	Every monitoring period
Value monitored:	179 587
Monitoring equipment	See Appendix G, standard plot sampling equipment
QA/QC procedures to be applied	Review of GER calculations
Purpose of data	Calculation of project emissions
Calculation method	Application of equation F.48, VM0009 V2.1 to monitoring data.

Comments	
Data / Parameter	$E_{\Delta GER}^{[i]}$
Data unit	tCO ₂ e
Description	GERs (NER according to VCS terminology) for monitoring period <i>i</i>
Source of data	Area measurements
Description of measurement methods and procedures to be applied	Quantifying deforestation in the reference area, carbon stock quantification in the baseline and with project scenario fed into equation F.48 of VM0009 V2.1.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	5614411
Monitoring equipment	See Appendix G, standard plot sampling equipment
QA/QC procedures to be applied	Review of GER calculations
Purpose of data	Calculation of baseline emissions
Calculation method	Application of equation F.48, VM0009 V2.1 to monitoring data.
Comments	

Data / Parameter	$E_{\Delta NER}^{[i]}$
Data unit	tCO ₂ e
Description	NERs (=VCU) for monitoring period <i>i</i>
Source of data	Area measurements
Description of measurement methods and procedures to be applied	Quantifying deforestation in the reference area, carbon stock quantification in the baseline and with project scenario and non-permanence risk assessment fed into equation F.50 of VM0009 V2.1.
Frequency of monitoring/recording	Prior monitoring period
Value monitored:	4 931 959
Monitoring equipment	See Appendix G, standard plot sampling equipment
QA/QC procedures to be applied	Review of NER calculations and non-permanence risk assessment

Purpose of data	Calculation of baseline emissions
Calculation method	Project non-permanence risk assessment (VCS AFOLU Non-Permanence Risk Tool V3.2 and application of equation F.50, VM0009 V2.1 to monitoring data.
Comments	

Data / Parameter	$E_B^{[m]}$
Data unit	tCO ₂ e
Description	Cumulative baseline emissions at the end of the current monitoring period
Source of data	Proxy area measurements
Description of measurement methods and procedures to be applied	See Appendix G, standard plot sampling techniques and quantifying deforestation in the reference area as per VM0009 V2.1
Frequency of monitoring/recording	Every monitoring period - annually
Value monitored:	1 099 529
Monitoring equipment	Standard vegetation and soil sampling equipment, see Appendix G.
QA/QC procedures to be applied	Annual monitoring of proxy area, see Appendix G for error correction procedures.
Purpose of data	Calculation of baseline emissions
Calculation method	Application of the baseline emissions model, F.4 VM0009 V2.1
Comments	

Data / Parameter	$E_B^{[m-1]}$
Data unit	tCO ₂ e
Description	Cumulative baseline emissions at the beginning of the current monitoring period
Source of data	Proxy area measurements

Description of measurement methods and procedures to be applied	See Appendix G, standard plot sampling techniques and quantifying deforestation in the reference area as per VM0009 V2.1
Frequency of monitoring/recording	Every monitoring period - annually
Value monitored:	919 927
Monitoring equipment	Standard vegetation and soil sampling equipment, see Appendix G.
QA/QC procedures to be applied	Annual monitoring of proxy area, see Appendix G for error correction procedures.
Purpose of data	Calculation of baseline emissions
Calculation method	Application of the baseline emissions model, F.4 VM0009 V2.1
Comments	

Data / Parameter	$E_B^{[m]} \Delta$
Data unit	tCO ₂ e
Description	Change in baseline emissions
Source of data	Proxy area measurements
Description of measurement methods and procedures to be applied	See Appendix G, standard plot sampling techniques and quantifying deforestation in the reference area as per VM0009 V2.1
Frequency of monitoring/recording	Every monitoring period - annually
Value monitored:	179 602
Monitoring equipment	Standard vegetation and soil sampling equipment, see Appendix G.
QA/QC procedures to be applied	Annual monitoring of proxy area, see Appendix G for error correction procedures.
Purpose of data	Calculation of baseline emissions
Calculation method	Application of the baseline emissions model, F.4 VM0009 V2.1
Comments	

Data / Parameter	$E_B^{[i]} \Delta BGB$
Data unit	tCO ₂ e
Description	Change in baseline emissions from below-ground biomass during monitoring period i
Source of data	Monitoring the proxy area
Description of measurement methods and procedures to be applied	See Appendix G
Frequency of monitoring/recording	Every monitoring period
Value monitored:	1607681
Monitoring equipment	See Appendix G
QA/QC procedures to be applied	See Appendix G
Purpose of data	Calculation of baseline emissions
Calculation method	Calculation of above ground biomass using standard vegetation sampling techniques and application of an acceptable root:shoot ratio and application of equation F.10 of VM0009 V2.1, the decay emissions model
Comments	

Data / Parameter	$E_B^{[m]} \Delta SOC$
Data unit	tCO ₂ e
Description	Baseline change in emissions from soil carbon
Source of data	Measurements in the proxy area
Description of measurement methods and procedures to be applied	See Appendix G
Frequency of monitoring/recording	Once off measurement
Value monitored:	56 532
Monitoring equipment	See Appendix G
QA/QC procedures to be applied	See Appendix G

Purpose of data	Calculation of baseline emissions
Calculation method	Calculation of SOC using standard soil sampling techniques and application of equation F.7 and F.26 of VM0009 V2.1, the SOC decay emissions model
Comments	

Data / Parameter	$E_{B \Delta SOC}^{[i]}$
Data unit	tCO ₂ e
Description	Baseline emissions from soil carbon in monitoring period i
Source of data	Measurements in the proxy area
Description of measurement methods and procedures to be applied	See Appendix G
Frequency of monitoring/recording	Once off measurement
Value monitored:	1713943
Monitoring equipment	See Appendix G
QA/QC procedures to be applied	See Appendix G
Purpose of data	Calculation of baseline emissions
Calculation method	Calculation of SOC using standard soil sampling techniques and application of equation F.7 and F.26 of VM0009 V2.1, the SOC decay emissions model
Comments	

Data / Parameter	$E_{B BGB}^{[m]}$
Data unit	tCO ₂ e
Description	Cumulative baseline emissions from below-ground biomass at the end of the current monitoring period
Source of data	Measurements in the proxy area

Description of measurement methods and procedures to be applied	Standard vegetation sampling techniques to quantify above ground biomass, application of a root-shoot ratio and a decay emissions model.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	345 442
Monitoring equipment	See Appendix G
QA/QC procedures to be applied	See Appendix G
Purpose of data	Calculation of baseline emissions
Calculation method	Calculation of above ground biomass using standard vegetation sampling techniques and application of an acceptable root:shoot ratio and application of equation F.10 of VM0009 V2.1, the decay emissions model
Comments	

Data / Parameter	$E_{B\ BGB}^{[m-1]}$
Data unit	tCO ₂ e
Description	Cumulative baseline emissions from below-ground biomass at the beginning of the current monitoring period
Source of data	Measurements in the proxy area
Description of measurement methods and procedures to be applied	Standard vegetation sampling techniques to quantify above ground biomass, application of a root-shoot ratio and a decay emissions model.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	290 127
Monitoring equipment	See Appendix G
QA/QC procedures to be applied	See Appendix G
Purpose of data	Calculation of baseline emissions
Calculation method	Calculation of above ground biomass using standard vegetation sampling techniques and application of an acceptable root:shoot

	ratio and application of equation F.10 of VM0009 V2.1, the decay emissions model
Comments	This is the first monitoring period, hence the emissions are 0.

Data / Parameter	$E_{B\ BM}^{[m]}$
Data unit	tCO ₂ e
Description	Cumulative baseline emissions from biomass at the end of the current monitoring period
Source of data	Measurements in the proxy area
Description of measurement methods and procedures to be applied	See Appendix G
Frequency of monitoring/recording	Every monitoring period
Value monitored:	985 149
Monitoring equipment	See Appendix G
QA/QC procedures to be applied	See Appendix G
Purpose of data	Calculation of baseline emissions
Calculation method	Standard vegetation sampling techniques, quantification of deforestation in the reference area and application of equation F.4 and F.21, VM0009 V2.1
Comments	

Data / Parameter	$E_{B\ SOC}^{[m]}$
Data unit	tCO ₂ e
Description	Cumulative baseline emissions from soil carbon at the end of the current monitoring period
Source of data	Measurements in the proxy area
Description of measurement methods and procedures to be applied	Standard soil sampling techniques in the proxy area, laboratory analysis and application of the soil decay model.
Frequency of monitoring/recording	Soil carbon is only quantified once at the first verification event as per VM0009.

Value monitored:	348 713
Monitoring equipment	Standard soil sampling equipment, see Appendix G.
QA/QC procedures to be applied	Soil analysed at a reputable laboratory – Institute of Soil, Climate and Water in South Africa.
Purpose of data	Calculation of baseline emissions
Calculation method	Quantification of soil carbon and application of equation F.9 and F.28, VM0009, V2.1
Comments	

Data / Parameter	$E_{B SOC}^{[m-1]}$
Data unit	tCO ₂ e
Description	Cumulative baseline emissions from soil carbon at the beginning of the current monitoring period
Source of data	Measurements in the proxy area
Description of measurement methods and procedures to be applied	Standard soil sampling techniques in the proxy area, laboratory analysis and application of the soil decay model.
Frequency of monitoring/recording	Soil carbon is only quantified once at the first verification event as per VM0009.
Value monitored:	292 181
Monitoring equipment	Standard soil sampling equipment, see Appendix G.
QA/QC procedures to be applied	Soil analysed at a reputable laboratory – Institute of Soil, Climate and Water in South Africa.
Purpose of data	Calculation of baseline emissions
Calculation method	Quantification of soil carbon and application of equation F.9 and F.28, VM0009, V2.1
Comments	This is the first monitoring period, emissions are thus zero at the start.

Data / Parameter	$E_{BA}^{[m]}$
Data unit	tCO ₂ e

Description	Cumulative emissions allocated to the buffer account at the end of the current monitoring period
Source of data	VCS Non-Permanence Risk Report, See Appendix I
Description of measurement methods and procedures to be applied	See Appendix I – standard VCS procedure used.
Frequency of monitoring/recording	Non-permanence risk revised at every baseline re-assessment.
Value monitored:	138 447
Monitoring equipment	None
QA/QC procedures to be applied	Annual review of risk criteria and disturbance monitoring
Purpose of data	Calculation of emissions submitted to VCS buffer account
Calculation method	Procedure followed in VCS non-permanence risk tool and emissions allocated to buffer account subtracted from GERs.
Comments	

Data / Parameter	$E_L^{[m]}$
Data unit	tCO ₂ e
Description	Cumulative emissions from leakage at the end of the current monitoring period
Source of data	Measurements in the leakage area(s)
Description of measurement methods and procedures to be applied	Plot based sampling of leakage area and estimation of degradation.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	0
Monitoring equipment	See Appendix H, standard vegetation sampling equipment
QA/QC procedures to be applied	See Appendix H, all evidence of tree-felling by humans are geo-referenced and plots photographed
Purpose of data	Calculation of activity shifting leakage

Calculation method	Application of equation F.44 and F.45 to field data collected.
Comments	Leakage in this monitoring period is considered insignificant. No deforestation has taken place in the leakage area, only minor degradation.

Data / Parameter	$E_L^{[m-1]}$
Data unit	tCO ₂ e
Description	Cumulative emissions from leakage at the beginning of the current monitoring period
Source of data	Measurements in the leakage area(s)
Description of measurement methods and procedures to be applied	Plot based sampling of leakage area and estimation of degradation.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	0
Monitoring equipment	See Appendix H, standard vegetation sampling equipment
QA/QC procedures to be applied	See Appendix H, all evidence of tree-felling by humans are geo-referenced and plots photographed
Purpose of data	Calculation of project emissions
Calculation method	Application of equation F.44 and F.45 to field data collected.
Comments	Leakage in this monitoring period is considered insignificant. No deforestation has taken place in the leakage area, only minor degradation.

Data / Parameter	$E_{L\Delta}^{[m]}$
Data unit	tCO ₂ e
Description	Change in emissions due to leakage
Source of data	See Appendix H
Description of measurement methods and procedures to be applied	Plot based sampling of leakage area and estimation of degradation.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	0

Monitoring equipment	See Appendix H, standard vegetation sampling equipment
QA/QC procedures to be applied	See Appendix H, all evidence of tree-felling by humans are geo-referenced and plots photographed
Purpose of data	Calculation of leakage
Calculation method	Application of equation F.44 and F.45 to field data collected.
Comments	Leakage in this monitoring period is considered insignificant. No deforestation has taken place in the leakage area, only minor degradation.

Data / Parameter	$E_{L\ AS}^{[m]}$
Data unit	tCO ₂ e
Description	Cumulative emissions from activity-shifting leakage at the end of the current monitoring period
Source of data	Measurements in the activity-shifting leakage area
Description of measurement methods and procedures to be applied	Plot based sampling of leakage area and estimation of degradation.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	0
Monitoring equipment	See Appendix H, standard vegetation sampling equipment
QA/QC procedures to be applied	See Appendix H, all evidence of tree-felling by humans are geo-referenced and plots photographed
Purpose of data	Calculation of leakage
Calculation method	Application of equation F.44 and F.45 to field data collected.
Comments	Leakage in this monitoring period is considered insignificant. No deforestation has taken place in the leakage area, only minor degradation.

Data / Parameter	$E_{L\ ME}^{[m]}$
Data unit	tCO ₂ e

Description	Cumulative emissions from market effects leakage at the end of the current monitoring period
Source of data	Measurements in the market-effects leakage area
Description of measurement methods and procedures to be applied	Market and activity shifting leakage are the same for the LZRP
Frequency of monitoring/recording	Every monitoring period
Value monitored:	0
Monitoring equipment	See Appendix H
QA/QC procedures to be applied	See Appendix H
Purpose of data	Calculation of leakage
Calculation method	See calculations for activity-shifting leakage above
Comments	

Data / Parameter	$E_P^{[m]}$
Data unit	tCO ₂ e
Description	Change in project emissions
Source of data	Monitoring records for Forest Fire, Burning, logging, wood products, and natural disturbance events
Description of measurement methods and procedures to be applied	Standard vegetation sampling techniques and remote sensing to determine the extent of fires.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	15
Monitoring equipment	Standard vegetation sampling equipment and satellite imagery.
QA/QC procedures to be applied	Remote sensing, patrols and field measurements
Purpose of data	Calculation of project emissions

Calculation method	Monitoring of disturbance in the project accounting area and equation F.40 VM0009 V2.1.
Comments	

Data / Parameter	$E_{P\Delta BRN}^{[m]}$
Data unit	tCO ₂ e
Description	Cumulative project emissions due to burning at the end of the current monitoring period
Source of data	Monitoring plots in the project accounting area
Description of measurement methods and procedures to be applied	Standard vegetation sampling techniques and remote sensing to determine the extent of fires.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	17 623
Monitoring equipment	Standard vegetation sampling equipment and satellite imagery.
QA/QC procedures to be applied	See monitoring report section 4.2
Purpose of data	Calculation of baseline emissions Calculation of project emissions
Calculation method	Monitoring of disturbance in the project accounting area and equation F.40 VM0009 V2.1
Comments	

Data / Parameter	$E_U^{[m]}$
Data unit	tCO ₂ e
Description	Cumulative confidence deduction at the end of the current monitoring period
Source of data	Biomass and soil carbon inventory data, Appendix E
Description of measurement methods and procedures to be applied	Calculation of the standard error of the total of the baseline emissions model, proxy area carbon stocks and accounting area carbon stocks
Frequency of monitoring/recording	Every monitoring period
Value monitored:	0
Monitoring equipment	See Appendix E

QA/QC procedures to be applied	See Appendix E
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Calculation method	Equation B.10, F.14 and F.52, VM0009 V2.1
Comments	There were no confidence deductions as the uncertainty was insignificant.

Data / Parameter	$p_{L\ DEG}^{[m]}$
Data unit	proportion (unitless)
Description	Portion of leakage due to degradation at the end of the current monitoring period
Source of data	Monitoring in the leakage area
Description of measurement methods and procedures to be applied	Plot based sampling of leakage area and estimation of degradation.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	0.087
Monitoring equipment	See Appendix H, standard vegetation sampling equipment
QA/QC procedures to be applied	See Appendix H, all evidence of tree-felling by humans are geo-referenced and plots photographed
Purpose of data	Calculation of leakage
Calculation method	Calculated using equation B.9, VM0009 V2.1. Minimum sample size determined using equation B.29, VM0009 V2.1
Comments	Leakage in this monitoring period is considered insignificant. No deforestation has taken place in the leakage area, only minor degradation.

