



**Verified Carbon
Standard**

**APRIL SALUMEI REDD PROJECT
MONITORING REPORT
2ND PROJECT REPORTING PERIOD**

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Prepared By	Rainforest Project Management Limited
Contact	<i>Stephen Hooper</i> <i>shooper@p-f-a.org</i>

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The April Salumei REDD Project ('the Project') is a pilot project located in the Wosera Gawi and Ambunti Drekiker Districts in East Sepik Province of Papua New Guinea (PNG). The Project comprises an area defined by forested land on mineral soils within the boundaries of two Forest Management Agreements (FMA) authorized by the Papua New Guinea Forest Authority (PNGFA). These areas are known as April Salumei (528,604 hectares -ha-) and April River (75,108 ha). These have a combined area of 603,712 ha that was estimated under a conservative baseline following several studies that suggested that logging operations in PNG are not undertaken on a sustainable basis (Forest Trends, 2006; ODI, 2006; ITTO, 2007; Shearman et al., 2009). The monitoring techniques used by the project (e.g., direct routinary field patrols and indirect satellite images) confirmed that the project area has not changed since the last monitoring report.

The April Salumei FMAs are ecologically significant areas that are rich in traditional culture and hold extraordinary levels of biodiversity. The area is under customary ownership through Incorporated Land Groups (ILGs) that are characterized by low levels of income, healthcare, and education. Therefore, the project aims to protect the forest and its rich biodiversity while improving the overall wellbeing of local communities, supporting sustainable agricultural opportunities, improving access to healthcare, education, and infrastructure, all while preserving the rich cultural traditions and customs of the indigenous peoples.

Through multiple project initiatives and investments (e.g., the Light Up April Salumei, the allocation of funds to schools, tree plantation and the Eaglewood initiatives), which are more fully detailed in later sections of this report, the project has promoted economic development and sustainable agriculture across the various ILGs, thus supporting the creation of sustainable enterprises generating jobs and incomes, assisting with poverty alleviation and closely aligning these activities with the UN Sustainable Development goals.

Stakeholder engagement with international, national, provincial, local governments and ILGs through different activities has fostered awareness on the importance of the management and conservation of the April Salumei FMA through the project.

This monitoring report covers the period from 1 January 2013 to 31 December 2018 and builds on the foundation established during the first monitoring period.

The project has avoided the emission equivalent to **1,628,812 tCO₂e** in this monitoring period.

1.2 Sectoral Scope and Project Type

The April Salumei REDD Project falls under the 'AFOLU' sectoral scope of the VCS and is not a grouped project as shown in Table 1.

Table 1: Sectoral scope, project category, activity and grouping classification.

Scope	Category	Activity	Grouped or Multiple Project
14 – Agriculture, Forestry and Other Land Use	Avoided (Sanctioned) Planned Deforestation	Protection without logging, fuel wood collection or charcoal production	Multiple
14 – Agriculture, Forestry and Other Land Use	Improved Forest Management	Conversion from Logged to Protected Forest	Multiple

1.3 Project Proponent

Organization name	Rainforest Project Management Limited (Company No 1-72274)
Contact person	Stephen Hooper
Title	CEO
Address	Po Box 3319, Boroko, NCD, Papua New Guinea
Telephone	+61 (0) 488 088 321
Email	shooper@p-f-a.org

1.4 Other Entities Involved in the Project

Organization name	TREES*
Role in the Project	Technical support, VCS abatement calculations
Contact person	Dr. Jacqueline Gehrig-Fasel/Dr. Martin Gehrig
Title	Managing Partner/Managing Partner
Address	Sihleggstrasse 23, CH-8832 Wollerau, Switzerland
Email	info@trees-consulting.com

Organization name	Emapper Pty Ltd
Role in the Project	Remote Sensing, Land Use Change Analysis
Contact person	Timea Kovacs Ledo

Title	Remote Sensing Analyst
Address	129 Royal St, Perth, WA 6004. Australia
Email	Timea.Kovacs-Ledo@astron.com.au

Organization name	Pacific Forest Alliance (PFA)
Role in the Project	Project Management and Implementation
Contact person	Stephen Hooper
Title	CEO
Address	Po Box 3319, Boroko, NCD, Papua New Guinea
Email	shooper@p-f-a.org

Organization name	Tasman Environmental Market
Role in the Project	Technical Support
Contact person	David Tow/Dr. Gabriel Machovsky-Capuska
Title	Managing Director/Head of Science and Sustainability
Address	Suite 1 651 Victoria Street Abbotsford VIC 3067. Australia
Telephone	+61 420 967 025
Email	David.tow@tem.com.au/gabriel@tem.com.au

1.5 Project Start Date

The project start date is May 22, 2009. This is the date that the first agreement was signed between the Landowner Companies and a Project Developer to develop the April Salumei FMA into a Carbon Project.

1.6 Project Crediting Period

While approved timber harvest plan is for 40 years, the crediting period for the project is 38 years as shown in **Error! Reference source not found..**

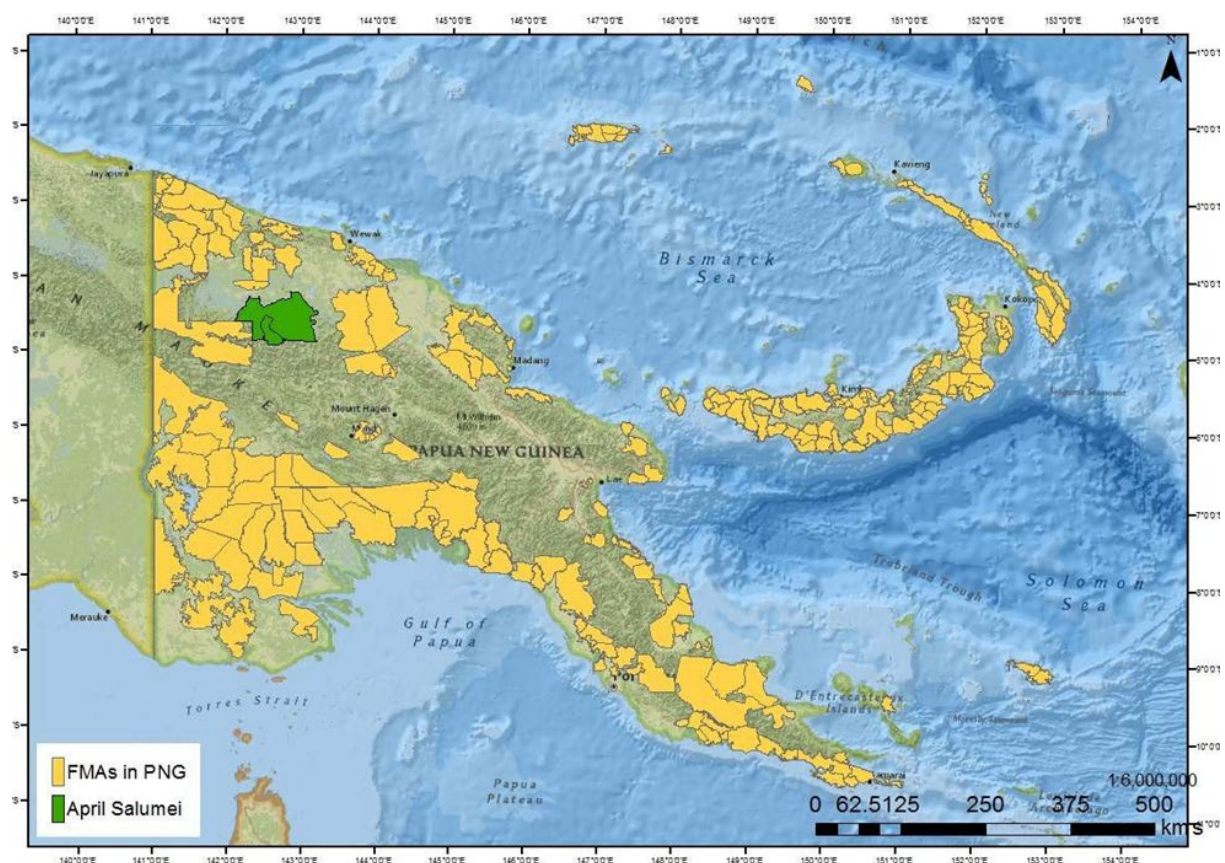
Table 2: Project crediting period.