Data / Parameter	$p_{L\ DEG}^{[m=0]}$
Data unit	proportion (unitless)
Description	Portion of leakage due to degradation prior to first verification event

Source of data	Monitoring in the leakage area
Description of measurement methods and procedures to be applied	Plot based sampling of leakage area and estimation of degradation.
Frequency of monitoring/recording	Every monitoring period
Value monitored:	0.087
Monitoring equipment	See Appendix H, standard vegetation sampling equipment
QA/QC procedures to be applied	See Appendix H, all evidence of tree-felling by humans are geo-referenced and plots photographed
Purpose of data	Calculation of leakage
Calculation method	Calculated using equation B.9, VM0009 V2.1. Minimum sample size determined using equation B.29, VM0009 V2.1
Comments	This is the first monitoring period, leakage is assumed 0 at the project start date as per VM0009 V.2.1

Data / Parameter	$t^{[i-1]}$
Data unit	Days
Description	Time from project start date to beginning of monitoring period i
Source of data	Monitoring records
Description of measurement methods and procedures to be applied	NA
Frequency of monitoring/recording	NA
Value monitored:	10592
Monitoring equipment	NA
QA/QC procedures to be applied	NA
Purpose of data	Calculation of baseline emissions
Calculation method	Count of days in project crediting period
Comments	

Data / Parameter	$t^{[m]}$
Data unit	Days
Description	Time from project start date to end of current monitoring period
Source of data	Monitoring records
Description of measurement methods and procedures to be applied	NA
Frequency of monitoring/recording	Every monitoring period
Value monitored:	3 014
Monitoring equipment	NA
QA/QC procedures to be applied	Monitoring records
Purpose of data	Calculation of baseline emissions
Calculation method	Deduct project start date from end of date of current monitoring period.
Comments	

Data / Parameter	$t^{[m-1]}$
Data unit	Days
Description	Time from project start date to beginning of current monitoring period
Source of data	Monitoring records
Description of measurement methods and procedures to be applied	NA
Frequency of monitoring/recording	Prior monitoring period
Value monitored:	2649
Monitoring equipment	NA
QA/QC procedures to be applied	Monitoring records, Appendix E

Purpose of data	Calculation of baseline emissions and compliance with VM0009 V2.1 minimum monitoring intervals.
Calculation method	NA
Comments	

Data / Parameter	$U_B^{[m]}$
Data unit	tCO ₂ e
Description	Total uncertainty in proxy area carbon stock estimate
Source of data	Biomass and soil carbon inventory data, Annex A
Description of measurement methods and procedures to be applied	Calculation of the standard error of the total of the baseline emissions model, proxy area carbon stocks and accounting area carbon stocks
Frequency of monitoring/recording	Every monitoring period
Value monitored:	60520
Monitoring equipment	NA
QA/QC procedures to be applied	NA
Purpose of data	Calculation of baseline emissions
Calculation method	Equation B.10, VM0009 V2.1
Comments	

Data / Parameter	$U_{EM}^{[M]}$
Data unit	tCO ₂ e
Description	Total uncertainty in Baseline Emissions Models
Source of data	Forest State Interpretation
Description of measurement methods and procedures to be applied	Calculation of the standard error of the total of the baseline emissions model, proxy area carbon stocks and accounting area carbon stocks
Frequency of monitoring/recording	Every baseline revision
Value monitored:	5063

Monitoring equipment	Appendix J
QA/QC procedures to be applied	Appendix J
Purpose of data	Calculation of baseline emissions
Calculation method	Equation F.14, VM0009 V2.1
Comments	

Data / Parameter	$U_P^{[m]}$
Data unit	tCO ₂ e
Description	Total uncertainty in project accounting area carbon stock estimate
Source of data	Forest State Interpretation
Description of measurement methods and procedures to be applied	Calculation of the standard error of the total of the baseline emissions model, proxy area carbon stocks and accounting area carbon stocks
Frequency of monitoring/recording	Every monitoring period
Value monitored:	872691
Monitoring equipment	Appendix G
QA/QC procedures to be applied	Appendix G
Purpose of data	Calculation of baseline emissions
Calculation method	Equation B.10, VM0009 V2.1
Comments	

Data / Parameter	Future climate change
Data unit	Temperature °C and Rainfall mm
Description	Regional climate change and climate variability scenarios and impacts, using available studies, and identify potential changes in the local land-use scenario due to these climate change scenarios in the absence of the project

Source of data	Peer reviewed climate scenarios
Description of measurement methods and procedures to be applied	Climate Change Scenarios developed at international level
Frequency of monitoring/recording	Every 5 years
Value monitored:	NA
Monitoring equipment	NA
QA/QC procedures to be applied	Peer reviewed climate scenarios
Purpose of data	GL1. Climate Change Adaptation Benefits
Calculation method	NA
Comments	

Data / Parameter	Climate Change Project Risks to community
Data unit	Loss of income due to crop failure
Description	Risks to the project's climate, community and biodiversity benefits resulting from likely climate change and climate variability impacts
Source of data	Participatory Rural Appraisal
Description of measurement methods and procedures to be applied	Incidence of crop failure due to adverse weather conditions and potential impact on community well being
Frequency of monitoring/recording	5 years
Value monitored:	Income
Monitoring equipment	NA
QA/QC procedures to be applied	Participatory Rural Appraisal by external consultants
Purpose of data	GL1. Climate Change Adaptation Benefits
Calculation method	Standard PRA procedures

Comments	
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Data / Parameter	Climate Change Project Risks to biodiversity
Data unit	Area protected as wildlife corridor
Description	Risks to the project's climate, community and biodiversity benefits resulting from likely climate change and climate variability impacts
Source of data	GIS assessment
Description of measurement methods and procedures to be applied	Monitoring of intact project area using remote sensing techniques
Frequency of monitoring/recording	5 years
Value monitored:	Area (ha)
Monitoring equipment	NA
QA/QC procedures to be applied	Peer reviewed climate scenarios
Purpose of data	GL1. Climate Change Adaptation Benefits
Calculation method	Hectares protected as project area
Comments	

Data / Parameter	Community Level Gold
Data unit	Household level income
Description	Number of poorest of the poor people benefitting
Source of data	Participatory Rural Appraisals and Baseline Assessments
Description of measurement methods and procedures to be applied	Participatory Rural Assessment and analysis of income
Frequency of monitoring/recording	Five year intervals
Value monitored:	Household income per annum ZMW

Monitoring equipment	NA
QA/QC procedures to be applied	Review of monitoring records
Purpose of data	GL2 Exceptional Community Benefits
Calculation method	Participatory Rural Appraisal
Comments	

Data / Parameter	GL2 Exceptional Community Benefits
Data unit	No of people
Description	Number of poorest of the poor people benefitting
Source of data	Participatory Rural Appraisals and Baseline Assessments
Description of measurement methods and procedures to be applied	Participatory Rural Assessment and analysis of income
Frequency of monitoring/recording	Five year intervals
Value monitored:	No of people in poorest of poor category benefitting.
Monitoring equipment	NA
QA/QC procedures to be applied	Review of monitoring records
Purpose of data	GL2 Exceptional Community Benefits
Calculation method	Participatory Rural Appraisal
Comments	

MR.79 Quality assurance and quality control measures employed for each.

20% of plots in the project accounting area and proxy area and all leakage plots were re-measured as per VM0009 V2.1 requirements. Please see tables in section 3.2 for assurances.

MR.80 Description of the accuracy of each.

The accuracy of each parameter can be found in Appendix E.

3.1.3 Monitoring Plan**MR.84 Maps of a stratification (if any) and references to plot allocation.**

The monitoring strategy for the LZRP followed a stratified random approach for the accounting area. The vegetation in the project accounting area is fairly homogenous Miombo woodland, but two different strata, namely light and dense tree cover were distinguished using remote sensing techniques (Figure 3).

A total of 186 circular, permanent inventory plots are located in Rufunsa Conservancy, and soil was sampled at 59 of these plots during M1. 26 plots fell within the dense tree stratum, the remainder were in the light tree stratum which incidentally covers the majority of the accounting area.

Twenty percent of plots are re-measured every year. Two of the 160 plots in the light tree stratum could not be located due to a GPS waypoint transcription error during the first inventory and they were thus not re-sampled and excluded from calculations.

MR.85 List of plot GPS Coordinates

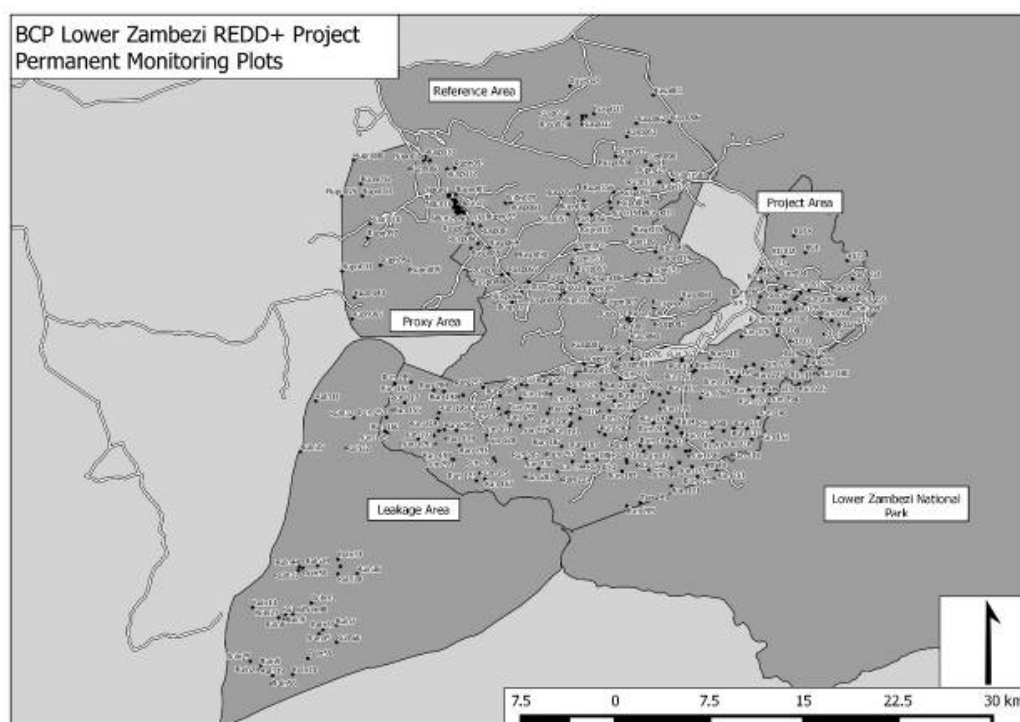


Figure 5. Permanent carbon stock monitoring plots for the Lower Zambezi REDD+ Project.

A list of the plots names and geographic coordinates are provided in Appendix J. The list has over 300 entries and as such is best presented in a separate document.

MR.91 The frequency of monitoring for each plot for all plots – all plots should be measured for the first verification. All leakage plots should be measured every verification, and all proxy and project accounting area plots at least every 5-10 years, or after a significant event that changes stocks.

All leakage plots were monitored as per VM0009 requirement for verification events.

Table 3. Summary of monitoring activities.

Monitoring Activity	Timing	Methods
Conservancy trespassing and boundary transgressions	Monthly patrols	Scouts patrol the conservancy on an ongoing basis, it is their core duty
Leakage monitoring	Annually	Forest Inventory team following VM0009
Plot measurements	Annually	Forest Inventory Team following VM0009, re-sample

Monitoring Activity	Timing	Methods
		20% of plots in project accounting.
Disturbance monitoring	Monthly in the fire season and otherwise as BCP becomes aware of disturbances.	Remote sensing (NASA FIRMS alerts) followed by ground based inspections, bi-monthly aerial surveys.
Charcoal production	Monthly	Charcoal operations managers records all charcoal production on an ongoing basis.

Carbon Stocks Monitoring – Biomass

Plot design, size and sample size

MR.86 Description of plot size and layout (such as the use of nests and their sizes) for each carbon pool.

Biomass monitoring was conducted according to the BCP field sampling manual (copy provided to VVB, **Appendix G**). Optimum plot size and minimum tree diameter were determined during a trial sampling run in February 2012. Circular plots (12m radius) were used due to their simplicity, ease of layout and reduced measurement error. A randomly generated plot location was navigated-to using a handheld GPS or Android Smart Phone. When the plot location was reached, the center was permanently marked with a steel rebar driven into the ground. If, for some reason, a plot could not be reached due to terrain, the location was moved following a predetermined deviation that lead to the location of another plot. Very few plots could not be reached.

Trees were identified to species level as far as possible, noting that there are several miombo species (some common) that require taxonomic revision (M. Bingham. Pers Comm¹). The use of a generic allometric equation to calculate AGOT mass fortunately negated mistakes or uncertainties with tree species identification.

As explained above, plots are re-measured on a rotating basis, with 20% re-measured per year, however stock estimates are only updated every 5 years after all plots have been re-measured.

¹ Mike Bingham, Zambian Miombo Ecosystem Authority.

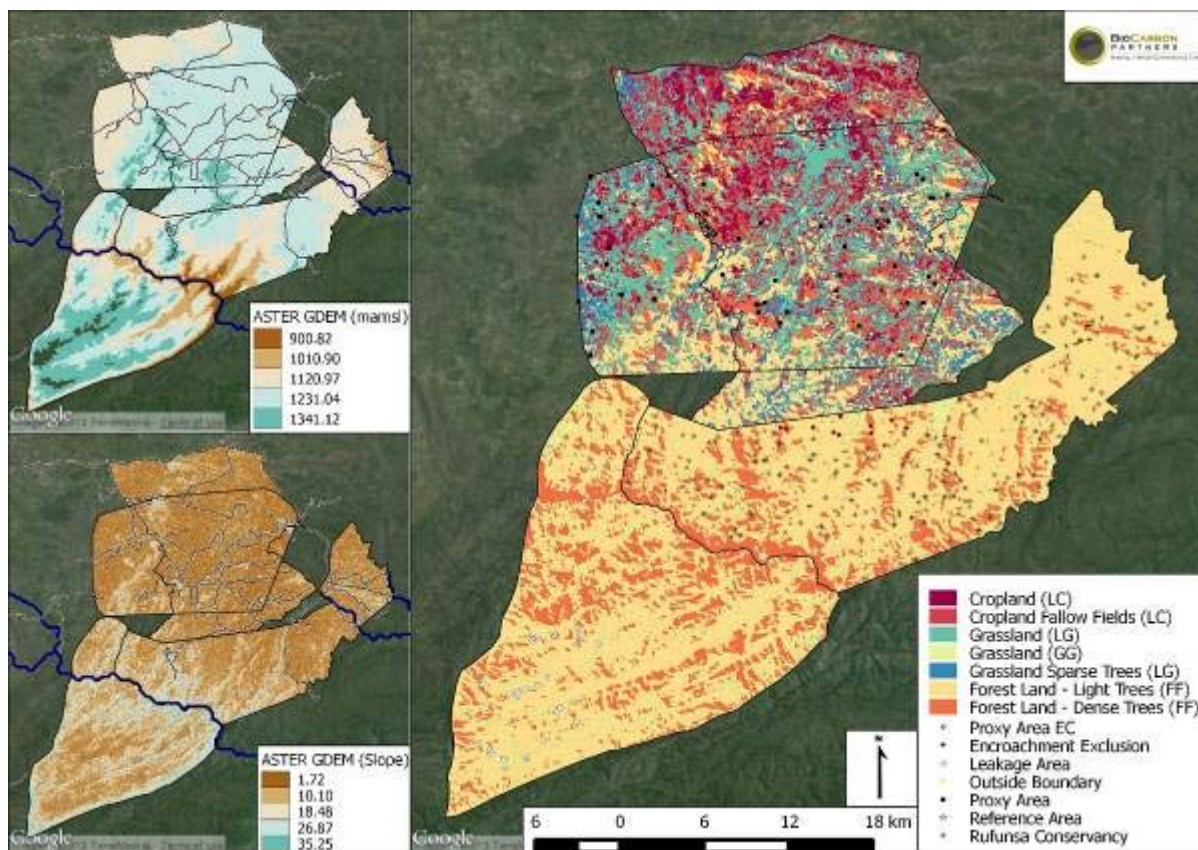


Figure 6. Location of Permanent Monitoring Plots in context of land cover.

Carbon Stock Monitoring – SOC

SOC was quantified during *m1* as per VM0009 V2.1 requirements and a description of the procedure can be found in the *m1* monitoring report in the online VCS project database.

Leakage Monitoring

Degradation in the leakage area was monitored in 30 leakage plots (23 minimum requirement as calculated using equation B.29, VM0009 Vers. 2.1). A slight variation of the visual approach was used (Appendix H) and see MR.90.

Organizational Structure, responsibilities and competencies

BioCarbon Partners has a team of experts responsible for the carbon inventory and standards compliance. There is a dedicated carbon accounting department that oversees all inventory data collection, processing, storage, GIS and remote sensing and electronic data capture systems (Figure 7).

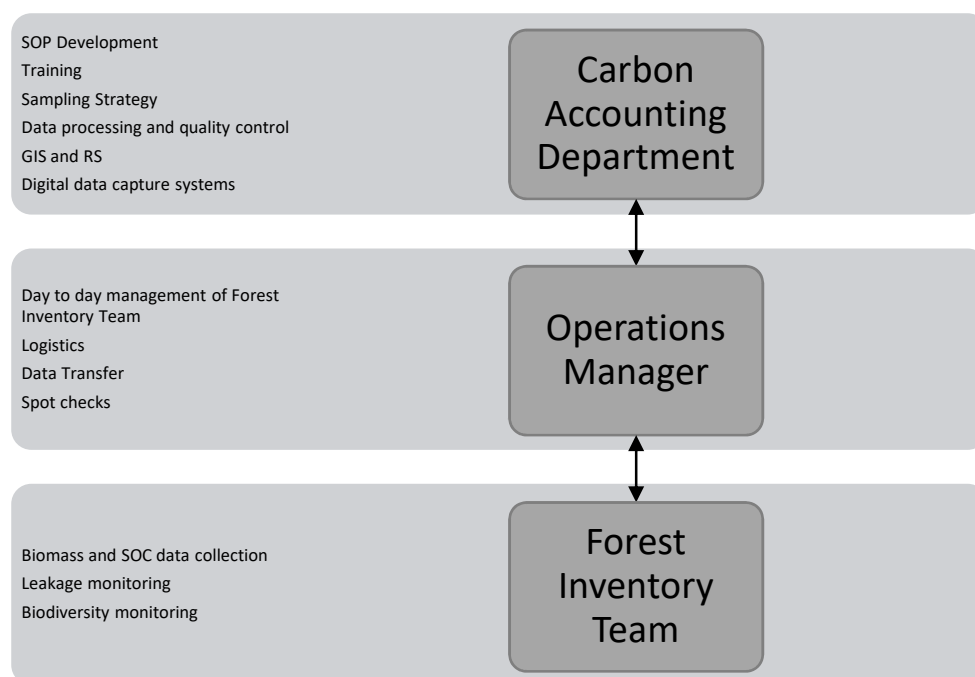


Figure 7. BioCarbon Partners carbon monitoring organisational structure.

Both the carbon accounting manager and remote sensing and GIS specialist have post graduate degrees with a strong focus on African ecology and collectively have more than 20 years' experience in biological inventories, remote sensing and GIS.

A field team consisting of local residents from neighbouring communities have been trained in forest monitoring (see below) in line with BCP's policy of local capacity building and investment. The team has intimate knowledge of local flora and fauna and their knowledge of the area enables them to locate inventory plots with limited difficulty.

The inventory team's day-to-day activities are monitored by the Rufunsa Conservancy Operations Manager who is based on site at the conservation centre. The operations manager sees to the logistical needs of the plot team, ensures that deadlines are adhered to, assists with any equipment failures and transfers data to the carbon accounting department.

Data Management

The initial inventory data for the project accounting area was collected using pen and paper, transferred to BCP HQ for copying, storage and entry. The data was entered by an experienced data capturer with specific experience in collating and capturing ecological data. Data was captured in spreadsheets and original data sheets are kept in a safe place at the BCP HQ. The data was then error checked by the carbon accounting manager to identify any obvious errors. Following this process, an intensive error checking was conducted with the data capturer and two of the senior inventory team members.

Subsequently, BCP developed a digital data capturing system using Android Smartphones. The advantage of this system is that it dramatically reduces errors and adds a significant element of quality control to data collection as start and end times plus location are recorded for all plots. Furthermore, the digital system allows for restrictions in data collection by using drop down menus and upper and lower bounds for figures. It also guides the data collector through the process with a series of text prompts and diagrams.

The process followed for data collection is outlined in Figure 8 and a spot error check SOP can be found in Appendix G. It is a feedback system that relies heavily on training, review and good communication. All training is followed by trial runs of the sampling procedure and then actual data collection under supervision (see MR.81 for more details). Data is continuously submitted from the field to the carbon accounting department, and feedback is provided if any corrective actions are required. Furthermore, plots are visited in the field periodically and subjected to an internal audit process.

Once data has been error checked and cleaned it is safely stored online using Google Drive and then transferred to an online relational database that is currently being developed.

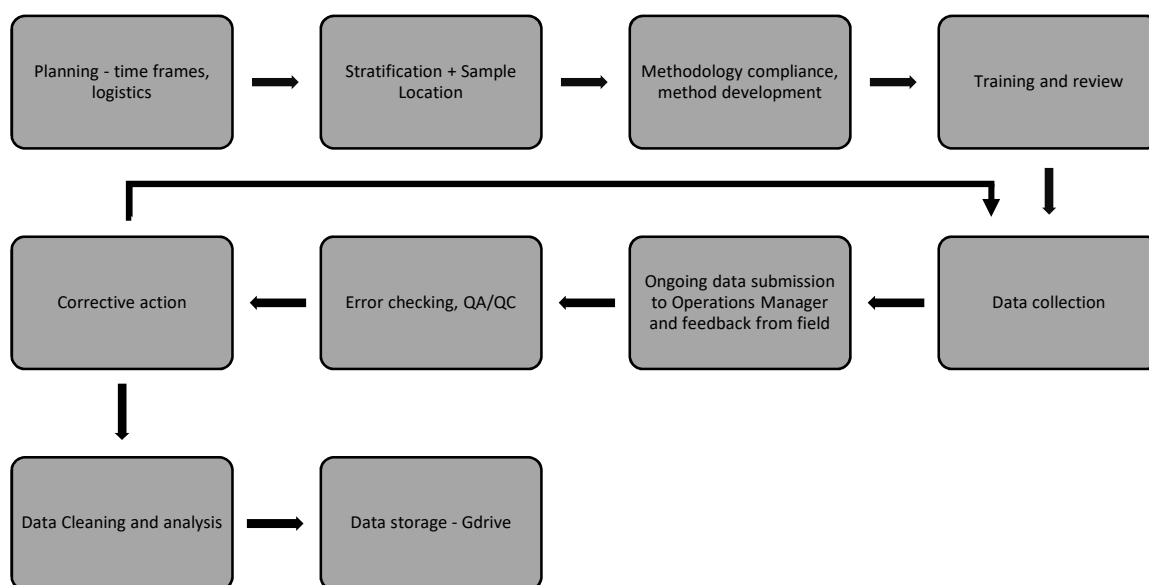


Figure 8. BioCarbon Partners data collection, QA/QC and storage process.

Quality Assurance and Quality Control

MR.83 Documentation of data quality assessment such as a check cruise and plots of the data such as diameter distributions by strata or plot.

A set of Standard Operating Procedures and Field Manuals have been developed for all the various aspects of the carbon inventory. As indicated above, BCP has strong systems in place to ensure all carbon related data is collected according to the required quality standards. Quality Control is embedded in the organisational structure of the Carbon Accounting department (Figure 7).

Continuous feedback from the field, coupled with field visits from senior staff, ensure that errors are identified in a timely fashion and corrected (Figure 8). Spot checks and internal audits are conducted to make sure all data collected is of the highest standard. The new digital data capture system furthermore ensures that errors are identified and rectified immediately, unlike paper based systems where data often takes weeks to enter and error check. Spot errors are dealt with as per Appendix G. During the current monitoring period a senior person was on site for the enumeration of all plots re-sampled. Corrections were done in field.

With regards to GIS and RS, similar procedures are followed although this role resides mainly within the senior management's responsibility. The Remote Sensing aspect of the Cumulative Deforestation Model was undertaken independently by two associates from a South African tertiary institution. The CDM point interpretation was then submitted to a rigorous third party audit by BCP staff.

MR.81 Documentation of training of field crews

Local capacity building and employment creation is one of the core focus points of BioCarbon Partners and this is clearly reflected in our approach to field based carbon accounting practices. Table 4 is a summary of all forest inventory training undertaken for the first monitoring period. BCP initially trained a group of 19 local residents consisting of neighbouring villagers, officials from the Department of Forestry and local post graduate ecology students in basic forest enumeration techniques followed by hands-on sampling and data collection according to our carbon stock assessment field manual (Appendix G).

Table 4. Summary of field based carbon accounting training for the LZRP.

Date	Training course	Number of trainees	Duration of training (days)	Venue	Trainers
Feb 2012	Biomass Inventory	19	8	Rufunsa Conservancy	L. Theron & H. Sachedina
Sep 2012	Biomass Inventory Advanced Training	5	4	Rufunsa Conservancy	L. Theron, W. Roberts & M. Bingham
Dec 2012	Biomass Inventory refresher course including use of improved bulk density corer	4	2	Rufunsa Conservancy	L. Theron
Jan 2013	Charcoal Inventory and Soil Proxy Sampling and electronic data capture	4	4	LRZP Eco-Charcoal Forest	L. Theron, W. Roberts, E. Chidumayo

Date	Training course	Number of trainees	Duration of training (days)	Venue	Trainers
Apr 2013	Tree allometry equation development	3	1 and 5 sampling under supervision	LRZP Eco-Charcoal Forest	L. Theron, W. Roberts
Jun 2013	NT and DW allometry development, Residual Biomass Sampling, Leakage Monitoring	4	3 and 4 sampling	Rufunsa Conservancy and Leakage Area	L. Theron
June 2014	Biomass Inventory refresher course	5	2	Rufunsa Conservancy	L. Theron
May 2016	Biomass Inventory refresher course	6	2	Rufunsa Conservancy	L. Theron
June 2016	Biodiversity Monitoring Course	15	6	Rufunsa Conservancy	A. Cotterill and L. McDonald

Following the viability phase of the project, five people were selected from the 19 originally trained, to undertake the required monitoring in preparation for the verification under the VCS of the project and one additional member selected from a local village. The forest inventory team members were:

- Pythias Sebente
- Collins Jere Kaoma
- Andrew Tembo
- Christopher Wanga
- Elvin Muchimba

The inventory team then underwent refresher and advanced training during September 2012 (Figure 9). The training particularly focused on correct data capture and measurement techniques, use of clinometers, GPS use and advanced tree identification presented by local Zambian expert Mike Bingham. Plots were then enumerated under supervision until a satisfactory level of proficiency was achieved.

Pythias Sebente resigned in November 2013 due to the physical nature of the work and was replaced as team leader by Andrew Tembo. The team were by that time well versed in the sampling method and did not need five people to complete the inventory.

BCP in the interim developed an electronic data capture system using Android smartphones and the Open Data Kit (ODK) software. This software allows for the design of custom data capture forms, capturing geographic data and images. It allows for the introduction of stringent data quality control features. A trial version was developed and in January 2013 the team was trained on it and it was piloted in the eco-charcoal forest to quantify the biomass available for charcoal. Since then all new data has been captured using this system.

The soil sampling procedure was also revised during this time; it included training in collecting metadata required for collecting data on residual soil carbon stocks and soil decay rates.

A refresher training course was again held in June 2014. It included a review of the upcoming leakage monitoring and planning for leakage monitoring.



Figure 9. Copy of certificate issued to Forest Monitoring Team members after completion of the advanced training course.

The current Forest Monitoring Team is:

- Elvin Muchimba (Team Leader)
- Lawrence Msoni
- Liason Chiyakamba
- Nchimunya Simwendengwe

MR.88 The estimated carbon stock, standard error of the total for each stock, and the sample size for each stratum in the area selected.

Summarised in Table 5 below, for calculations please see Appendix E.

Table 5. Estimated carbon stock, standard error and the sample size of each stratum.

Parameter	Project Accounting Area			Proxy Area	
	Dense Tree OT	Light Tree OT	Soil (Dense + Light)	Proxy Area OT	Proxy Area Soil
Plots (P)	26	158	48	46	16
Total Possible plots ($N_{p,k}$)	132,986	603,954	736,941	945,964	945,964
C	1,083,490	4,555,663	6,420,888	286,069	5,634,230
U (B.10) per stratum	208,511	208,511	841,589	84,055	283,500

MR.82 If included in the project activities, a description of procedures used to estimate the rate of biomass burning and charcoal production and demonstration that these estimates are conservative

During the previous monitoring period biomass available for charcoal production was estimated following the BCP carbon stock assessment field manual in the eco-charcoal forest located to the north of the project accounting area, the Ndubalula eco-charcoal forest. The Ndubalula eco-charcoal area is approximately 93 ha in size and would have been deforested in the baseline scenario. The area was identified by local community leaders and charcoal producers who agreed to harvest it in a sustainable manner. Biomass was enumerated in 30 plots. There is currently 484 ha under eco-charcoal management.

Figure 10 shows the location of the eco-charcoal forests, the harvesting strips, and the harvested area. Charcoal is harvested using a coup & shelter belt system (eco-charcoal harvesting and production system documents have been made available to the VVB), on a rotational basis, returning to the first strip after approximately 18 years. 18.28 ha was harvested during M5.

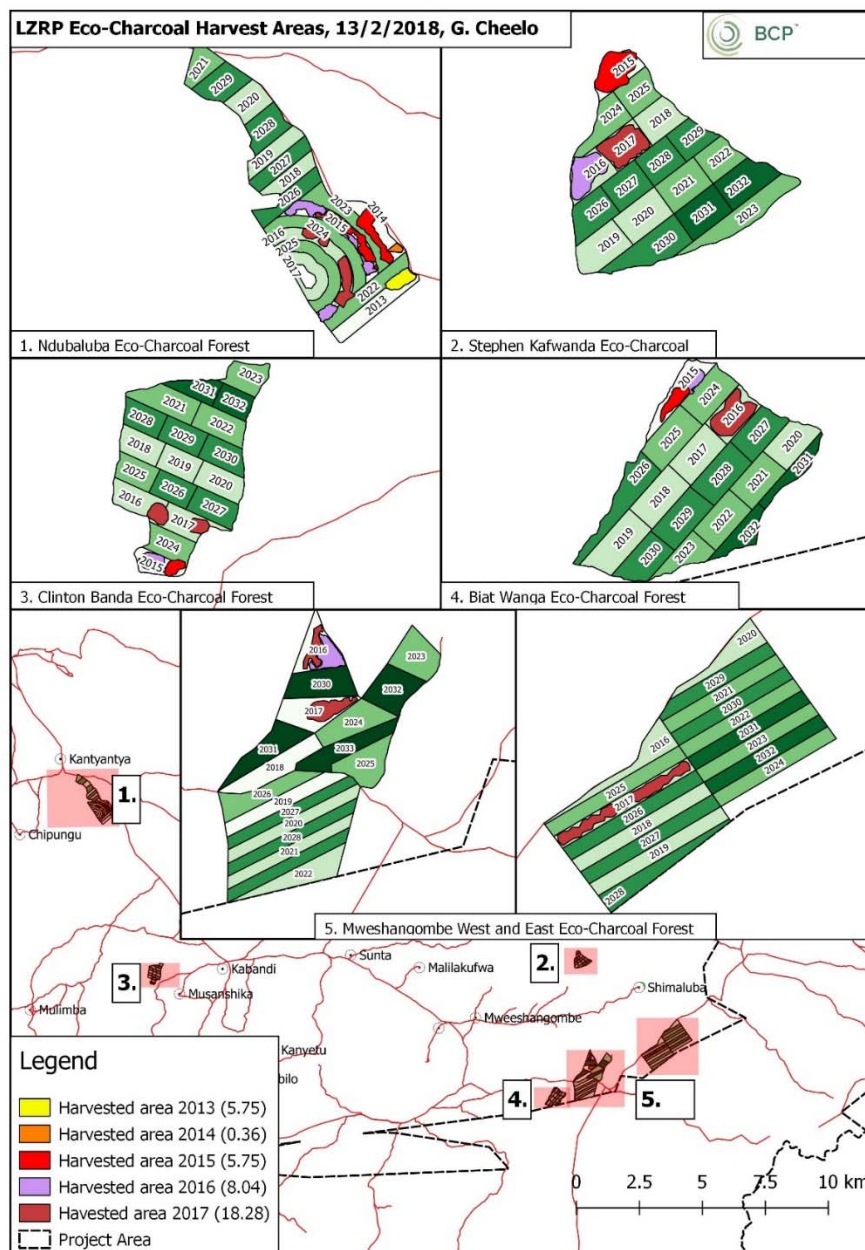


Figure 10. Eco-charcoal production forest with coupe and shelter belt harvesting plans and area harvested to date.