Time Period	Start Date	End Date	No of years
Project crediting period	22 May 2009	21 May 2047	38

1.7 Project Location

The Project is located approximately 122 kilometers (km) from the provincial town of Wewak in the Wosera Gawi and Ambunti Drekiher Districts in East Sepik Province of PNG (Figure 1). The geographic coordinates of the centroid of the Project Area are 4°33'31"S and 142°41'20"E. The Project boundaries are provided in the supporting documents, and the geographic coordinates of the centroid of the spatial extent of the two project areas are as below:

- IFM – LtPF project area: 4° 42' 02"S and 142° 38' 43"E
- REDD-APD project area: 4° 36' 29"S and 142° 38' 20"E


Figure 1. The April Salumei REDD Project Location. Source: EAS for Rainforest Project Management, 2012.

The April Salumei REDD Project area is divided into two different VCS Agriculture, Forestry and Other Land Use (AFOLU) depending on whether the forest is converted during the baseline crediting period.

These categories have delineated spatial boundaries for accounting purposes (Figure 2) and are known as:

Avoiding Planned (Sanctioned) Deforestation (REDD – APD) that follows the standard methodology rules and guidelines established in VCS Approved Methodology VM0007.

Improved Forest Management – Logged to Protected Forest (IFM – LtPF) that follows the standard methodology rules and guidelines established in VCS Approved Methodology VM0010.

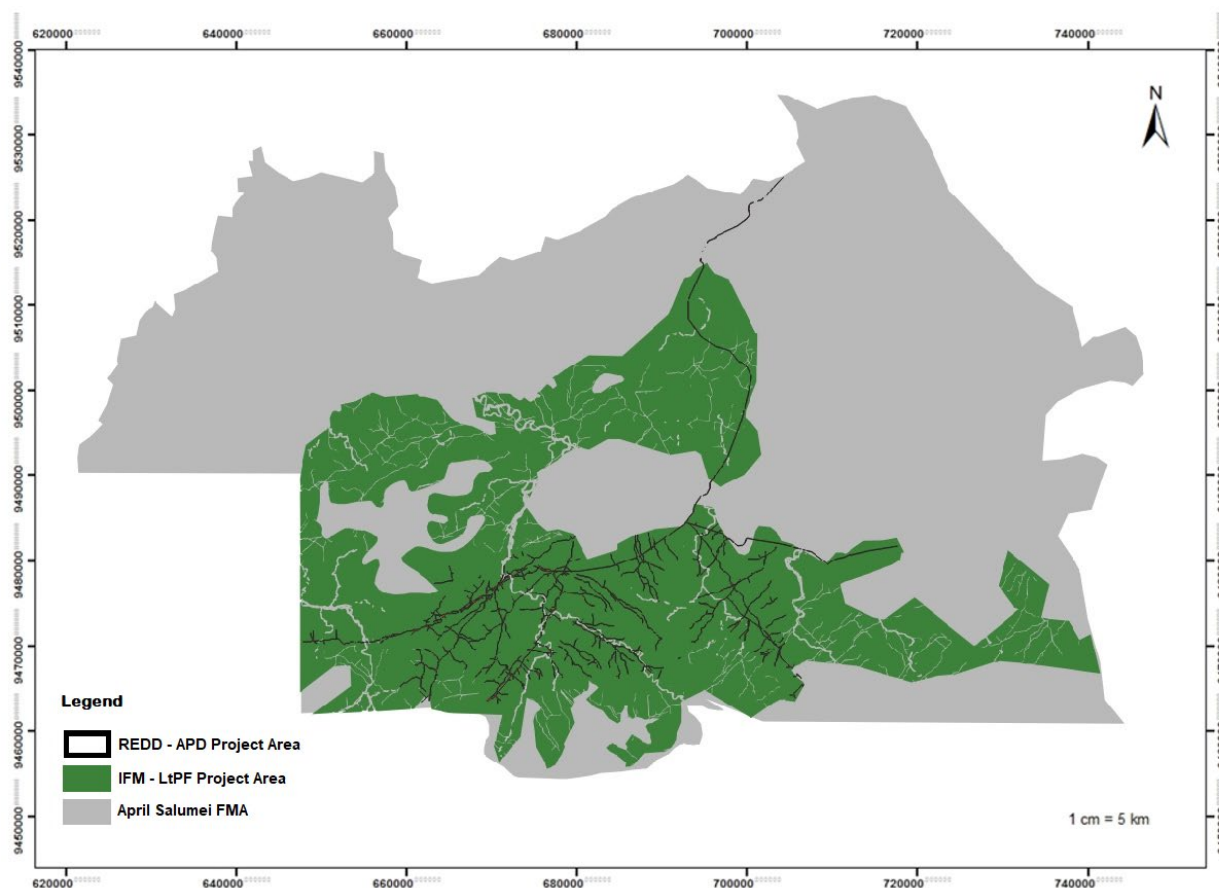


Figure 2. The April Salumei REDD Project Area. The project area includes the spatial boundaries of two VSC categories identified as 'IFM-LtPF Project Area', and 'REDD-APD Project Area'. Source: EAS for Rainforest Project Management, 2012.

For the remainder of this document, the boundaries of the two different Project categories are collectively referred to as the 'FMA Area', while the carbon accounting area less all exclusions is referred to as the 'Project Area'.

1.8 Title and Reference of Methodology

Table 3: Title and version and of the methodologies and tools used in the project.

Methodology	ID	Version
REDD Methodology Framework.	REDD-MF (VM0007)	1.3
Methodology for Improved Forest Management: Conversion from Logged to Protected Forest	IFM- LtPF (VM0010)	1.3
Estimation of uncertainty for REDD project activities.	X-UNC (VMD0017)	2.0
Methods for monitoring of greenhouse gas emissions and removals.	M-REDD (VMD0015)	2.2
Estimation of carbon stocks in the above and belowground biomass in live tree and non-tree pools.	CP-AB (VMD0001)	1.1
Estimation of carbon stocks in the litter pool.	CP-L (VMD0003)	1.0
Estimation of carbon stocks in the long-term wood products pool.	CP-W (VMD0005)	1.1
Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation/forest degradation.	BL-PL (VMD0006)	1.3
Estimation of emissions from activity shifting for avoiding planned deforestation/forest degradation.	LK-ASP (VMD0009)	1.3
Estimation of emissions from market-effects.	LK-ME (VDM0011)	1.1
Estimation of greenhouse gas emissions from biomass and peat burning	E-BPB (VMD0013)	1.2
Methods for stratification of the project area.	X-STR (VMD0016)	1.2
AFOLU Non-Permanent Risk Tool		4.0

1.9 Participation under other GHG Programs

The project is not registered under any other GHG programs.

1.10 Other Forms of Credit

The April Salumei REDD Project is not registered with any other GHG programs and emission reductions, or removals generated during this monitoring period have not been used for compliance under such programs or mechanisms.

It is noted that the REDD.plus platform formed by the Coalition of Rainforest Nations (CfRN) sells REDD+ Results Units (RRUs) for its member countries, including PNG. For PNG, these RRUs correspond to results observed during the period of 2014-2015 estimated against the Forest Reference Level (FRL) submitted to UNFCCC which considers deforestation, degradation and carbon stock enhancement, but not sustainable forest management. The emissions reduction from the April Salumei REDD Project is not included in the estimation for the RRUs for the reasons below:

1. The Forest Reference Level against which the emissions are compared is arrived from a historic emissions baseline period from 2001 to 2013. The Forest Reference Level for the years from 2014-2018 have been extrapolated from the baseline trajectory.
2. The April Salumei project has been ongoing since 2009 and is included in the baseline trajectory that includes forest cover till 2013.

Likewise, during this monitoring period, the April Salumei REDD project has not generated any other form of GHG related Environmental Credit including renewable energy certificates.