Charcoal production and sales are carefully monitored by BCP staff and project participants. Charcoal production figures per month are listed in Table 6 below.

Table 6. Summary of Eco-charcoal production in t for the LZRP during 2017

Month	Total (t)
January	8.9
February	0
March	7.5
April	10
May	20.3
June	27.6
July	22.3
August	26.2
September	17.2
October	18.4
November	27.6
December	19.4
TOTAL	205.4

3.1.4 Dissemination of Monitoring Plan and Results (CL3.2)

The monitoring plan has been submitted to the VCS website after each of the previous four verifications. Results of emissions reductions and subsequent VCU sales are made available to the land owner and to community members during revenue sharing events.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

MR.10 Calculations of current baseline emissions $E_{B\Delta}^{[m]}$ as of the current monitoring period.

Gross Emissions Reductions (baseline emissions) for the fifth monitoring period (2017) are summarized in Table 7. Emissions reductions were calculated using a logistic deforestation model, based upon a point interpretation of forest state in the reference area applying equation F.16 VM0009 V2.1

Table 7. Baseline emissions reduction summary for the third monitoring period (see Appendix F for calculations).

Monitoring Period	Carbon Pool	Baseline Emissions Reductions (tCO ₂ e)
M5	AGOT	102 434
M5	BGOT	55 532
M5	SOC	21 636
Total		179 602

MR.11 Calculations of baseline emissions $E_{B\Delta}^{[m-1]}$ from prior monitoring periods.

Cumulative baseline emissions were calculated using equation F.4 and F.21, VM0009 V.2.1 Refer to Appendix F for calculations.

MR.12 Calculations of cumulative baseline emissions for each selected pool ($E_{B\Delta}^{[m]}$ and $E_{B\Delta}^{[m]}$) and undecayed carbon ($C_{B\Delta}^{[m]}$, $C_{B\Delta}^{[m]}$, $C_{B\Delta}^{[m]}$, and $C_{B\Delta}^{[m]}$), as of the current monitoring period.

Summarised in Table 7. Refer to Appendix F for calculations.

MR.13 Calculations of cumulative baseline emissions from biomass $E_{B\Delta}^{[m]}$ for the current monitoring period.

985 149 tCO₂e

Cumulative baseline emissions were calculated using equation F.4 and F.21, VM0009 V.2.1 Refer to Appendix F for calculations.

MR.14 Calculations of cumulative baseline emissions from biomass $E_{B\Delta}^{[m]}$ for all prior monitoring periods.

827 400 tCO₂e

Cumulative baseline emissions were calculated using equation F.4 and F.21, VM0009 V.2.1 Refer to Appendix F for calculations.

MR.15 The order of strata from lowest carbon stocks to highest carbon stocks based on the average across all pools.

As the project is baseline type U3, the spatial algorithm (equation F.24) had to be applied to biomass stocks (Table 8).

Table 8. Results of applying the spatial algorithm (equation F.24) to carbon stocks per strata (see Appendix E for calculations).

Stratum	Carbon Density (tCO ₂ e/ha)
Light Tree	166.7
Dense Tree	169.1

MR.16 Calculations for each step which are carried through from monitoring period to monitoring period.

See Appendix F for application of the spatial algorithm to baseline emissions calculations. For this monitoring period predicted emissions only stemmed from the first stratum, *Light Tree*.

MR.17 Calculations of cumulative baseline emissions from biomass $E_{B\ BM}^{[m]}$ for prior monitoring periods.

The cumulative baseline emissions from biomass for $m4$ is 827 400 tCO₂e, for calculations please see **Appendix F**.

MR.24 An estimate of current baseline emissions from SOC $E_{B\ \Delta\ SOC}^{[m]}$ as of the current monitoring period.

Current baseline emissions from soil are 56 532 tCO₂e applying equation F.9 and F.32, VM0009 V.2.1 Please see Appendix F for further details.

MR.25 An estimate of cumulative baseline emissions from SOC $E_{B\ SOC}^{[m]}$ for the current monitoring period.

Cumulative baseline emissions for SOC for $m5$ is 348 713 tCO₂e

MR.26 Calculations of cumulative baseline emissions from SOC $E_{B\ SOC}^{[m]}$ for all prior monitoring periods.

Cumulative baseline emissions are 292 181 tCO₂e.

MR.32 An estimate of carbon stored in non-decayed BGB $C_{B\ BGB}^{[m]}$ for the current monitoring period.

Current carbon stocks stored in non-decayed BGB are 211 tCO₂e, equation F10 and F.29 VM0009 V.2.1. Please see Appendix F for further details.

MR.33 An estimate of cumulative baseline emissions from BGB $E_{B\ BGB}^{[m]}$ for the current monitoring period.

Cumulative baseline emissions from BGB are 345 442 tCO₂e using the revised version of equation F.10. Please see Appendix F for calculations and equations

MR.34 Calculations of cumulative baseline emissions from BGB $E_{B\ BGB}^{[m]}$ for all prior monitoring periods.

Cumulative baseline emissions from BGB equals to 290 127tCO₂e.

MR.35 An estimate of carbon stored in non-decayed SOC $C_{B\ SOC}^{[m]}$ for the current monitoring period.

Current carbon stocks stored in non-decayed SOC are 34 896 tCO₂e as per equation F.32 of VM0009 V.2.1. Please see Appendix F for calculations and equations.

3.2.2 Project Emissions

The project accounting area falls within a fire prone ecosystem that has evolved over millennia with frequent (often annual) fires. The project proponent is actively implementing an ecologically sound fire management system that is aimed at preventing potentially catastrophic late season fires through a firebreak system, early, cool season burns and reduction of fuels through community-based seasonal enterprises (such as thatch and reeds for urban markets). This fire management system is designed to mitigate the impact hot fires have on woody biomass. The project proponent acknowledges that fire is a common occurrence during the dry season and that fires actually play a positive role in maintaining the ecological integrity of the project area.

However, hot late season fires can have a negative impact on the woody biomass in the area as well as the potential for regeneration following degradation related activities such as charcoaling and agriculture. As such, the fire management system will reduce the occurrence of such fires in the future and prevent unnecessary emissions and loss of woody biomass.

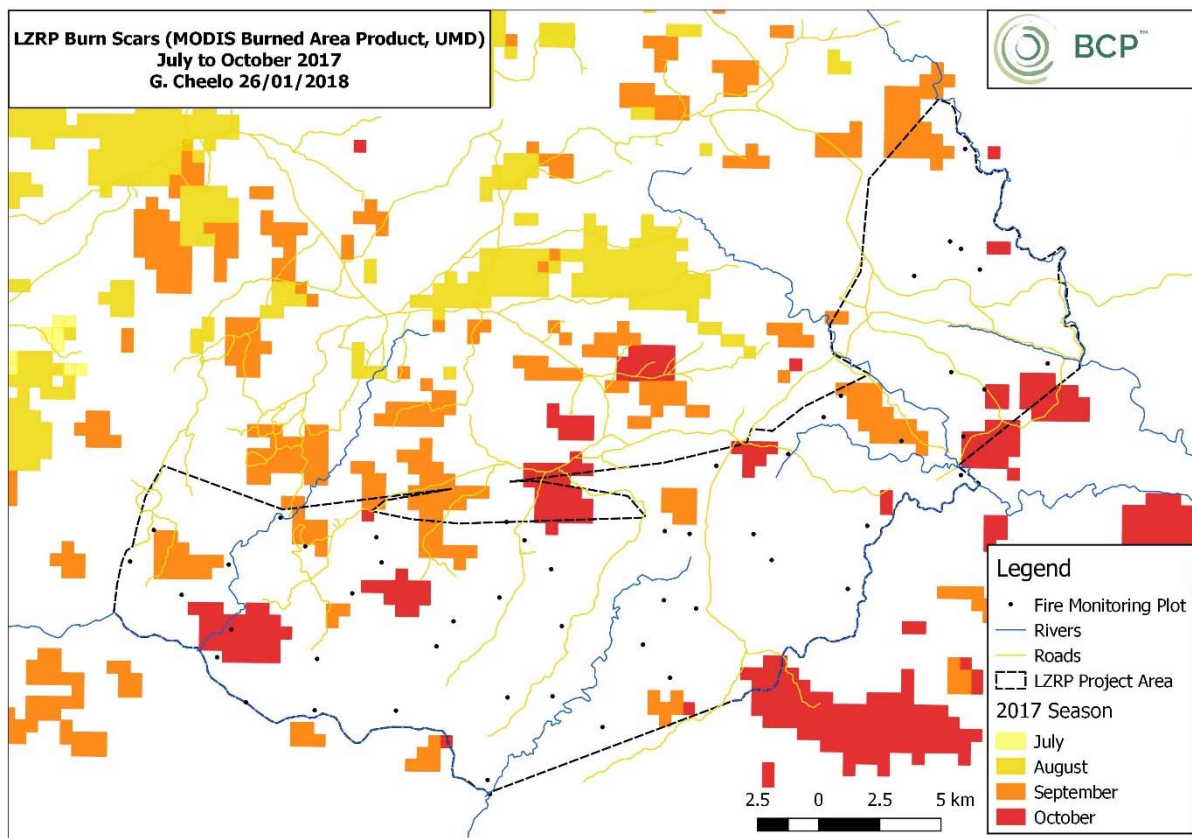


Figure 11 Burned areas in 2016 recorded by MODIS with monitoring plot locations.

No losses were found in the sampling following the M4 fire season. Sampling within the burn scar areas has occurred as part of the continued biomass monitoring initiatives described in Section 2.

In addition, we have implemented a new fire monitoring system to supplement the plot monitoring. It consists of 40 belt transects (Figure 11) of 2mx100m randomly located across the project area. The transects have been permanently marked and all live trees with circumference $\geq 15\text{cm}$, tagged and recorded for future monitoring. This monitoring will be done annually after the fire season.

MR.38 A map of the boundaries of any significant disturbance in the project accounting areas during the monitoring period.

There was a minor incidence of illegal pole cutting in the project area. All the poles were located, georeferenced and measured. It was a minor point based disturbance and not mapped.

The generic allometric equation of Chidumayo (2013) was applied to the poles and the total emissions equaled 15.3 tCO₂e. For calculations please see Appendix ?

MR.39 Evidence that plots were installed into these disturbed areas and were measured per section 9.

Plots were not installed in the disturbed area, the disturbance was too widely dispersed and of a very low intensity. Instead, tracks made by loggers were followed and the Forest Monitoring Team searched the area for evidence of disturbance. All stumps found were ,marked, tagged and measured.

MR.40 A table of events when woody biomass was burned during the monitoring period, showing the weight of woody biomass in tonnes and the date consumed.

No woody biomass in the Other Tree pool was burnt during the monitoring period.

Table 6 is a summary of all charcoal produced by project activities. Charcoal production takes place outside of the accounting area in an area that would have been deforested as part of the baseline.

3.2.3 Leakage

MR.44 Leakage Mitigation Strategies A description of project activities that have been implemented since the project start date and the estimated effects of these activities on leakage mitigation.

See Section 4.1 for a summary of project leakage mitigation activities and a detailed description of how these projects will achieve leakage mitigation can be found in the Project Design Section 1.8.

During the third monitoring period, a total of 30 plots were sampled using a predefined leakage monitoring strategy. Observed degradation was calculated from these plots as being 0.087 using equation B.9 VM0009 V.2.1 (see Appendix E for calculations). This value is slightly lower than what was recorded for monitoring period 3.

Table 9. Monitoring results for the activity shifting leakage area for the third monitoring period.

Plot no	Stump count	Leakage score	Degradation Factor
RuIn11	4	0.69%	0.2
RuIn13	2	0.34%	0.2
RuIn22	9	1.54%	0.2
RuIn23	0	0.00%	0
RuIn26	0	0.00%	0
RuIn31	0	0.00%	0
RuIn35	1	0.17%	0.2
RuIn48	28	4.80%	0.2
RuIn60	7	1.20%	0.2
RuIn9	2	0.34%	0.2
RuIn8	6	1.03%	0.2
RuIn6	0	0.00%	0
RuIn41	2	0.34%	0.2
RuIn12	0	0.00%	0
RuIn33	3	0.51%	0.2
RuIn36	0	0.00%	0
RuIn38	9	1.54%	0.2
RuIn34	0	0.00%	0
RuIn50	23	3.94%	0.2
RuIn44	0	0.00%	0
RuIn7	0	0.00%	0
RuIn45	0	0.00%	0
RuIn59	0	0.00%	0
RuIn10	0	0.00%	0
RuIn56	0	0.00%	0
RuIn19	0	0.00%	0
RuIn28	0	0.00%	0
RuIn5	0	0.00%	0
RuIn29	0	0.00%	0
RuIn32	1	0.17%	0.2
Pldeg			0.087

MR.45 Estimating Emissions from Activity-Shifting Leakage Calculated cumulative emissions from activity-shifting leakage for the current monitoring period $E_{LAS}^{[m]}$ and supporting calculations.

Using the Leakage Emissions Model, emissions from activity shifting leakage were calculated as - 830,433 tCO₂, corrected to zero in overall estimation of leakage (equation F.42), as no positive leakage is credited. Results are reported in Table 9 and calculations can be found in Appendix E and Appendix F. None of the leakage plots obtained a rating of greater than 0.8, the deforestation threshold prescribed in VM0009 V2.1.

MR.46 Calculated cumulative emissions from activity-shifting leakage for the prior monitoring periods $E_{LAS}^{[m]}$

Equal to zero, there was no activity shifting leakage in *m4*.

MR.47 Estimating Emissions from Activity-Shifting Leakage Calculated cumulative emissions from activity-shifting leakage for the prior monitoring periods $E_{LAS}^{[m]}$

Equal to zero, activity shifting leakage for *m1* to *m4* are zero.

MR.48 A map of the delineated boundaries.

Figure 1 shows the boundaries of the leakage area.

MR.49 Maps of the landscape configuration, including:

- a. Topography (elevation, slope, aspect);
- b. Recent land use and land cover (either a thematic map created by the project proponent or publicly available map);
- c. Access points;
- d. Soil class maps (if available);
- e. Locations of important markets;
- f. Locations of important resources like waterways or roads; and
- g. Land ownership/tenure boundaries.

Figure 3 and Figure 4 show the landscape configuration of the leakage area.

MR.50 A narrative describing the rationale for selection of activity-shifting leakage area boundaries. If the activity-shifting leakage area is smaller than the project accounting area or cannot be defined, justification for the size of the area.

Forested areas adjacent to the project accounting site have been selected as the activity-shifting leakage area. Landsat imagery from a number of dates throughout the reference period were visually interpreted to determine if the leakage area has been forested for at least ten years prior to the project start date. To preserve the conservative nature of the project, only areas accessible to the agents of deforestation were selected. To maintain the conservative nature of the project, areas with steep slopes were removed from the leakage area. These included areas with a slope of greater than 20°.

In the present project, the leakage area abuts the project accounting area on its north western border and shares approximately 26 km of its perimeter with the accounting area. The leakage area also shares approximately 5 km of its boundary with the Lower Zambezi National Park.

The rest of the perimeter allows free access to the leakage area. Free access to the leakage area was determined during sampling activities undertaken by the BioCarbon Partners field sampling team. During these monitoring activities the team were able to easily access the entire leakage area as shown by the locations of monitoring plots (Figure 6), there were no issues with private land owners, rivers, or rugged terrain.

MR.51 Results of a spatial analysis to demonstrate the activity-shifting leakage area is entirely forested as of the project start date.

Figure 12 shows the results of a supervised classification of the activity shifting leakage area indicating that all areas with a slope <20% were forested as of the project start date.