1.11 Sustainable Development Contributions

The UN Sustainable Development goals were adopted by all member countries of the United Nations in September 2015. The goals are closely aligned with PNG pre-existing goals under the 'PNG Vision 2050' and the National Strategy for Sustainable Development known as 'StARS' and have now become the focus of sustainable development activities in PNG. Whilst the Sustainable Development Goals were established after the April Salumei project had commenced all project activities have been designed with sustainability and environmental integrity underpinning them. Consequently, the Sustainable Development Goals are closely aligned with the project activities as indicated in the table below.

Table 4: Sustainable Development Contributions.

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	4.a	4.a.1 Proportion of schools with access to electricity	Implemented activities to increase	As part of the “Light Up April Salumei initiative”, solar power lights were delivered to 30 community schools within the project area	Provided 30 solar power lights to community schools within the project area and over the project lifetime
2)	4.b	4.b.1 Volume of official development assistance flows for scholarships by sector and type of study	Implemented activities to increase	To enable the sustainable development of learning environments and improve school completion rates, the project allocated funds to assist 4 Elementary schools (Nawei, Wario, Sio and Nia Nauen) and 11 primary schools (Somuwari, April River, Gahom, Kagiru, Changriman, Paliagwi, Banakot, Yerakai, Nawei, Moropote, April River and Somoai), and allocated funds to assist on school fees	Allocated funds to assist 4 Elementary and 11 primary schools on school fees
3)	7.1	7.1.1 Proportion of population with access to lighting powered by renewable energy	Implemented activities to increase	As part of the “Light Up April Salumei initiative”, over 100 solar power lights were delivered to 30 community schools within the project area, 26 health centres and aid posts, churches, and selected families within the project area	Provided over 100 solar lights to health centres, schools, aid posts, churches, and selected families over the project lifetime
4)	8.3	Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises,	Implemented activities to increase	The Light Up April Salumei initiative employed local people to successfully deliver the solar lights to the different communities. Upon arrival, representatives from each landowner company were employed and trained to install and maintain the solar lights provided. In addition, the Eaglewood initiative employed experts in nursery management practices that trained representatives from each landowner company to develop sustainable nurseries in their ILGs	Created at least 8 jobs during the project lifetime Provided training to all landowner Companies on Eaglewood Trained 6 representatives on maintaining solar lights Created at least 10 jobs during the project lifetime

		including through access to financial services		generating additional jobs and incomes for their communities	
5)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By conserving 603,712 ha of tropical rainforest, the April Salumei Project has prevented the release of 1,848,434 tonnes of carbon into the atmosphere during the monitoring period	Prevented the release of 2,530,771 tonnes of carbon (682,337 tonnes during M1 and 1,848,434 tonnes during M2) into the atmosphere
6)	15.0	15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	Implemented activities to increase	The avoidance of deforestation and the plantation of over 10,000 trees are clear indications that the project has protected and created new potential habitats for wildlife and promoted the sustainable use of terrestrial ecosystems.	Planted over 10,000 trees and protected 603,712 ha of tropical rainforest
7)	16.0	16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels	Implemented activities to increase	The project promotes respect, empathy, and justice through the engagement and recognition of the Traditional Landowners and the Provincial and National Governments in the activities proposed. The governance structure of the project includes a Chairman for the April Salumei Working Group (ASWG) that was democratically selected by all the different ILGs communities involved	During its lifetime, the project has followed a bottom-up approach on their stakeholder engagement. This, in turn, guarantees the participation of the local communities in the socioecological and financial decisions made to sustainable growth and further develop the project

2 SAFEGUARDS

2.1 No Net Harm

With a primary focus on forest conservation and its biodiversity, the April Salumei REDD project has promoted activities that reduced the drivers of deforestation and forest degradation while implementing best practices for improving the well-being of the local communities and their livelihoods.

The Project governance structure (refer to Figure 3) has placed emphasis on empowering local people as custodians of their land and ensured the preservation of endemic and endangered species as well as the sustainability of the environment. During this second monitoring period the project area and surrounding regions did not experience any adverse environmental impacts, though some minor clearing around villages has been observed (detailed in section 3.2.2.2).

Direct routine field patrols undertaken by local people, have prevented illegal logging, any potential conversion of forests into unsustainable agricultural practices, and ensured that unsolicited human migration that could lead to land disputes did not occur. Thus, the results obtained from the field patrols combined with the analysis of satellite images enabled the monitoring of land cover change, confirming that the project area has not changed in any material manner since the last monitoring report.

Frequent meetings established by the project, enabled fluid communication with each of the six Landowner Chairman confirming no adverse socio-economic impacts in the ILGs were caused by the project during this second monitoring period, while promoting economic development and sustainable agricultural practices across the different ILGs, in a manner that is closely aligned with the UN Sustainable Development goals.

The Annual Reports provide a registry of the main activities and measures undertaken during this second monitoring period.

2.2 Local Stakeholder Consultation

The April Salumei REDD project is committed to ensure that the carbon credit funds are used for the development and maintenance of social infrastructure to manage and develop world class, long term local community outcomes based on mutual respect, open communication, empathy, and strong work ethic with the Traditional Landowners, the Provincial and National Governments and the International Community.

The governance structure of the April Salumei REDD project is designed to delegate the limits of authority and establish effective escalation routes for issues and change requests, as shown in Figure 3.

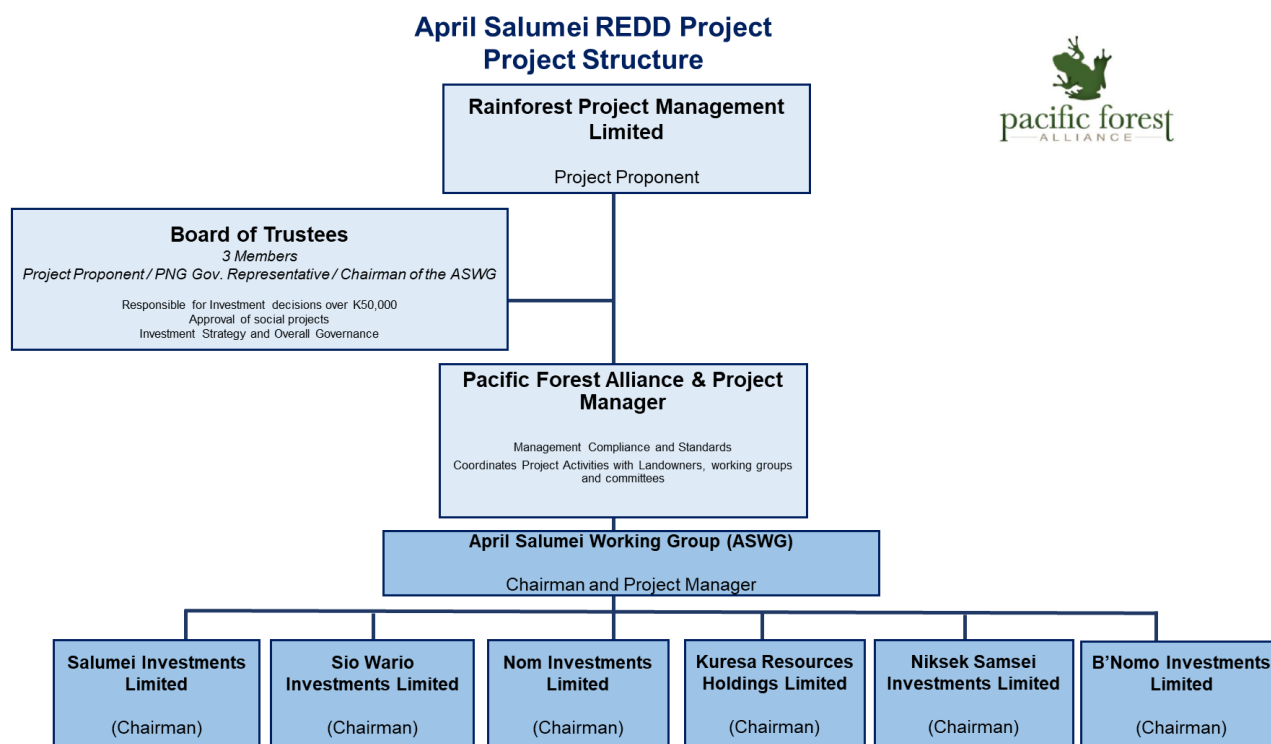


Figure 3. The April Salumei REDD Project governance structure.

This structure has evolved over the course of the project to respond to project needs, as follows:

- Rainforest Project Management Limited (RPML) is responsible for monitoring and controlling the effectiveness of the organization's governance model during the project life cycle.
- A three-member Board of Trustees is responsible for the investment strategy, approval of social and infrastructure projects, and the overall governance of the project. It is constituted by the project proponent, a representative of the PNG government and the Chairman of the April Salumei Working Group (ASWG).
- The Board of Trustees works directly with the Pacific Forest Alliance that is responsible for the management and compliance of the project and the April Salumei Working Group (ASWG) that represents the six different landowner companies.
- Each of the landowner companies encompass project ILGs that democratically select a Landowner Chairman that represents them on the ASWG. They also select the Chairman of the ASWG that sits on the Board of Trustees.

The Landowner Chairman of each of the six landowner companies is responsible for maintaining close engagement with their local communities and undertaking regular visits to the project areas, local meetings, and maintenance of local networks throughout their communities. These leaders oversee the collection of annual field data by conducting participatory Rural Appraisals and collating the information in an annual field monitoring report. Our field monitoring program also encompasses the report of illegal logging, fire events and land use change. None of the first two events occurred in the villages during the M2 period in consistency with remote sensing analysis presented in section 3.3.2.2. The Landowner Chairman reported minor land changes that were identified as old gardens that the locals cleared for reuse as part of traditional rotation of food production areas (see section 3.3.2.2). The outcomes of these reports are discussed in the Annual meetings that are included in the Annual Reports (see Appendix A) providing a reflection of bottom-

up communication in the project. The outcomes of these meetings are communicated to the local villagers through each of the Landowner Chairman as a sing of top-down ongoing communication.

The project conducts Annual Meetings where the stakeholders are advised of a meeting date and asked to contribute to the agenda. A formal open meeting is then held utilizing a transparent and participatory principle. The meeting is chaired by a selected Landowner Company Chairman and the agenda is followed. Project activities are discussed along with sales and revenue generated by the project for the respective year. This meeting is formally recorded and written records of the meeting including outcomes and resolutions distributed to all chairman at the conclusion. The Chairman are then responsible to distribute the information back to their communities and a copy is also sent to the relevant government agencies.

Below, a detailed list of the year-by-year stakeholder engagement activities is presented (Tables 5 to 10). The detailed implementation status and activities undertaken can be assessed in the Annual Reports for this second monitoring period (2015-2018).

Table 5. Main activities undertaken during 2013 (for details see AS_2013-2014_Annual Report.pdf in Appendix A).

2013			
Action	Type	Communication Channel	Description
VERRA first VCS Validation	Governance	Written document	The project went through the first VCS validation
Annual General Meeting	Financial, Management, and Governance	Formal meeting Face to face Distribution of written minutes	General overview of the different project activities during the year, update of the finances, and the social developments and investments.
Leadership training	Governance and Management	Face to face meeting	Workshop at Medang, to develop skills on the management and implementation of project activities and the development of field operations.
Community Engagement	Management, Engagement and Financial	Face to face meetings Notes taken at the meetings Written summary of outcomes distributed to the Landowner Chairman	Regular meetings between the ASWG and the different Landowner companies and ILGs during the year. Main topics included an update on project activities, reconciliation of funds and the discussion of future social development projects.
Papua New Guinea Vision 2050	Political and Management	Formal meeting with power point presentation to the ministers and agencies	The Board of Trustees of the project meets with the PNG Vision 2050 team, representatives of the University of Papua New Guinea (UPNG), the Minister of Forestry & Climate change: Ministers Charlie Abel and Ben Micha, and the Office of Climate Change and Development (OCCD) Executive Director and Manager REDD+.

Table 6. Main activities undertaken during 2014 (for details see AS_2013-2014_Annual Report.pdf in Appendix A).

2014			
Action	Type	Communication Channel	Description
Papua New Guinea Forest Authority	Governance	Formal meeting with presentation to Ministers and agencies	Submission to update on landowner and governance structure.
Annual General Meeting	Financial, Management, and Governance	Formal meeting Face to face Distribution of written minutes Landowner Chairman to disseminate information post meeting, face to face meetings with their community in the villages	General overview of the different project activities during the year, update of the finances, and the social developments and investments.
Climate Change and Development Authority	Political	Formal meeting with presentation to Ministers and agencies	Update on the project and discussions on the support needed from the government to materialize different activities.
Community Engagement	Management, Engagement and Financial	Face to face community meetings with Landowner Chairman collecting feedback from communities	Regular meetings between the ASWG and the different Landowner companies and ILGs during the year. Main topics included an update on project activities, reconciliation of funds and the discussion of future social development projects.
Provincial Government Engagement	Political	Formal meeting with presentation to Ministers and agencies	The Board of Trustees, the ASWG and multiple stakeholders from the project area met with the East Sepik Provincial Government to discuss the progress made by the project.
Routine Field Patrols	Management	Face to face community meetings Reports written	Monitoring and Surveillance of the land cover change in the Project Area.

Table 7. Main activities undertaken during 2015 (for details see AS_2015_Annual Report.pdf in Appendix A).

2015			
Action	Type	Communication Channel	Description
Project members attended the Paris	Political	Formal meeting Face to face Distribution of written minutes	The United Nations Framework Convention on Climate Change included international representatives.

Agreement on Climate Change			
Annual General Meeting	Financial, Management, and Governance	Formal meeting Distribution of written minutes Face to face	General overview of the different project activities during the year, update of the finances, and the social developments and investments.
Community Engagement	Management, Engagement and Financial	Face to face community meetings with Landowner Chairman collecting feedback from communities	Regular meetings between the ASWG and the different Landowner companies and ILGs during the year. Main topics included an update on project activities, reconciliation of funds and the discussion of future social development projects.
Routine Field Patrols	Management	Face to face community meetings in local language Annual Field Monitoring Report	Monitoring and Surveillance of the land cover change in the Project Area.

Table 8. Main activities undertaken during 2016 (for details see AS_2016_Annual Report.pdf in Appendix A).

2016			
Action	Type	Communication Channel	Description
Climate Change and Development Authority Workshop	Management and Governance	Formal meeting Distribution of written minutes Face to face meetings	Technical workshop in Port Moresby to discuss the extent of the project with local and government authorities.
Annual General Meeting	Financial, Management, and Governance	Formal meeting Distribution of written minutes Face to face Landowner Chairman to disseminate information post meeting, face to face meetings with their community in the villages	General overview of the different project activities during the year, update of the finances, and the social developments and investments.
Community Engagement	Management, Engagement and Financial	Face to face community meetings with Landowner Chairman collecting feedback from communities	Regular meetings between the ASWG and the different Landowner companies and ILGs during the year. Main topics included an update on project activities, reconciliation of funds and the discussion of future social development projects.
Capacity Building	Management	Workshop with Chairman on service delivery and objectives for projects	Basic training for the members of the ASWG to improve effective group interactions and service delivery.

ASWG training			
Routine Field Patrols	Management	Face to face community meetings in local language Annual Field Monitoring Report	Monitoring and Surveillance of the land cover change in the Project Area.
Light Up April Salumei	Engagement	Planning with Landowner Chairman and the communities. Outcomes distributed to the Landowner Chairman	This initiative delivered over 100 solar power lights to all the 30 community schools, 26 health centres and aid posts, churches, and selected families within the project area.
Light Up April Salumei	Human Resources	Planning with Landowner Chairman and communities Local training for selected individuals for each community	This initiative employed and trained representatives from each landowner company to deliver, install and maintain the solar lights provided.
Landowner Companies Profiling	Engagement	Formal surveys conducted in the villages Results collected by Project Manager and stored into a database	The data collected will help to make informed development decisions for the different communities.
Tree Planting Initiative	Engagement	Face to face Written guide presented Outcomes distributed to the Landowner Chairman	The project planted 10,000 trees in B'Nomo ILGs.