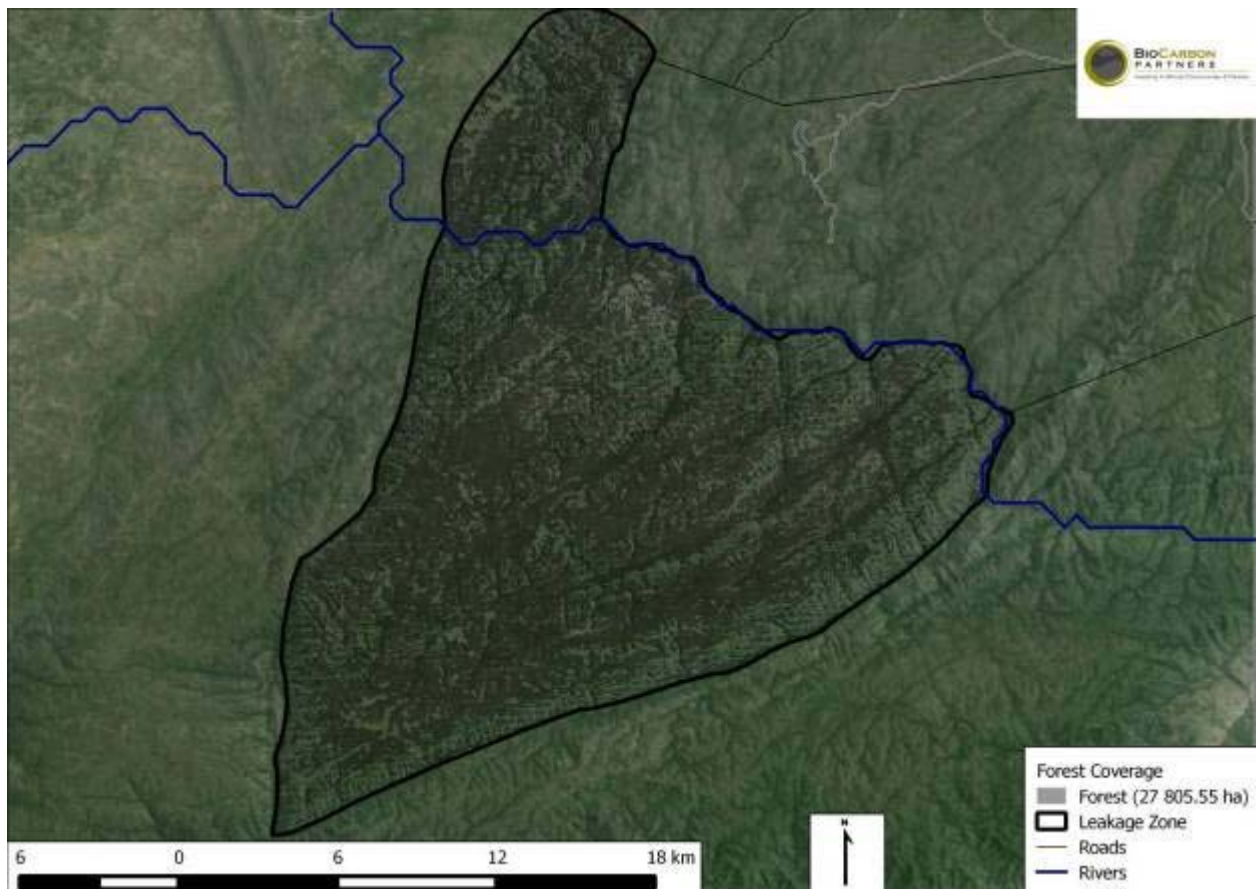


Figure 12. Forest cover of the activity shifting leakage area.

MR.52 Results of a spatial analysis to demonstrate the activity-shifting leakage area is no larger than the project accounting area .

The activity shifting leakage area that will be subjected to deforestation is 27806 ha (Appendix J).

MR.53 The estimated value $\hat{P}_{L\ DEG}^{[m]}$ for the current monitoring period and supporting calculations.

Table 9 shows the results of leakage monitoring, the value of $\hat{P}_{L\ DEG}^{[m]} = 0.087$ using equation B.9, VM0009 V.2.1. For calculations please see Appendix E.

MR.54 The calculated value $\hat{P}_{L\ DEG}^{[m=0]}$ calculated for the first monitoring period.

The value for $m1 = 0.087$

3.2.4 Net GHG Emission Reductions and Removals

MR.58 Quantified GERs (equals NER's per guidelines of VCS Monitoring Template V3.3) for the current monitoring period including references to calculations.

A summary of net GHG removals and reductions are provided in Table 10. Baseline emissions were calculated using equation F.15 of VM0009 Vers 2.1. Project Emissions were zero. Gross Emissions Reductions (equals NER's per guidelines of VCS Monitoring Template V3.3) were calculated using equation F.48 VM0009, V.2.1.

Table 10. Summary of net GHG removals and deductions for the current monitoring period by vintage year (see Annex D for calculations).

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2017	179 602	15	0	179 587
Total	179 602	15	0	179 587

MR.59 Quantified GERs (equals NER's per guidelines of VCS Monitoring Template V3.3) for the prior monitoring period.

For $m4$ the GERs were 163 571 tCO₂e .

MR.60 A graph of GERs (equals NER's per guidelines of VCS Monitoring Template V3.3) by monitoring period for all monitoring periods to date.

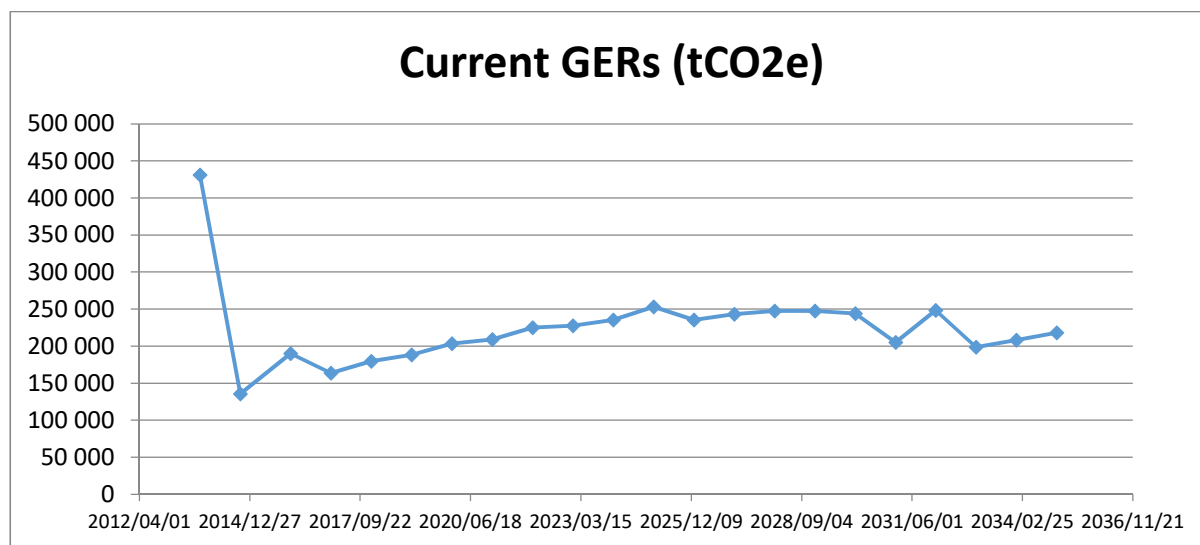


Figure 13. Current GERs (equals NER's per guidelines of VCS Monitoring Template V3.3) by monitoring period for the LZRP.

MR.61 The confidence deduction $E_U^{[m]}$ and estimated standard errors used to determine the confidence deduction.

$U_B^{[m]}$ – Total uncertainty in proxy area carbon stock estimate = 60,520 tCO2e

$U_{EM}^{[m]}$ – Total uncertainty in Baseline Emissions Models = 5,063 tCO2e

$U_P^{[m]}$ – Total uncertainty in project accounting area carbon stock estimate = 882,520 tCO2e

E_u – Total uncertainty = -4,2155 tCO2e = 0

There were no confidence deductions.

MR.62 Reference to calculations used to determine the confidence deduction.

$U_B^{[m]}$ equation B.10 VM0009 V.2.1

$U_{EM}^{[m]}$ equation F.14 VM0009 V.2.1

$U_P^{[m]}$ equation B.10 VM0009 V.2.1

E_u equation F.52 VM0009 V.2.1

Please see Appendix E for calculations.

MR.67 Quantified NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) for the current monitoring period including references to calculations.

The NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) for the current monitoring period is reported in Table 11. NERs were calculated using equation F.50, VM0009 V.2.1, for calculations please see Appendix F.

MR.68 Quantified NERs for the prior monitoring period.

For *m4* the NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) were 143 861 tCO₂e (Appendix F).

MR.69 A graph of NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) by monitoring period for all monitoring periods to date.

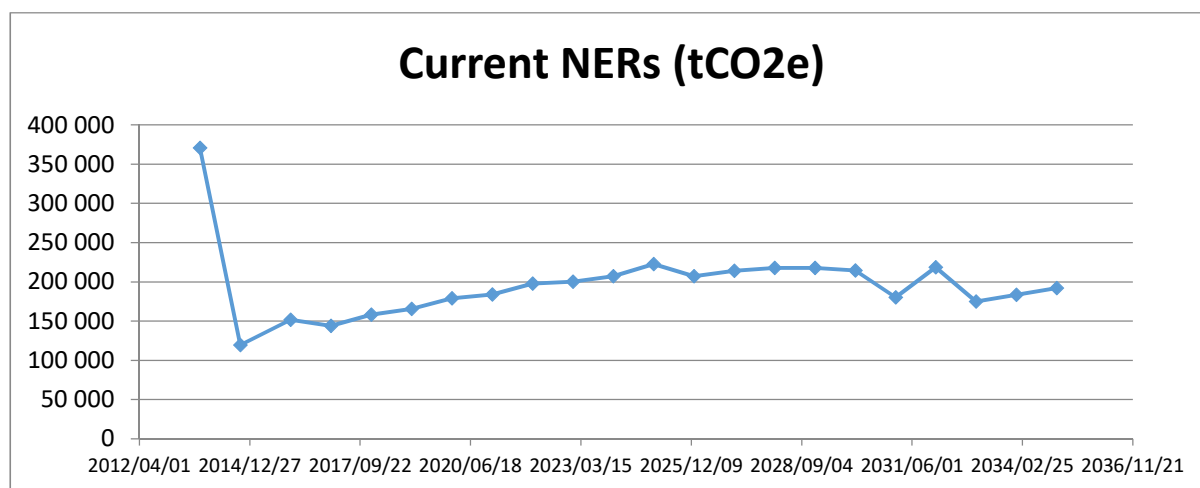


Figure 14. Graph of NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) for LZRP.

MR.70 Reference to the VCS requirements used to determine the buffer account allocation.

VCS Non-Permanence Risk Assessment Tool V3.2 was used to calculate buffer account allocation and calculated by GERs x Non Permanence Risk score (10%) = 17 959 tCO₂e.

Table 11. Buffer account allocation per vintage year.

Year	Current Baseline Emissions (tCO ₂ e)	Current Project Emissions (tCO ₂ e)	Current Leakage (tCO ₂ e)	NERs (tCO ₂ e)	Buffer account (tCO ₂ e)	VCUs (tCO ₂ e)
2017	179 602	15	0	179 587	17 959	161 628
Total	179 602	15	0	179 587	17 959	161 628

Please see Appendix I for non-permanence risk rating calculations.

MR.71 Reference to calculations used to determine the buffer account allocation.

The non-permanence risk is 10%. Please see Appendix I for non-permanence risk calculations and references used to calculate risks.

MR.75 Quantified NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) by vintage year for the current monitoring period including references to calculations.

The net emissions reductions (VCUs) for the current monitoring period is 161 628 tCO₂e.

Vintage NERs (termed GERs in VM0009 V2.1) were allocated by year proportional to the number of calendar days in each year relative to the total number of days in the current monitoring period as per VM0009 V.2.1 (Appendix F). NERs (termed GERs in VM0009 V2.1) were quantified using equation F.48 VM0009 V2.1 (Appendix F).

MR.76 Comparison of NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) presented for verification relative to NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) from ex-ante estimates.

There is a difference of 15t CO₂e due to the illegal logging event.

Ex-ante NERs (equals VCU's issued per guidelines of VCS Monitoring Template V3.3) were 161 643 tCO₂e and after the illegal logging NERs ((equals VCU's issued per guidelines of VCS Monitoring Template V3.3) were 161 628 tCO₂e.

MR.77 Description of the cause and effect of deviations from ex-ante estimates.

There was an illegal logging event described in section 4.2.

3.3 Optional Criterion: Climate Change Adaptation Benefits

3.3.1 Activities and/or Processes Implemented for Adaptation (GL1.4)

The project zone is predicted to experienced increased temperatures and more erratic rainfall due to climate change. Rainfall is not predicted to decrease much, but rather increase in variability with fewer, more intense rainfall events with potential impacts on subsistence agriculture and wildlife habitat.

The project's main climate change adaptation activities are diversification of income streams and resilience as described in section 4.1 and 5.1. People in the project zone are already benefitting from improved agricultural practices thanks to the conservation farming project. The honey project is generating new income streams and the eco-charcoal project is ensuring sustainability in the charcoal industry. Biodiversity benefits from the protection of an additional 41 000 ha of intact Miombo woodland.

4 COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CM1.1)

As was described in the initial Project Design Document (project description) for the LZRP, the deforestation mitigation activities of the LZRP were designed to enhance livelihoods in a sustainable manner and not to restrict access to natural resources.

Table 12 provides a summary of project activities, anticipated impacts (as proposed in 2013) and achieved impacts, to date.

Table 12. Summary of project activities and implementation status.

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
Miombo Mushroom Business	+ Increased household income from new business + Increased cash-flow within community due to more households with income	+ Increased food security from surplus product + Women, youth and marginal groups able to participate	+ Adds additional incentive to protect forest areas where mushrooms grow + Compatible with deforestation mitigation efforts + Does not impact water supply + Reduced need to clear fields or produce charcoal for additional income	<u>Positive:</u> + Business opportunity + Improved food security + Easy for women and children to be involved	Positive	Inactive not currently viable
Seasonal Thatch Business	+ Increased household income from new business + Increased cash-flow within community due to more households with income	+ Women, youth and marginal groups able to participate	+ Reduces fuel load; protection against hot late-season fires + Compliments BCP's "early burning" plan as part of improved Conservancy management + Does not impact water supply + Reduced need to clear fields or produce charcoal for additional income	<u>Positive:</u> + Business opportunity + Easy for women and children to be involved	Positive	Inactive not currently viable
Social Services (ex: school, borehole, clinic)	+ Reduces cost of access (ie: lower transport costs to attend clinic or schools, less money spent on accessing water or paying for private education or healthcare options in urban areas)	+ Targets children and vulnerable groups + Improves community health through access to clean water and healthcare + Improved education and school attendance rates, through shorter distance to attend school and local education available + Less time/money spent accessing better, more local resources	+ Use of hydra-form brick machine to construct or refurbish buildings reduces demand for wood-fired bricks; supports deforestation mitigation efforts and reduces emissions + Improves access to community water resources (boreholes) + Does not negatively impact community forest / clearing	<u>Positive:</u> + Improves quality of local options + Reduces costs associated with private, distant options, or transportation + Improves health and education + Improved access to resources . Risk: ensure not to attract in-migration that increases pressure on community resources	Positive	Ongoing