Table 9. Main activities undertaken during 2017 (for more details see AS_2017_Annual Report.pdf in Appendix A).

2017			
Action	Type	Communication Channel	Description
Annual General Meeting	Financial, Management, and Governance	Formal meeting Face to face Distribution of written minutes Landowner Chairman to disseminate information post meeting, face to face meetings with their community in the villages	General overview of the different project activities during the year, update of the finances, and the social developments and investments.
Provincial Government Engagement	Political	Formal meeting with Power point presentation to Ministers and agencies	The Board of Trustees, the ASWG and multiple stakeholders from the project area met with the Governor Hon. Alan

			Bird and provincial advisors to discuss the progress made by the project.
Community Engagement	Management, Engagement and Financial	Face to face community meetings with Landowner Chairman disseminating information and collecting feedback from communities	Regular meetings between the ASWG and the different ILGs during the year. Main topics included an update on project activities, reconciliation of funds and the discussion of future social development projects.
Eaglewood Initiative	Human Resources	Community consultation and training Formal training at UPNG Written guide presented	The Eaglewood initiative employed experts in nursery management practices to trained representatives from each landowner companies to develop sustainable nurseries in their ILGs.
Routine Field Patrols	Management	Face to face community meetings in local language Annual Field Monitoring Report	Monitoring and Surveillance of the land cover change in the Project Area.
Light Up April Salumei	Engagement	Face to face Landowner Chairman delivering lights to communities	This initiative delivered additional 70 solar power lights to selected families within the project area.

Table 10. Main activities undertaken during 2018 (for details see AS_2018_Annual Report.pdf in Appendix A).

2018			
Action	Type	Communication Channel	Description
Annual General Meeting	Financial, Management, and Governance	Formal meeting Face to face Distribution of written minutes Landowner Chairman to disseminate information post meeting, face to face meetings with their community in the villages	General overview of the different project activities during the year, update of the finances, and the social developments and investments.
Community Engagement	Management, Engagement and Financial	Face to face community meetings with Landowner Chairman disseminating information and collecting feedback from communities	Regular meetings between the ASWG and the different Landowner companies and ILGs during the year. Main topics included an update on project activities, reconciliation of funds and the discussion of future social development projects.
Routine Field Patrols	Management	Face to face community meetings in local language	Monitoring and Surveillance of the land cover change in the Project Area.

		Annual Field Monitoring Report	
Signature of MoU with the PNG Government to promote the April Salumei project as an example for REDD projects in the country	Political and Management	Face to face Reports written MoU signed Outcomes distributed to the Landowner Chairman	The Rainforest Project Management Limited, the six Landowner groups, the Papua New Guinea Forest Authority (PNGFA), the Climate Change and Development Authority (CCDA) and the East Sepik Provincial Government (ESPG) signed the MoU.
Eaglewood Initiative	Engagement	Face to face Reports written Outcomes distributed to the Landowner Chairman	As part of this initiative, the project distributed 5 kg of seeds to the different landowners for their nurseries.

In a meeting held in Wewak (PNG), all the Landowner Chairman were advised by the Project Manager of the ASWG that the project will undergo a second monitoring period (M2) under the VCS Verification Program. During this meeting, the group discussed the steps involved in this process including the preparation of the selected villages for the sites visits planned by the SCS global services audit team. Once the SCS selected the villages they wanted to visit, preparations were made for the audit team and the Project Manager of the ASWG to travel to the villages and meet the locals and the remaining Landowner Chairman.

2.3 AFOLU-Specific Safeguards

The project has developed several procedures to achieve and safeguard the proposed social and environmental goals.

2.3.1 Governance

As mentioned in the section 2.1, the project established clear and fluid channels of communication and consultation with the different stakeholders, particularly the six landowner Chairman representing the different ILGs.

Adaptive management through a reliable governance structure (refer to Figure 3) has been one of the strategies implemented by the project, considering the challenges in communications that remote populations present (e.g., takes three full days of travelling to reach some of the outlying communities) and the importance of representing a population with different cultural backgrounds. The democratic foundation of the project guarantees the participation of the local communities in the socioecological decisions made (e.g., election of different Landowner Chairman), to sustainable growth and further develop the project. Key to this is the representation of the respective landowner companies. Each company has an elected individual to represent them and identify the needs of the people. This structure has proved effective in identifying the needs and evolved to better represent the traditional ownership. Two new landowner companies have been incorporated at the request of the group. This demonstrated a maturity in decision making and leadership.

As the planning and budgeting skills of the respective groups were established, effective and well considered projects were identified and subsequently funded. These included education programs, scholarships, building repairs and upgrades and renewable energy projects. Unfortunately, some of the planned activities suffered due to poor implementation and delivery of some of these activities was not to the expected standard.

As a principle of adaptive management, the project has focused on these challenges and undertaken a larger role in the implementation of activities whilst building local capacity. For example, when all schools, health centres and churches we provided solar lights, a representative from each landowner company was trained in the installation and maintenance for the lights. This provided a more effective distribution and assisted the longevity of the program. It also provided local employment opportunities.

The project has also identified there is not enough funding to provide the required level of health and education services for the whole area. The project can not undertake the role of government but will do all it can to assist the provision of these services.

The project will have a greater focus on the establishment of sustainable agricultural activities. As communities are able to generate income, they are likely to become self-sufficient and empowered. This will require significant investment in the provision of transport to move product from the remote areas of the project to markets. Hopefully over time the project can establish direct markets and capitalize on the unique communities and biodiversity the project conserves.

2.3.2 Field Monitoring

To systematically monitor land cover change in the project area, routine field patrols (Annual) and incident based non-routine patrols (where an incident has been reported) completed by the local villagers, collected information on the following parameters:

- illegal commercial harvesting
- harvesting of fuel wood
- fire
- harvesting of wood for charcoal production

Detailed information on these field patrols can be found in the Annual Reports for each year.

As mentioned in section 2.1 the results obtained from the direct field patrols undertaken by local people combined with the analysis of satellite images enabled the monitoring of land cover change, confirming that the project area has not changed since the last monitoring report.

These findings were reviewed and confirmed by an independent auditor. The findings of the audit and in detail explanation of the review-process can be found in the files titled “AS_2013-2018_Field Monitoring Letter” and the “AS_2022_Audit Letter” (see Appendix A).

2.3.3 Grievance Management

A well-established grievance redress protocol has enabled the ASWG project manager and the six landowner Chairman to assist in resolving conflicts or grievances that may have arisen between the different stakeholders of the project.

The project established a policy and a Standard Operating Procedure (SOP) for the redress of grievances (for details see AS_2012_Complaints Handling and Dispute Resolution Policy in Appendix A). The policy and SOP were written in both English and the local pidgin language for easy access to all the stakeholders. During this reporting period, the policy was signed by the ASWG Chairman and the project manager, and each of the six Landowner Chairman. This has ensured that the Landowner Chairman had the opportunity to address the grievance and see whether it may be escalated to other stakeholders.

The different stakeholders of the project have been suggested to lodge their grievances through email, written letter, or phone call (Table 11).

Table 11. A summary of the grievances recorded during this second monitoring period (2013-2018).

2013-2014			
There were no specific grievances reported during this period			
2015			
Grievances	Comments	Action Required	Outcomes
False claim of ownership	Sami Jamuarius and Hunstien Range Holdings were defying the ASWG by claiming resource ownership over the April Salumei Project	Letters were written to the Provincial and National Government regarding the illegitimacy of these claims	Complete
Letter to UNREDD by Resource Owners	Raymond Suario of Sio Wario area forged official signatures and wrote a letter to the United Nations REDD program (UN-REDD) containing misleading information on the April Salumei REDD Project on behalf of the landowners. The ASWG requested the authorities to arrest Raymond for his false claims	Anton Pakiawi personally discussed the issue with him that lead to an official apology for the damages caused	Complete
Chairman's Position and Letters to various Authorities	Gideon Joseph ceased from being the chairman of the ASWG for alleged misappropriation of part of the K500,000 that ASWG received from the National Planning and Monitoring Department	During the annual meeting the allegations made against Gideon Joseph were reported to the police to further investigate the issue	Complete
2016			
Threats from scammers	Several attempts by scammers to hijack the benefits of the project. Appropriate actions are needed to counter-act illegal practices by scammers. Intercede any political abnormal practices that threaten the well-being of the project	Letters written to Prime Minister of PNG regarding the NEC submission to withdraw any abnormalities submitted to the Climate Change and Development Authority (CCDA)	Complete
2017			

False claim of resource ownership	Lobbying of the Climate Change and Development Authority (CCDA) by individuals claiming to represent the project is frustrating the chairman and their landowners they represent	The project proponent discussed the illegitimacy of these claims with the CCDA authorities	Complete
2018			
There were no specific grievances reported during this period			

2.3.4 Community Profiling

The project believes the need for accurate information to best assist the communities to forecast their future needs as a very important and helpful tool for the project's establishment of long-term goals. Recent census data is questionable and to ensure accuracy and better understand the community, the project has undertaken a detailed community survey to better understand key metrics such as:

- Population,
- Age,
- Sickesses prevalent,
- Health services,
- Education services and standards,
- Income sources.

2.3.5 Adaptive management

Further evidence of the project's adaptive strategy (see Appendix A) and the engagement with the local communities is the establishment of a 6th landowner company to better represent the cultural groups from within the project area. In this instance the landowner company chairmen met and agreed unanimously there needed to be a new landowner company formed to better represent the people of the Kuresa area. Previously these Incorporated Land Groups (ILGs) had been under the Salumei Landowner company. Following this the project supported financially and administratively the establishment of the Kuresa Holdings Limited. This landowner company now represents the 20 ILGs and Salumei the remaining 6 ILGs.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project implemented a series of forest conservation measures and socio-economic actions that reduced illegal logging, deforestation, and forest degradation, and promoted economic development across the different ILGs during this second monitoring period. The backbone of the project's implementation was governance and management activities.

Supporting the development of sustainable projects and the livelihoods for the ILGs has been crucial towards the success of the project during this second monitoring period. As mentioned in section 1.11, all project activities have been designed with sustainability and environmental integrity underpinning the UN Sustainable Development Goals and the 'PNG Vision 2050' and the National Strategy for Sustainable

Development known as 'StARS'. Thus, in alignment with the latter, seven key community development strategies have been implemented as described in the table 12 below.

Table 12. Project Activities aligned with the proposed community strategies.

Strategy 1: Improved community infrastructure		
Year	Activity	Outcomes
2015 -2016	Light Up April Salumei (see AS_2016_Light up April Salumei Video in Appendix A)	The project delivered solar power lights to 30 community schools, 26 health centres and aid posts within the project area.
2017	Light Up April Salumei	The project delivered additional 70 solar power lights to selected families within the project area.
2015-2017	Resource centres	The project distributed funds to the different ILGs for the completion of the Resource centres.
2016	Tree Planting Initiative	The project planted over 10,000 trees that are an important form of green infrastructure for the ILGs.
Strategy 2: Improved community education quality and extent		
Year	Activity	Outcomes
2015-2016	Funding allocated to schools	The project allocated funds to assist elementary and primary schools across the different ILGs.
Strategy 3: Improved health care quality and outreach		
Year	Activity	Outcomes
2015-2016	Light Up April Salumei	The solar lights and the funds allocated for their maintenance delivered by the project, improved the health centre services across the ILGs.
2016-2018	Landowner Companies Profiling	The information gathered in this survey enabled a review on the health status and services of the communities from the different ILGs.
Strategy 4: Improved mobility and transport		
Year	Activity	Outcomes
2015	Boats	New boat engines were delivered to each of the ILGs.
2016-2018	Boat Maintenance	The project discussed with the different ILGs the importance of maintaining the boats operational.
Strategy 5: Improved communication networks		
Year	Activity	Outcomes
2013-18	Communication strategy	Communication across the project area continues to be a major challenge, both due to remoteness and lack of infrastructure. Landowners' Chairman are responsible for local engagement with their communities; however, the project continues to investigate opportunities to work with Government and communication providers to upgrade local infrastructure so that electronic communication is available. This is a priority ongoing.
Strategy 6: Update the landowner database		
Year	Activity	Outcomes
2015-2016	Mapping Landowner boundaries	In collaboration with the six Landowner Chairman the boundaries of their communities were mapped.
2016-2018	Landowner Companies Profiling	To better establish long-term socio-economic goals, the project undertook a survey to better understand the population health, age,

		education and health services and income sources of the different ILGs.
Strategy 7: Generate employment opportunities		
Year	Activity	Outcomes
2016-2017	Light Up April Salumei	The Project employed local people to deliver the solar lights to the different landowner companies.
2016-2017	Light Up April Salumei	The project employed and trained representatives from each landowner company to install and maintain the solar power lights provided.
2018	Eaglewood Initiative (see AS_2018_Eaglewood Growers Guide in Appendix A)	The project employed experts in nursery management practices that trained representatives from each landowner company to develop sustainable nurseries in their ILGs.

3.1.1 Activities to Mitigate Risk

The April Salumei REDD project is a valuable example of a collaborative effort with the local communities (bottom-up approach) to improve their livelihoods while promoting the sustainable use of terrestrial ecosystems through the protection of forests that serve as ecosystem services in the form of habitat for a wide range of wildlife species and through the prevention of land degradation and desertification, with the aim to reduce the risks of natural disasters (e.g., droughts, floods).

The project's proposed activities do not represent any risks to the local communities, different stakeholders, and the environment. To successfully achieved these goals, the project promotes the following actions:

- **Landowner property rights**: since the development of the project, there has been an agreement in place with the different local communities and no changes in the landowner property rights have been registered. Thus, the project has generated no negative impacts on the property rights of the local communities of interest. Overall, the project has a long-term amicable relationship with the traditional landowners that is based on mutual respect, open communication, empathy, and strong work ethic.
- **Landowner chairman acting as forest stewards**: the forest stewards are responsible for monitoring, observing, and reporting of the forests within their local communities through a custody and patrolling system to minimise any potential forest degradation, fires, and deforestation risks. The forest stewards are required to report their observations on fire, illegal logging, and any other loss of resource immediately and through their annual monitoring field program.
- **Participatory Rural Appraisals (PRAs)**: The Chairman of each of the landowner companies are responsible to maintain close engagement with their local communities through regular visits to the project areas, local meetings, and maintenance of local networks throughout their communities. For each of the different communities involved in the project, PRAs are used by their representative landowner chairman to inform the locals the results from the annual monitoring field program and discuss their outcomes.
- **Satellite monitoring of project area**: The use of satellite monitoring of the project areas for potential deforestation is further explain in section 3.2.2.2. The results obtained from the field patrols combined with the analysis of satellite images enabled the monitoring of land cover change, confirming that the project area has not changed in any material manner since the last monitoring report.
- **Environmentally friendly and sustainable projects**: during the M2 period, the April Salumei REDD project has developed and delivered several community projects that aim to the sustainable development of the local communities while protecting their local forests. The following is a summary of each of these projects:

- *Light up April Salumei project:* to make communities inclusive, safe, resilient, and sustainable, the project focused on sourcing over 100 solar panels and lights to community schools, health centres and aid posts, churches, and selected families from the different ILGs to reduce reliance on kerosene lamps and woodfires for illumination, particularly during dark hours.
- *The Eaglewood initiative:* employed experts in nursery management practices that trained representatives from each landowner company to develop sustainable nurseries in their ILGs generating additional jobs and incomes for their communities.
- *Promote quality education:* To enable the sustainable development of learning environments and improve school completion rates, the project allocated funds to assist 4 Elementary schools (Nawei, Wario, Sio and Nia Nauen) and 11 primary schools (Somuwari, April River, Gahom, Kagiru, Changriman, Paliagwi, Banakot, Yerakai, Nawei, Moropote, April River and Somoai), and allocated funds to assist on school fees.