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
Sustainable Eco-Charcoal Production	+ Increased income paid to producers + Generation of funds for community trust + Reduced fees lost to transportation or bribes + Community-run business opportunity + Niche-market product that promotes sustainable, community-based inclusive business	+ Reduction in corruption (legitimate fee structure) + Women involved, in drum kilns + Institutional strengthening: Creation of Eco-Charcoal Association to ensure compliance with terms of Community Covenant + Community management of natural resources	+ Financial incentives to protect forest and harvest sustainably + Community forest protected + Sustainable harvesting of forest resources + Improved community access to forest resources + Reduced incentive to deforest / compatible with deforestation mitigation efforts	<u>Positive:</u> + Increased income to producers + Increased funds within community + Sustainable use of forest resources + Community involvement in forest protection + Reduced unsustainable charcoal production	Positive	Ongoing
Sustainable Honey Production	+ Increased household income from new business + Increased cash-flow within community due to more households with income	+ Women, youth and marginal groups able to participate + Additional access to honey for nutrition/diet	+ Promotes forest protection for apiaries + Compatible with deforestation mitigation efforts + Does not negatively impact water availability + Introduces sustainable hives; reduce deforestation from traditional methods + Reduced need to clear fields or produce charcoal for additional income	<u>Positive:</u> + Business opportunity + Access to community-produced honey (less expensive than to purchase; benefit to diet)	Positive	Ongoing
Sustainable Hydra-Form Brick Making	+ Reduced money spent on cement (less needed) + Reduced cost of construction for community projects Risk: even if provided access "at cost," it may be more expensive for communities to use the machine than to make wood-fired mud bricks, as villagers may not value the opportunity cost i.e. the value of their labour days to produce wood fired bricks.	+ Facilitated construction of community buildings + Community members have access to improved brick-making options	+ Reduced deforestation, as no need to cut trees for firewood + Reduced use of cement, which reduces emissions caused by construction	<u>Positive:</u> + Improved building structures + Possible employment (community construction projects)	Positive	Inactive not currently viable

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
Tree Planting (woodlots), Tree Nurseries, Orchards	+ Possible business opportunity + "Free" trees to local communities (donated by Forestry Department)	+ Women, youth and marginal groups able to participate + School Orchards generate interest in tree protection and provide food/business source + Improved diet from fruit trees and <i>Moringa</i> spp.	+ Promotes reforestation and rehabilitation efforts + Generates interest in tree protection <i>Risk:</i> Project should not be implemented where community water resources are limited <i>Risk:</i> area for tree-planting or nursery should not result in deforestation/ clearing	<u>Positive:</u> + Potential source of income or employment + Involves community in tree-care and reforestation + Possible source of food (fruit), fertilizer (<i>Faidherbia albida</i>) or nutritional supplement (<i>Moringa</i> spp.)	Positive	Ongoing
Scholarships programme	+ Increased financing for education + Reduced household expenditures on education	+ Increased school attendance + Focus on youth	+ Increased environmental education and awareness, promotes environmental protection	<u>Positive:</u> + Improved access to education + Improved environmental protection	Positive	
Crop Diversification	+ Improved access to seeds + Reduced risk of lost crops + Improved access to agricultural markets through partner orgs + Additional income generation	+ Improved resiliency + Promotes food security + Promotes producer cooperatives/associations	+ Promotes resiliency and improved agricultural production + Reduced pressure to expand fields	<u>Positive:</u> + Improved food security, income generation and resiliency to climate change	Positive	Ongoing
Vegetable Production	+ Possible business opportunity + Reduced cost of vegetables to local communities (no transport) + Increased cash-flow within community due to more households with income	+ Women, youth and marginal groups able to participate + Improved food security	+ Participation in business/project can be linked to assistance protecting project boundaries; preventing deforestation <i>Risk:</i> Project should not be implemented where community water resources are limited	<u>Positive:</u> + Business opportunity + Easy for women and children to be involved	Positive	Ongoing
Miombo Fruit Company	+ Possible business opportunity + Increased cash-flow within community due to more households with income	+ Women, youth and marginal groups able to participate + Improved food security through	+ Compatible with forest protection projects; fruit can be harvested from protected forest areas	<u>Positive:</u> + Business opportunities + Forest protection incentive	Positive	Inactive not currently viable

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
	+ Dried fruit: obtain higher prices due to sale post-season	improved/continual access to fruit	+ Increased value placed on protecting fruit trees; reduced incentive for deforestation	+ Involves women, youth and marginal groups		
Sewing Project	+ Possible business opportunity + Increased cash-flow within community due to more households with income	+ Target women for involvement + Increases training; capacity-building for women/participants	+ Can be linked to reducing income from deforestation-dependent activities	<u>Positive:</u> + Income generation; business opportunity targeted at women	Positive	Inactive not currently viable
Edible Insect Project	+ Possible business opportunity with low start-up cost	+ Women, youth and marginal groups able to participate + Improved food security + Promote traditional food source/harvesting techniques	+ Compatible with forest protection projects; insects can be harvested from protected forest areas + Increased value placed on protecting forest; reduced incentive for deforestation	<u>Positive:</u> + Improved food security + Income generation + Promotes forest protection + Traditional knowledge	Positive	Inactive not currently viable
Savings and loans group	+ Increased access to finance within communities + Promotes local business development + Community-managed funds promote community projects and business innovation + Increased financial knowledge	+ Women, youth and marginal groups able to participate + Promotes community-based projects and self-enforcement	+ Money can be used to finance alternatives to deforestation + Conditional access to loans can promote forest protection efforts	<u>Positive:</u> + Increased money within communities + Increased financial awareness + Community ownership of finances, projects and businesses	Positive	
Educational Programs	+ Increased awareness / knowledge of environmental issues + Target youths + School support programs improve local educational services	Environmental Education Program initiated in 2013.	+ Involvement of youths + Regular community events raise public awareness + Highly visible program reaching many households creates widespread awareness about environmental issues; empowers youths to deliver messages and take action related to environmental issues / conservation	<u>Positive:</u> + Broadens children's education + Understanding of environmental issues + Move towards sustainability	Positive	Ongoing

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
Rent-to-own	+ Reduced cost of access to equipment + Promotes business development + Opens access to equipment/start-up materials for lower-income households	+ Women, youth and marginal groups able to participate + Allows greater range of livelihood activities in community	+ Equipment can be used to start alternatives to deforestation + Conditional access to equipment can promote forest protection efforts + Improved agriculture or business opportunities reduces need to deforest	<u>Positive:</u> + Promotes inclusive, community-driven business and expansion opportunities	Positive	

4.1.2 Net Positive Community Well-Being Impacts (CM1.1)

In addition to the specific community livelihoods activities listed above, it should be noted that these impacts are taking place within the wider framework of the effective development and implementation of community-based REDD+ activities, under the LZRP. A such, additional impacts worth noting include:

- Increased community financial resources derived from forest-protection activities, that simultaneously lead to substantive improvements in community well-being, promote improved governance (among community institutions, and the communities that hold them accountable), and create tangible incentives for conservation.
- Employment opportunities for members of local communities.
- Improved natural resources management leading to healthy local ecosystems.

It should be noted that, to date, the LZRP has achieved the following impacts in local communities:

- Community stakeholders benefitting from REDD+ and participating in revenue-sharing activities;
- A total of 908 000 ZMK distributed to local communities as community revenue-share derived from REDD+ forest protection activities of the LZRP;
- Additional investment into community projects that promote improved livelihoods and conservation;
- A total of 7 303 community stakeholders directly participating local livelihoods activities supported by the LZRP, including the targeted inclusion of women, and youths (through the Environmental Education Program (EEP)):
 - Conservation Farming program:
 - Total # participants: 750
 - # Males: 368
 - # Females: 382
 - Honey Production Program:
 - Total # participants: 420

- # Males: 321
- # Females: 99
- Eco-Charcoal program:
 - Total # participants: 39
 - # Males: 32
 - # Females: 7
- Environmental Education Program (specifically targeted at youths in local schools):
 - Total # participants: 143
 - # Males: 75
 - # Females: 68
- **40** local jobs created
- Infrastructure / social services investments made in local communities, using funds generated through the LZRP. These investments have wide-reaching impacts on local communities, and positively impact the lives of women, youths, and members of vulnerable / minority groups, equally.

In 2017, BCP commissioned a Socio-Economic Impact Assessment survey (Appendix C), as a follow-up study to assess project impacts on local stakeholder livelihoods since the initial baseline survey was conducted at the start of project implementation, in 2012. The 2017 study was conducted as part of BCP's Social Monitoring Program for the LZRP, and was completed by an external research firm (Mint Advisory Services). The 2017 follow-up Impact Assessment study for the LZRP shows **overwhelmingly positive** impacts of the project on local stakeholder community livelihoods. A summary of key positive impacts measured and documented by this study include:

- Drastic increase in average reported annual household income.
- Reduced dependency on charcoal production, with a shift away from charcoal as the most significant source of income for local community members, to agriculture;

- Significant participation and involvement of local community members in REDD+ activities;
- Significant community stakeholder reported perception of “benefits” from REDD, and support for the ongoing implementation of REDD+ activities under the LZRP.

Importantly:

- 95% (of 100 respondents) reported that they feel BCP benefits their community^[11]_{SEP}
- 91% of households reported that they perceive direct benefits/inputs to their household from the project^[11]_{SEP}
- 75% of households reported active participation in the LZRP by a member of their household^[11]_{SEP}
- ^[11]_{SEP}96% say BCP is welcome in the community

With 750 participants in the Conservation Farming program, the project is estimated to be reaching **10%** of the stakeholder community population within the project zone for the LZRP, making this one of the largest and most significant interventions supported by the project, and thereby indicating the extent of the positive impacts that this project is having on local community livelihoods and well-being.

Participants in the sustainable eco-charcoal project additionally reported higher incomes as a result of their participation in the project (100% of respondents), as well as satisfaction with the project: 100% said they appreciated the project, and that they would continue.

The 2017 Assessment provides important baseline data, documenting that the majority of participants (91% of respondents) did not have access to this sustainable business opportunity until BCP made this source of diversified, sustainable, increased income possible to them, through our launching of this program. Projected rates of production, yields and income demonstrate significant potential for this intervention to bring significant positive impacts to participants’ livelihoods, in the short- and long-term, which is important as this is also expected to be one of our largest livelihoods interventions, currently reaching 375 participants , or **5%** of the stakeholder community population within the project zone for the LZRP.

In addition to the documented positive impacts that were highlighted in recent assessments, numerous stakeholder “success stories” provide a human face to the impacts that the project is having on individual local stakeholder livelihoods. Impacts reported in these success stories include diversified sources of income, moving away from dependency on unsustainable sources of income towards sustainable livelihoods that promote conservation, increased awareness of environmental issues and appreciation for / support of conservation efforts, and specific improved livelihoods indicators such as higher yields, higher incomes, new sources of incomes, improved access to social services and improved infrastructure raising quality of lives in local communities. Individual stakeholder success stories highlighting project impacts on stakeholder lives from the LZRP are available upon request.

Finally, the overall effective implementation of the REDD+ project model for the LZRP, since 2012, can be seen as bringing demonstrable, documented positive impacts to local community stakeholders, in the form of providing direct and tangible financial payments to local communities in exchange for their support of overall REDD+ conservation efforts.

To date, a total of ZMK 908,000 in revenue share has been channeled into local communities, in 2 rounds of payments for 2015 and 2016 years of sales of verified credits from the project. This is in addition to funding that has been invested into local community programs, infrastructure support, and livelihoods interventions and employment opportunities, as described above, as a direct result of the project. Taken as a whole, these financial amounts have not only gone towards funding the sorts of community infrastructure and livelihoods interventions that have brought the positive impacts as outlined in the sections above, but, perhaps more importantly, on a higher level, these payments can be viewed as meaningfully *empowering* local community stakeholders as true owners and beneficiaries of their own natural resources, and the distribution of these funds has provided important opportunities to build the capacity of local governance institutions, promoting transparency and accountability, and creating incentives for conservation through a Community-Based Natural Resources Management approach. These can all be considered to be short- and long-term positive impacts from the project.

Table 13 below provides an outline of project activities and specific short- and long-term impacts on local community well-being:

Table 13. LZRP Short term and long term community impacts

Activity	Short-Term Impacts	Long-Term Impacts	Net Impacts
Conservation Farming & Agro-Forestry	+ Higher yields + Higher incomes + Food security + Crop diversification + Financial diversification + Technical empowerment / skills / knowledge + Awareness of environmental issues	+ Reduced clearing due to higher productivity / efficiency + Resilient communities in the face of climate change and economic adversity + Conservation incentives + Development of skills base and local knowledge in terms of conservation farming and natural resources management + Market growth around sustainable agriculture	Positive
Eco-Charcoal	+ Higher incomes + Tangible incentive to transition from unsustainable to sustainable practices + Technical empowerment / skills / knowledge + Awareness of environmental issues + Higher efficiency / cleaner technology involved in sustainable charcoal production	+ Reduced deforestation due to unsustainable land-management + Community-based natural resources management + Improved governance of local leaders/institutions + Development of markets / economies around cleaner energy	Positive

Sustainable enterprises based on NTFP harvesting and other sustainable activities that promote conservation	+ Higher incomes + Economic diversification + Sustainable enterprise development + New business opportunities for women, and/or members of marginalized/vulnerable groups	+ Conservation incentives + Reduced deforestation due to sustainable harvesting + Community-based natural resources management + Improved governance of local leaders/institutions + Development of markets / economies around sustainable enterprises + Resilient communities with diversified sources of higher incomes based on sustainable enterprises	Positive
Social Services / Infrastructure	+ Direct benefits on human well-being – provision of improved access to clean/safe drinking water, improved school or healthcare facilities, etc.	+ Healthier communities with higher indicators for human well-being + Improved governance of local leaders/institutions + Empowered communities / community accountability + Reduced incentives to clear to establish new communities – communities “build out” from existing areas of development, around existing social services + Tangible incentives for conservation – promotes REDD+ as PES model with demonstrable impacts on communities and conservation	Positive
Educational Programs	+ Increased awareness / knowledge of environmental issues + Target youths + School support programs improve local educational services	+ Future generations of environmentally-mindful citizens	Positive

Additionally, it is worth noting that, just as it was outlined in the original project description for the project, the LZRP is delivering these positive impacts to local community stakeholders in an area that is defined by high levels of poverty, and dependence on unsustainable consumption of natural resources. These impacts can all therefore be said to be benefitting a population that can be considered to include “poorest of the poor,” with widespread impacts reaching to the poorest 50% of the community – at the very *least*.

In summary: population surveys of stakeholder communities in 2012 and 2017 show that the project is engaging and benefitting approximately 7,303 community stakeholders living within 4 community “zones” – this is broken down into 1197 households, 186 (16%) of which are female-headed, and therefore considered to represent an important category of “vulnerable” members of the community. Through the delivery of community infrastructure projects that are intended to benefit “the wider community” in each of 4 community zones, and through the effective distribution of revenue share and other community payments for conservation that create meaningful incentives for conservation, improved natural resources management, and transparent/effective management community resources to maximize benefits to the widest number of stakeholders possible, the interventions of the LZRP can be said to be reaching the vast majority of these households, if not actually all of them. These households include female-headed households, elderly individuals, youths, and other members of minority or vulnerable groups. As the figures presented in earlier sections (such as section 4.1.1, above) demonstrate, the project is additionally supporting a number of interventions (including: livelihoods interventions, social services interventions, and infrastructure support) that are considered to be directly benefitting at least 7,303 individuals/households, reflecting 100% of the stakeholder community.

For all of these reasons, the project can be said to be achieving short- and long-term positive impacts for local community stakeholders. These impacts are demonstrable and documented through a variety of sources of both quantitative and qualitative data, information and feedback, the vast majority of which is available upon request, but which is ultimately best confirmed by a visit into the local communities, to meet with local community members themselves, to discuss and view the project impacts, directly.

4.1.3 Protection of High Conservation Values (CM1.2)

There has been no negative impacts on any areas of High Conservation Value.

4.2 Offsite Stakeholder Impacts

4.2.1 Mitigation of Negative Impacts on Other Stakeholders (CM2.2)

As described above, there are no stakeholder groups in or outside of the project zone that are anticipated to be negatively impacted by the project. In the event of negative impacts, these should be reported and resolved in accordance with BCP’s grievance mechanism procedures.

Activities that have been undertaken to avoid / mitigate negative impacts on stakeholders include:

- Careful assessment of existing local conditions and stakeholder dynamics, prior to project implementation, as part of the initial project viability assessment and design process (which was thoroughly documented and shared at the time of our original validation);
- Significant stakeholder consultation prior to project implementation, as part of the Free, Prior and Informed Consent (FPIC) procedures followed, and as outlined in BCP's Standard Operating Procedure (SOP) for FPIC. This included consultation with relevant government authorities and community leaders, to identify any potential project impacts and to ensure that the project would be designed to avoid negative impacts, and to ensure that adequate feedback and reporting mechanisms would be in place between BCP and local stakeholders, to ensure that any problems, concerns, questions or updates could be communicated effectively between the implementing parties of the project, to ensure their resolution in an effective and timely manner;
- BCP maintains regular community presence and undertakes regular assessments of program activities and impacts (as described in section 4.3, below, in greater detail), to ensure that any potential negative impacts would be identified, reported, documented, and addressed/resolved within in a timely manner;

BCP additionally works closely with local stakeholder governance institutions and local government partners, in order to promote a truly community-driven project implementation model, with the support and knowledge of local government and local traditional leaders. This model is intended to ensure that the project is implemented in ways that are locally appropriate, to minimize any potential local risks, and ensure that any potential problems are identified, reported and responded to appropriately.