3.2 Deviations

3.2.1 Methodology Deviations

The deviations discussed in this section are permitted under the version 4.1 of the VCS standard and did not negatively impact the conservativeness of the quantification of GHG emission reductions or removals :

1. The methodology for the calculation of the Market Effects Leakage for both VM0010 and VM0007 was based on the ratio of Annual Allowable Cut (AAC) relative to the total concession area, rather than the ratio of aboveground biomass relative to total merchantable biomass. A more detailed explanation of this issue is provided in Section 3.6 of the Project Description (PD, see AS_2013_Project Description in Appendix A).
2. Timber harvesting was modelled to occur in areas of high relief on slopes steeper than 25 degrees. It was not possible to determine areas with slopes of greater than 25 degrees, as the only slope data available (from the PNGRIS dataset) had pre-classified slope categories of 20-30 degrees, and > 30 degrees. Given that all areas with a slope of greater than 30 degrees were excluded from the operable area (and therefore the IFM Project Boundaries), this deviation from the Code is considered negligible.
3. The equation from Chave et al., 2005 estimates the aboveground biomass by using the DBH and wood density as the only input parameters. The inclusion of height as a parameter in this equation does not improve its predictive capability (i.e., Coefficient of Determination is equivalent between the two equations for wet forest stands). The exclusion of height represents a deviation from the methodology without impacting the conservativeness of the GHG quantifications.
4. Section 6.2 of the M-REDD module (formerly M-MON), requires each parameter to be monitored at least every 5 years. In deviation from this, this monitoring report covers a period of 6 years from 2013 to 2018. The work on the monitoring report commenced in 2016. However, the CEO of the development company became seriously ill from 2016 to 2018 and the work on the monitoring report was suspended until 2018, at which stage the data was updated to reflect the time that was passed. The extension from 5 to 6 years has no impact on the quantification of GHG emissions or removals.

3.2.2 Project Description Deviations

3.2.2.1 Frequency of Monitoring

The frequency of the monitoring periods changed from the proposed timing in the initial project description (PD). While in the PD the end of this monitoring period was identified as the fifth monitoring period, here we identify and discuss activities that occurred from the 1 January 2013 to 31 December 2018 as part of the second monitoring period for the project.

This change has the outcome of having a deviation in the monitoring of parameters is thus required for VM0007 and VM0010. While in the PD an annual frequency of the monitoring of these parameters was suggested, the project found this activity to be cost prohibitive and also disrupted by Covid-19. In consistency with PD, the proposed monitoring period (1 January 2013 to 31 December 2018) falls within the 10-year baseline period.

The duration of the monitoring period is in line with the methodology requirements of VM0007 and VM0010 and has no impact on the method applicability, additionality or the appropriateness of the baseline.

3.2.2.2 Project Area

In terms of the project area quantification, the original IFM area was reported as 196,703 ha (AS_2013_Project Description). This estimated area was based on the satellite images with low resolution (e.g., Landsat 30 m resolution) available at that time. However, as a result of the improved accuracy and resolution of the satellite images currently available (see Sections 3.2.2.4 Landsat Imagery and 3.2.2.5 Improved Accuracy), the size of the project is estimated to be 196,723 ha rather than the previously proposed in the PD.

However, to ensure consistency and conservativeness in impact accounting, all calculations for baseline and project scenarios remain based on original area size, which is conservative (i.e., smaller) and in line with the PD and has no outcome on any other assumptions. Thus, the deviation in area size will not impact methodology applicability, additionality or benefits calculations.

3.2.2.3 Remote sensing and land cover change

The project planned to use remote sensing to monitor potential annual changes. The Annual Monitoring Reports from the respective landowner companies indicated no illegal logging occurred during the monitoring period. However, remote sensing imagery has shown that other local clearing as part of traditional land management has occurred around some of the villages (Figure 4).

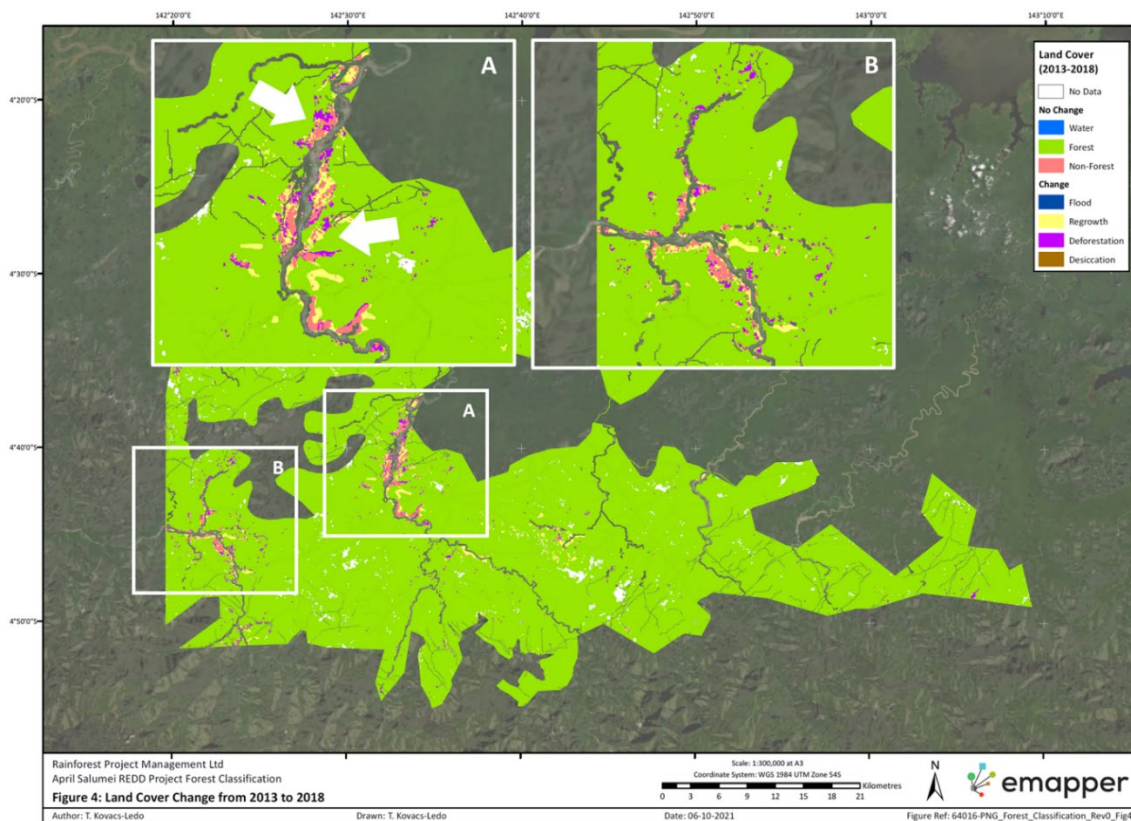


Figure 4. The April Salumei REDD Project showing areas with minor land change around Nicksek Village (A) and Sumwari Village (B). Source: emapper 2021.

A detailed analysis of local land cover change dynamics since project start confirmed recurring land cover changes in the village surroundings (details for Nickseck village (A) are shown in Figure 5). Shifting activities leading to vegetation cover losses (categorized as “deforestation”) and gains (“regrowth”) in forest cover analysis dominate these areas. While these practices are accepted as customary land use in the project area and losses and gains have been balanced in these areas, vegetation cover losses in the reporting period (2013-2018) have been accounted as deforestation in the GHG emission quantification, even if the area was cleared before and has regrown since. This approach ensures that potentially lower biomass stocks in forest regrowth do not lead to overestimation of overall emission reductions (see also section 3.2.2.4.).