4.2.2 Net Impacts on Other Stakeholders (CM2.3)

There are no stakeholder groups negatively impacted.

4.3 Community Impact Monitoring

4.3.1 Community Monitoring Plan Development (CM5.3)

Not applicable.

4.3.2 Community Monitoring Plan Results (CM5.1, CM5.2, GL2.5)

Since the project was initiated, BCP has adhered to the terms of a rigorous Social Monitoring Program, as was originally outlined in a Standard Operating Procedure (SOP Appendix B) has been in place since 2012. Key elements (Table 14) of this monitoring program include:

- Regular field-based presence, including local staff and a “field-based” project implementation model, to allow for regular monitoring and reporting of project impacts, and collection of data on a regular basis;
- Regular collection of information from field-based teams, pertaining to key areas of project implementation and performance;
- Regular reporting periods, including the compilation of reports providing updates on project implementation, and key indicators for success/performance. These reports are shared with external stakeholders;
- Undertaking socio-economic Impact Assessments on a 2-5 year timeline, to assess project impacts on general stakeholder well-being;
- Undertaking project-specific impact assessments on a regular (2-5 year) basis, to assess the impacts that specific livelihoods activities or other interventions are having on specific, targeted areas of change, to assess their effectiveness.

As a whole, BCP is adhering to a system of “adaptive management” for the LZRP. Under this model for project implementation, we place a heavy focus on collecting regular feedback to assess project impacts, and to use this feedback to adjust, change or influence project design, as needed, to ensure the program is achieving its intended results. Activities are adjusted based on this feedback (Table 15).

In 2017, BCP commissioned four Impact Assessments to be conducted by an external research firm (Mint Advisory Services), to assess and quantify impacts that the project has had on stakeholder livelihoods, to date. Surveys conducted included:

- **Follow-up Social Monitoring Survey / Impact Assessment** to assess general project impacts on key socio-economic indicators of community stakeholder well-being, at the five-year point in project implementation. The survey was conducted among a representative sample of 100 households selected at random from across the four community “zones” where the project is taking place. Where possible, the same households were surveyed as had been originally surveyed in the initial 2012 baseline that was conducted at the start of project implementation – this was possible for 74 of the original 90 households. For the most part, the same questionnaire was used (but updated to a digital format), to allow for comparability of results, to assess project impacts.

- Project-specific Impact Assessments for key livelihoods interventions, including:
 - **Conservation Farming:** 100 farmers were surveyed from 4 participating community zones, reflecting a representative sample size of 13% of the 750 farmers participating in the program, overall.
 - **Sustainable Eco-Charcoal:** 15 beneficiaries in three participating zones as follows: Mweshang'ombe (5 participants), Ndubulula (5 participants) and Namanongo (5 participants). This is considered to be an extremely representative sample of the total participants in the project, from these 3 zones.
 - **Honey Production:** 90 farmers were surveyed from 4 participating community zones, reflecting a representative sample size of 24% of the 375 farmers participating in the program, overall.

In all cases, efforts were made to ensure that survey sample sizes were representative of stakeholders – this was done by ensuring that large-enough sample sizes were collected, and by ensuring that respondents were selected as representatively as possible. For example, efforts were made to ensure that respondents from all four community zones were selected, for the general Social Monitoring survey (to assess overall project impacts), and for the Conservation Farming and Honey Production interventions, which are being implemented in all 4 zones. The decision to use an external research firm to complete the surveys was made with the aim of ensuring neutrality and integrity of responses, to ensure that feedback received would be genuine, and therefore would be most reflective and “useful” to the program, for adaptive management and monitoring and evaluation purposes.

Copies of the survey templates used, as well as survey reports, are available upon request. In addition to the broader Social Monitoring Program of the LZRP, BCP is also adhering to a Monitoring and Evaluation (M&E) Plan that was developed for the purposes of managing funding from the United States Agency for International Development (USAID), including USAID funds that are being used to support activities under the LZRP. This M&E Plan involves the regular collection and reporting of data against **15** indicators, on a minimum quarterly basis. According to the terms of the M&E Plan, BCP is collecting data pertaining to key indicators for community, economic and conservation impacts of the project. The plan itself contains detailed descriptions on the types of data to be collected, as well as clear prescriptions for who is responsible for data collection for each indicator, and specifically outlines how data is to be collected, shared and reported. A copy of the M&E Plan that is being used for the LZRP is available upon request. Quarterly and annual reports containing both technical updates as well as monitoring and evaluation updates are also available upon request. These are available for every quarterly and annual period, to date, beginning from 2014, when BCP began receiving USAID funds to support the implementation of activities at the LZRP, as part of the Community Forests Program (CFP).

In addition to the formal reporting processes outlined above, BCP also undertakes monthly assessments and reporting of key technical updates. Monthly reports are compiled by locally-based field “extension” staff, outlining key impacts and highlighting areas of progress and/or concern, on a regular, monthly basis. It is the responsibility of the BCP Communications Team to ensure these monthly reports are compiled and shared with internal and external stakeholders on a regular, monthly basis.

At a bare minimum, monthly reports are to be shared with Community Leaders (traditional authorities, local institutional representatives) as well as local Government partners, as well as key external partners – including, for example, investors, partner organizations, or “interested parties” who have signed up to receive our newsletters and updates. Each monthly report contains contact information to allow interested parties to contact BCP to provide feedback and/or ask questions. These monthly reports are therefore an important part of our regular monitoring and accountability processes for the project.

Table 14. LZRP Community parameters monitored.

Parameter	Monitoring, Reporting and Verification Frequency	Current Status	Result
Annual household income	Biennial (every 2 years)	Reviewed in 2017	Improved
Household size and age and gender composition	Biennial (every 2 years)	Reviewed in 2017	Stable
Income from agriculture	Biennial (every 2 years)	Reviewed in 2017	Improved
Income from charcoal production	Biennial (every 2 years)	Reviewed in 2017	Improved
Participation in conservation agriculture	Biennial (every 2 years)	Reviewed in 2017	Improved
Participation in eco-charcoal production	Biennial (every 2 years)	Reviewed in 2017	Improved
List of major assets	Biennial (every 2 years)	Reviewed in 2017	Improved
Highest education level in household	Biennial (every 2 years)	Reviewed in 2017	Stable
Number of dependents attending school	Biennial (every 2 years)	Reviewed in 2017	Stable
Direct & indirect benefits from Lower Zambezi REDD+ Project	Biennial (every 2 years)	Reviewed in 2017	Improved
Employment status	Biennial (every 2 years)	Reviewed in 2017	Improved

Table 15. Current status of LZRP community project activities.

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
Miombo Mushroom Business	+ Increased household income from new business + Increased cash-flow within community due to more households with income	+ Increased food security from surplus product + Women, youth and marginal groups able to participate	+ Adds additional incentive to protect forest areas where mushrooms grow + Compatible with deforestation mitigation efforts + Does not impact water supply + Reduced need to clear fields or produce charcoal for additional income	<u>Positive:</u> + Business opportunity + Improved food security + Easy for women and children to be involved	Positive	Inactive not currently viable
Seasonal Thatch Business	+ Increased household income from new business + Increased cash-flow within community due to more households with income	+ Women, youth and marginal groups able to participate	+ Reduces fuel load; protection against hot late-season fires + Compliments BCP's "early burning" plan as part of improved Conservancy management + Does not impact water supply + Reduced need to clear fields or produce charcoal for additional income	<u>Positive:</u> + Business opportunity + Easy for women and children to be involved	Positive	Inactive not currently viable
Social Services (ex: school, borehole, clinic)	+ Reduces cost of access (ie: lower transport costs to attend clinic or schools, less money spent on accessing water or paying for private education or healthcare options in urban areas)	+ Targets children and vulnerable groups + Improves community health through access to clean water and healthcare + Improved education and school attendance rates, through shorter distance to attend school and local education available + Less time/money spent accessing better, more local resources	+ Use of hydra-form brick machine to construct or refurbish buildings reduces demand for wood-fired bricks; supports deforestation mitigation efforts and reduces emissions + Improves access to community water resources (boreholes) + Does not negatively impact community forest / clearing	<u>Positive:</u> + Improves quality of local options + Reduces costs associated with private, distant options, or transportation + Improves health and education + Improved access to resources . Risk: ensure not to attract in-migration that increases pressure on community resources	Positive	Ongoing
Sustainable Eco-Charcoal Production	+ Increased income paid to producers	+ Reduction in corruption (legitimate fee structure)	+ Financial incentives to protect forest and harvest sustainably + Community forest protected	<u>Positive:</u> + Increased income to producers	Positive	Ongoing

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
	+ Generation of funds for community trust + Reduced fees lost to transportation or bribes + Community-run business opportunity + Niche-market product that promotes sustainable, community-based inclusive business	+ Women involved, in drum kilns + Institutional strengthening: Creation of Eco-Charcoal Association to ensure compliance with terms of Community Covenant + Community management of natural resources	+ Sustainable harvesting of forest resources + Improved community access to forest resources + Reduced incentive to deforest / compatible with deforestation mitigation efforts	+ Increased funds within community + Sustainable use of forest resources + Community involvement in forest protection + Reduced unsustainable charcoal production		
Sustainable Honey Production	+ Increased household income from new business + Increased cash-flow within community due to more households with income	+ Women, youth and marginal groups able to participate + Additional access to honey for nutrition/diet	+ Promotes forest protection for apiaries + Compatible with deforestation mitigation efforts + Does not negatively impact water availability + Introduces sustainable hives; reduce deforestation from traditional methods + Reduced need to clear fields or produce charcoal for additional income	<u>Positive:</u> + Business opportunity + Access to community-produced honey (less expensive than to purchase; benefit to diet)	Positive	Ongoing
Sustainable Hydra-Form Brick Making	+ Reduced money spent on cement (less needed) + Reduced cost of construction for community projects Risk: even if provided access "at cost," it may be more expensive for communities to use the machine than to make wood-fired mud bricks, as villagers may not value the opportunity cost i.e. the value of their labour days to produce wood fired bricks.	+ Facilitated construction of community buildings + Community members have access to improved brick-making options	+ Reduced deforestation, as no need to cut trees for firewood + Reduced use of cement, which reduces emissions caused by construction	<u>Positive:</u> + Improved building structures + Possible employment (community construction projects)	Positive	Inactive not currently viable

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
Tree Planting (woodlots), Tree Nurseries, Orchards	+ Possible business opportunity + "Free" trees to local communities (donated by Forestry Department)	+ Women, youth and marginal groups able to participate + School Orchards generate interest in tree protection and provide food/business source + Improved diet from fruit trees and <i>Moringa</i> spp.	+ Promotes reforestation and rehabilitation efforts + Generates interest in tree protection <i>Risk:</i> Project should not be implemented where community water resources are limited <i>Risk:</i> area for tree-planting or nursery should not result in deforestation/ clearing	<u>Positive:</u> + Potential source of income or employment + Involves community in tree-care and reforestation + Possible source of food (fruit), fertilizer (<i>Faidherbia albida</i>) or nutritional supplement (<i>Moringa</i> spp.)	Positive	Ongoing
Scholarships programme	+ Increased financing for education + Reduced household expenditures on education	+ Increased school attendance + Focus on youth	+ Increased environmental education and awareness, promotes environmental protection	<u>Positive:</u> + Improved access to education + Improved environmental protection	Positive	Inactive not currently Viable
Crop Diversification	+ Improved access to seeds + Reduced risk of lost crops + Improved access to agricultural markets through partner orgs + Additional income generation	+ Improved resiliency + Promotes food security + Promotes producer cooperatives/associations	+ Promotes resiliency and improved agricultural production + Reduced pressure to expand fields	<u>Positive:</u> + Improved food security, income generation and resiliency to climate change	Positive	Ongoing
Vegetable Production	+ Possible business opportunity + Reduced cost of vegetables to local communities (no transport) + Increased cash-flow within community due to more households with income	+ Women, youth and marginal groups able to participate + Improved food security	+ Participation in business/project can be linked to assistance protecting project boundaries; preventing deforestation <i>Risk:</i> Project should not be implemented where community water resources are limited	<u>Positive:</u> + Business opportunity + Easy for women and children to be involved	Positive	Ongoing
Miombo Fruit Company	+ Possible business opportunity + Increased cash-flow within community due to more households with income	+ Women, youth and marginal groups able to participate + Improved food security through	+ Compatible with forest protection projects; fruit can be harvested from protected forest areas	<u>Positive:</u> + Business opportunities + Forest protection incentive	Positive	Inactive not currently viable

Project Activity	Estimated Impacts on Community Well-Being			Community Evaluation of Impacts	Anticipated Impact on Community Well-Being	Status
	Economic	Social	Natural Resources			
	+ Dried fruit: obtain higher prices due to sale post-season	improved/continual access to fruit	+ Increased value placed on protecting fruit trees; reduced incentive for deforestation	+ Involves women, youth and marginal groups		
Sewing Project	+ Possible business opportunity + Increased cash-flow within community due to more households with income	+ Target women for involvement + Increases training; capacity-building for women/participants	+ Can be linked to reducing income from deforestation-dependent activities	<u>Positive:</u> + Income generation; business opportunity targeted at women	Positive	Inactive not currently viable
Edible Insect Project	+ Possible business opportunity with low start-up cost	+ Women, youth and marginal groups able to participate + Improved food security + Promote traditional food source/harvesting techniques	+ Compatible with forest protection projects; insects can be harvested from protected forest areas + Increased value placed on protecting forest; reduced incentive for deforestation	<u>Positive:</u> + Improved food security + Income generation + Promotes forest protection + Traditional knowledge	Positive	Inactive not currently viable
Savings and loans group	+ Increased access to finance within communities + Promotes local business development + Community-managed funds promote community projects and business innovation + Increased financial knowledge	+ Women, youth and marginal groups able to participate + Promotes community-based projects and self-enforcement	+ Money can be used to finance alternatives to deforestation + Conditional access to loans can promote forest protection efforts	<u>Positive:</u> + Increased money within communities + Increased financial awareness + Community ownership of finances, projects and businesses	Positive	Inactive not currently viable
Rent-to-own	+ Reduced cost of access to equipment + Promotes business development + Opens access to equipment/start-up materials for lower-income households	+ Women, youth and marginal groups able to participate + Allows greater range of livelihood activities in community	+ Equipment can be used to start alternatives to deforestation + Conditional access to equipment can promote forest protection efforts + Improved agriculture or business opportunities reduces need to deforest	<u>Positive:</u> + Promotes inclusive, community-driven business and expansion opportunities	Positive	Inactive not currently viable

With regards to distributing benefits to the poorest of the poor, the initial project baseline identified that the majority of the people in the project zone find themselves below the recognized poverty line. The BCP Community Engagement SOP was specifically designed to ensure that even within this already impoverished community all people have access to project activities and benefits and many are beneficiaries described in the results above.

4.3.3 Dissemination of Monitoring Plan and Results (CM5.3)

Monitoring results get reported in monthly reports and newsletters that are distributed to a wide stakeholder base. The results are also disseminated to local communities during revenue share distribution meetings.

Emissions reduction results are made available publically on the internet annually after each verification on the VCS project database.

4.4 Optional Criterion: Exceptional Community Benefits

4.4.1 Barriers to Benefits (GL2.3)

No barriers were identified preventing the flow of benefits to the poorest of the poor, it is notable that a large number of female headed households are participating and benefitting from project activities. The project was designed from the outset to be inclusive and this was achieved by the setting up of zone development committees that ensured representation of all members of the communities and avoided “elite capture”. The eco-charcoal project for example specifically selected existing subsistence charcoal producers as these members of societies are known to make up the lower income bracket in an already impoverished society. The eco-charcoal has expanded markedly since validation and only current subsistence unsustainable charcoal producers are selected for participation.

4.4.2 Protections for Poorer and More Vulnerable Households and Individuals (GL2.4)

There are no negative impacts on vulnerable households or individuals. As stated the project has specifically designed from ground up to protect such households and individuals and ensure their participation. But poorer sectors of the community are described in Table 16 below:

Table 16. Poorer and more vulnerable community members.

Potential negative impact	No negative impact
Households or individuals affected	Households that rely on the majority of their income from charcoal
Impact aversion and mitigation	Participants in the eco-charcoal project are specifically from these households

5 BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (B1.1)

The Lower Zambezi REDD+ Project initially identified the following areas of biodiversity impact:

- Increase in locally threatened large mammals (such as sable and roan) to healthy densities.
- Locally present endangered species such as the African elephant, lion and African wild dog will benefit from a significant swathe of habitat that is managed with a goal of enhancing these species.
- Decrease of catastrophic late season fires with the implementation of a controlled burning programme.
- Improved health of woodlands due to the increase in large ungulates and reduction of late season fires.
- Continued survival of an entire suite of miombo woodland species that may have become locally extinct on Rufunsa Conservancy in the baseline scenario.
- Maintenance of eco-system functioning and integrity in forests managed for the production of eco-charcoal using the coup and shelter system that would have otherwise been lost if it was clear-felled for charcoal and then converted to agriculture.

Appropriate methodologies to estimate changes in biodiversity have been implemented. These include:

- Scout-based monitoring system to estimate changes in wildlife numbers;
- The use of Geographic Information Systems (GIS);

Threats to biodiversity have been reduced through increased patrolling and monitoring leading to the arrest and prosecution of poachers and the removal of snares and are summarized in in monthly reports and BCP database.

5.1.2 High Conservation Value Protection (B1.2)

There has been no negative impacts on any high conservation value areas due to project activities.

5.1.3 Invasive Species (B1.3)

No invasive species are being used in the project, see 5.1.4 below for a list of all non-native species used.

There is no evidence of the spread of any invasive species in the project area nor the project zone.

5.1.4 Impacts of Non-native Species (B1.4)

Species	<i>Zea mays</i>
Justification of Use	<i>Sorghum</i> spp. Is a potential alternative but has been replaced in favour of maize as it produces bigger yields and not prone to bird predation.
Adverse Effect	No negative evidence documented it is used extensively in Zambia

Species	<i>Cajanus cajan</i>
Justification of Use	No known local alternative, it is a nutritious legume.
Adverse Effect	No negative evidence documented it is used extensively in Zambia

Species	<i>Mangifera indica</i>
Justification of Use	<i>Parinari curatellifolia</i> is a potential alternative and is locally utilised but does not have the same production and fruit size and is slow growing.
Adverse Effect	No negative evidence documented it is used extensively in Zambia

Species	<i>Carica papaya</i>
Justification of Use	No known local alternative with fruit that size.
Adverse Effect	No negative evidence documented it is used extensively in Zambia

Species	<i>Moringa oleifera</i>
Justification of Use	There are possibly alternative local species that have the same nutritional values, but the particular species is particularly fast growing.
Adverse Effect	No negative evidence documented it is used extensively in Zambia

It must be noted that all non-native species used in project activities have been planted in the project zone before project initiation.

5.1.5 GMO Exclusion (B1.5)

No GMOS are used, this is a REDD+ project, not an A/R project.

5.2 Offsite Biodiversity Impacts

5.2.1 Negative Offsite Biodiversity Impact Mitigation (B2.2)

No negative offsite biodiversity impacts have been identified during this monitoring period. Negative potential impacts originally identified was the displacement of poaching from the project zone to other areas due to improved patrolling, but patrolling efforts have been spread beyond the project area boundary into the national park in support of the Department of Parks and Wildlife. The National Park is the only really feasible area where poachers can move to if prohibited from entering Rufunsa, but the added patrols have countered that and numerous arrests having been made.

5.2.2 Net Offsite Biodiversity Benefits (B2.3)

There has been no net offsite negative biodiversity impacts or benefits other than the creation of an increased buffer to the national park.

5.3 Biodiversity Impact Monitoring

5.3.1 Biodiversity Monitoring Plan Development (B3.3)

Not applicable, monitoring plan included in PD and has undergone several updates submitted with previous VCS verification events. Monitoring Plan included as Appendix A.

5.3.2 Biodiversity Monitoring Results (B3.1, B3.2)

Biodiversity is monitored on an ongoing basis (Table 17). Scout patrols and the Forest Monitoring Team (FMT) record all wildlife they see (Appendix ?). In addition there is fixed line transect monitoring using the distance sampling technique that takes place twice every year at the beginning and end of the dry season (Figure 15).

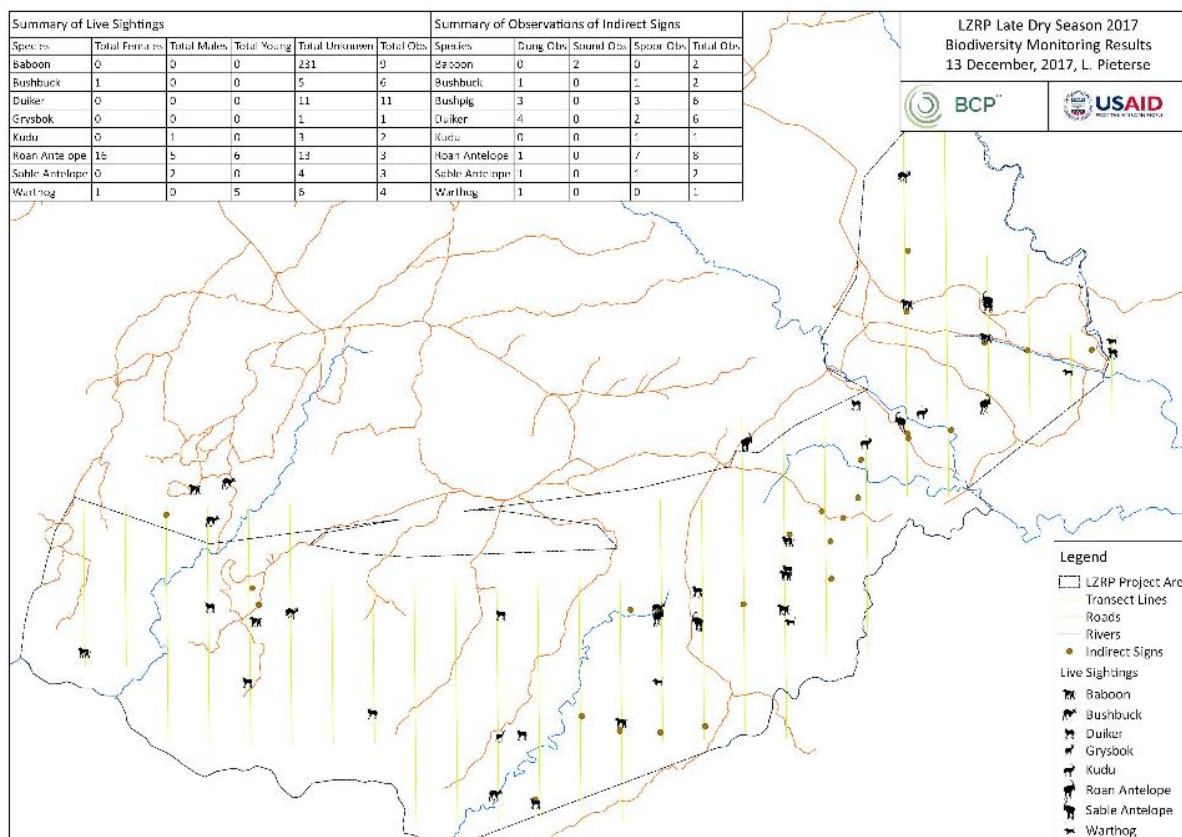


Figure 15. 37 fixed line transects and monitoring results late dry season 2017.

Table 17. Biodiversity Impact Monitoring Variables and MRV.

Variable	Monitoring Frequency	Reporting Frequency	Results
Poachers arrested	Continuous	Biennial (every 2 years)	20
Poachers convicted on wildlife or firearms crimes	Continuous	Biennial (every 2 years)	16
Number of firearms used to poach recovered	Continuous	Biennial (every 2 years)	11
Number of poaching signs, such as campsites, meat racks	Continuous	Biennial (every 2 years)	8
Number of poached wildlife carcasses	Continuous	Biennial (every 2 years)	unknown
Number of snares recovered	Continuous	Biennial (every 2 years)	145
Illegal Grazing	Continuous	Biennial (every 2 years)	None recorded
Illegal charcoal kilns	Continuous	Biennial (every 2 years)	None recorded
Felled trees in Conservancy	Continuous	Biennial (every 2 years)	607
Large mammal type and location	Continuous	Biennial (every 2 years)	Results summary Appendix K
HCV type and location	Continuous	Biennial (every 2 years)	None new recorded

Human wildlife conflict incidents	Continuous	Biennial (every 2 years)	None recorded
Scout patrol days	Monthly	Biennial (every 2 years)	Results BCP Database
Number of Tree species in permanent plots	Annual	Biennial (every 2 years)	Data reported in Appendix E

Table 18. Potential High Conservation Value Species occurring in the Project Zone and current status

Common name	Scientific Name	Status	Global Population Trend ²	Results
Wild Dog	<i>Lycaon pictus</i>	Endangered	Decreasing	Confirmed sighting project zone
White Backed vulture	<i>Gyps africanus</i>	Endangered	Decreasing	No sighting
Hooded vulture	<i>Necrosyrtes monachus</i>	Endangered	Decreasing	No sighting
Greater spotted eagle	<i>Aquila clanga</i>	Vulnerable	Decreasing	No sighting
Lappet faced vulture	<i>Torgos tracheliotos</i>	Vulnerable	Decreasing	No sighting
Southern ground hornbill	<i>Bucorvus leadbeateri</i>	Vulnerable	Decreasing	Regular sighting > 6 family groups
White headed vulture	<i>Trigonoceps occipitalis</i>	Vulnerable	Decreasing	No sighting
Elephant	<i>Loxodonta africana</i>	Vulnerable	Increasing	No sighting
Lion	<i>Panthera leo</i>	Vulnerable	Decreasing	Regular sighting has returned
-	<i>Ochna gambleoides</i>	Local Near Endemic	No Red List Data	No sighting
-	<i>Pavetta crassipes</i>	Local Near Endemic	No Red List Data	No sighting
Rocket Sugarbush	<i>Protea rupestris</i>	Local Endemic	No Red List Data	No sighting
Eared bloodwood	<i>Pterocarpus brenanii</i>	Local Endemic	Lower Risk/Least Concern	No sighting
Nationally Significant: Species in decline in Lower Zambezi NP considered locally threatened³				
Roan	<i>Hippotragus niger</i>	Least Concern	Decreasing	Regular sighting large herds >30
Sable	<i>Hippotragus equinus</i>	Least Concern	Stable	Regular sighting large herds >30
Eland	<i>Tragelaphus oryx</i>	Least Concern	Stable	No sighting

It is currently not possible to come up with reliable population estimates of species as not enough data has been accumulated and animal densities are still relatively low. It must be noted though that Lion (*Panthera leo*) has returned to the conservancy. A pride moves in and out and regularly hunts in the conservancy. Field teams now often see large herds of Sable and Roan antelope which was unheard of before. The largest to date numbered 50 animals. A pack of 10 wild dog (*Lycaon pictus* – IUCN endangered) were sighted by DNPW staff at Mukamba gate in the project zone in 2016 and it was confirmed in writing (Appendix K). BCP staff saw the tracks.

² Source: <http://www.iucnredlist.org>

³ Source: Conservation Lower Zambezi.

The Southern Ground Hornbill (*Bucorvus leadbeateri* - IUCN vulnerable) population has been monitored extensively. To date we have identified up to six different family groups (Figure 16) following a monitoring protocol of locating calling birds from high sites at daybreak. It is currently not possible to give an accurate estimate of the population size with the data at hand, but family groups usually consist of 3 to 6 members and the population is thus on track to achieving the 30 size to meet Gold Level requirements.

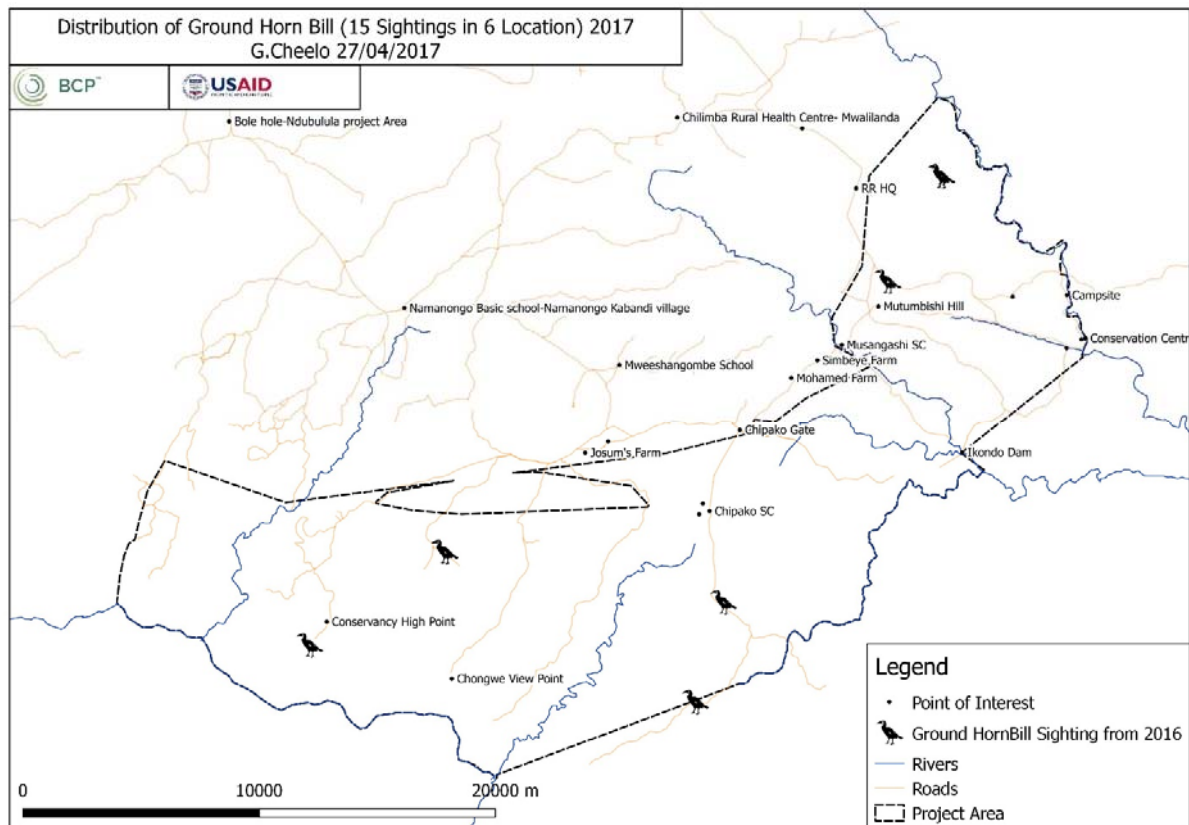


Figure 16. Location of Southern Ground hornbill family groups in Rufunsa Conservancy.

5.3.3 Monitoring Plan and Results Dissemination (B3.3)

Results of monitoring have been made available to stakeholders in project newsletters. Please note though that making results of biodiversity, especially large ungulates, freely available runs the risk of attracting poachers and the information is thus shared sparingly.

6 ADDITIONAL PROJECT IMPLEMENTATION INFORMATION

6.1.1 GL3 – Exceptional Biodiversity Benefits

Monitoring results of exceptional biodiversity benefits are presented in Section 5.3.2 above notably monitoring results on vulnerable and endangered species for qualification of “exceptional biodiversity benefits”.

7 ADDITIONAL PROJECT IMPACT INFORMATION

No additional information

8 APPENDIX

Appendix A Adaptive Management Plan. Confidential

Appendix B BCP Community Engagement SOPs and Monitoring Systems. Confidential

Appendix C Socio-economic baseline re-assessment. Confidential

Appendix D Carbon rights covenant with land owner. Confidential

Appendix E Carbon Inventory. Confidential

Appendix F Emissions Reductions Calculations. Confidential

Appendix G Biomass and soil monitoring protocol. Confidential

Appendix H Leakage monitoring protocol. Confidential

Appendix I VCS Non-permanence risk assessment. Public

Appendix J Spatial Data. Confidential

Appendix K Biodiversity Monitoring Results