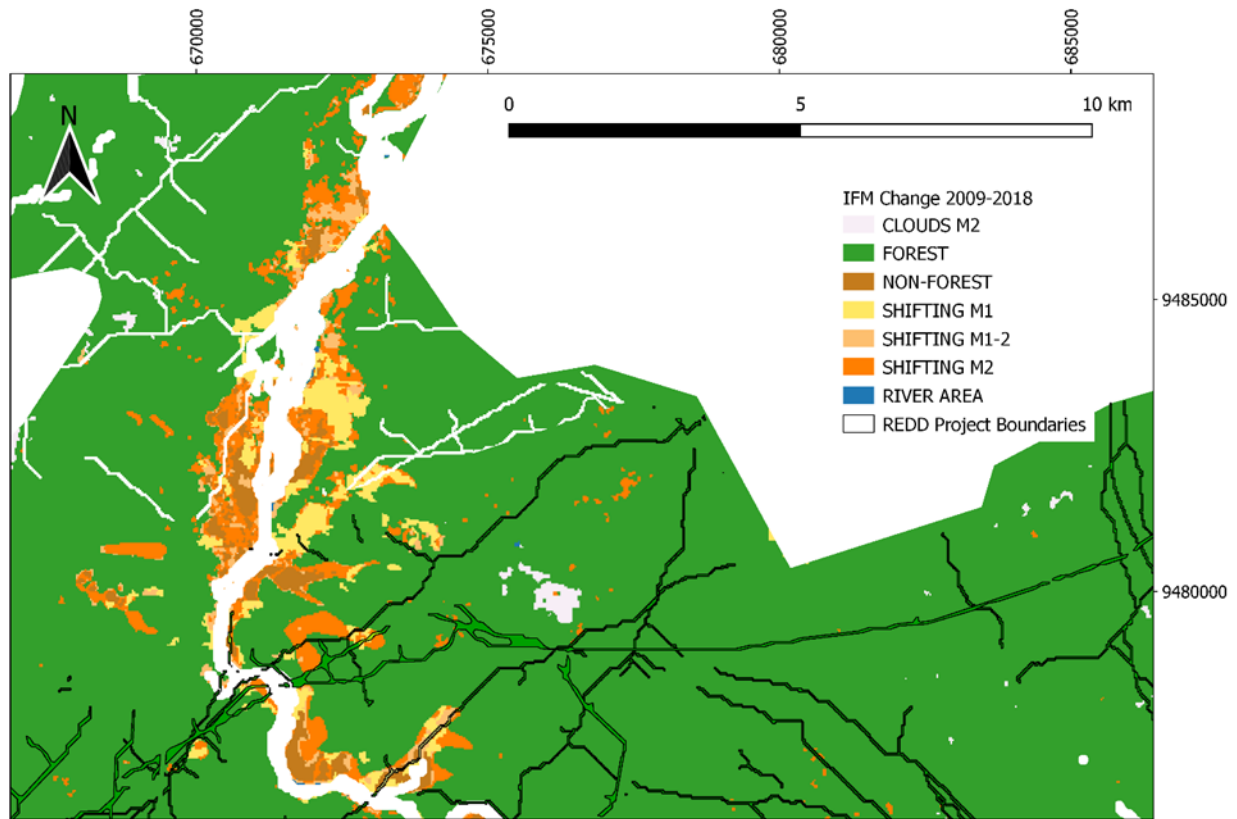


Figure 5. Land cover dynamics around Nicksek Village (A) indicating shifting cultivation dynamics between reporting periods (categories include vegetation losses as well as gains).

During the 2018 routine field patrols, the project reported that former garden areas were reactivated and used for the plantation of rice at Nicksek and Sumwari villages. This is consistent with the areas identified in the remote sensing data analysis. Prof. Kaluwin Chalapan, as the Chairman for the National Agricultural Research Institute, confirmed that rice is part of PNG national food security strategy and serves as an important food option for these remote areas. The project goal is for nil expansion of cultivation areas, even having regard to local customary practices which should be limited to the minimum required.

Although the second monitoring period does show some balancing between newly cultivated areas and areas that have regrown, along with no dynamic activity in over 98% of the project area, the project will implement further training and development activity to encourage and support sustainable agriculture practices. These practices will enable an increase in agricultural productivity and will support increasing populations, without requiring any expansion of cultivation areas. As an outcome of this deviation, prioritization will be given to further training and direct support to local communities in the implementation of sustainable agriculture practices.

The incorporation of these activities to complement the data from remote sensing improves the quality of information, and has no impact on the applicability of methodology, additionality or the appropriateness of baseline scenario.

3.2.2.4 Landsat Imagery

The techniques for processing land-use and land-cover (LU/LC) data slightly differed to those used in the first monitoring period. Landsat imagery USGS Level 1 Terrain Corrected product was utilized which is consistent with the first monitoring period. The first monitoring report used eCognition – a proprietary software program – to complete the classification. eCognition uses object based (polygon) classification and small areas of change can potentially be missed due to the larger nature of the polygons. For this monitoring period we used a pixel-based classification to land cover change based on the statistical technique known as Random Forests. This well-established methodology is used for mapping forest and non-forest areas with satellite imagery. The treatment and detection of clouds and cloud shadows in the first monitoring period was done by a semi-automated object-based image classification routine, using the eCognition software package. Whereas for this monitoring period a mosaic of multiple Landsat images for each year (2013 and 2018) enabled the creation of a cloud free image. In consistency with the first reporting period, we achieved 90% accuracy in our mapping assessments that have also been validated by extracts from the land over change assessment report (see Appendix C: Papua New Guinea Forest Classification Report) on the outcome of this deviation:

- “The supervised pixel-based classification relied on the Random Forest algorithm (Breiman, 2001) to identify the three main land cover types. Random Forest is a machine learning technique which incorporates a large number of individual decision tree classifications. The previous classification work implemented a single decision tree classification on a segmented image while the present algorithm analysed the result of a 1,000-decision tree classification. The model assigns a class for each pixel based on a summary of individual decision tree classifications. A single decision tree classifier might introduce high variance models which can cause overfit and potential error. As the Random Forest algorithm considers the results of several decision trees, variance is reduced, and a more accurate prediction is expected. The algorithm trains the classifier by utilising random sets of predictor variables to provide multiple independent models”.
- “The pixel-based classification approach was considered superior to the previous object-based classification approach. Object-based classification might remove smaller details, for instance small deforestation scenes might be missed since larger polygons generalise these details. In a pixel-based analysis, each pixel’s values are analysed and classified, which provides the ability to capture smaller areas of change”.
- “To ensure consistency, the selected approach used in the current report followed the previous method (EAS, 2013) where possible. As detailed above the image mosaics, training data collection, accuracy assessment and change detection all followed the methods used in the previous report (EAS, 2013). The differences related only to the classifier being a pixel based, versus an object-based approach. Object based classification, as used with eCognition (EAS, 2013), tends to generalise results, while the pixel-based classification used in this report can capture changes in smaller areas, so is more sensitive to change. In addition, the Random Forest classifier is based on the aggregated results of 1,000 decision tree models, while the EAS (2013) project used a single decision tree for classification. In view of these considerations an analysis of the IFM area was completed to ensure consistency between the classification in EAS (2013) and the classification used in this report for 2013. This analysis showed 5% more area was classified as forest in the current report compared to the EAS (2013) report, however 5% more data was classified as no data in the EAS (2013) report (due to cloud and shadow cover). The area classified as non-forest was approximately 1% for both reports. This analysis suggests that the two approaches are consistent,

with any differences in area between 2012 and 2013 most likely being due to the mosaic used for 2013 reporting having less cloud than that used for the EAS (2013) report”.

The Random Forest methodology is therefore more conservative than the object based (polygon) classification as it is able to capture smaller changes and does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

3.2.2.5 Improved Accuracy

As a result of the improved accuracy of the land cover change assessment (pixel-based assessment for this monitoring period (M2), compared to polygons in the first monitoring period (M1)), there was an overlap of detected deforestation for this monitoring period when compared to the first monitoring period. This was confirmed when comparing the land cover change assessment from M1 and M2 in QGIS. The spatial files (more details in Appendix B) that depict the land cover change assessment for M1 and M2 were intersected to identify where deforestation was detected for both monitoring periods in the same location (i.e., areas already identified as deforested in the first monitoring period). The overlap of deforestation was 54.73 ha for the IFM project area (VM0010), and 0.16 ha of overlap for the REDD project area (VM0007). To avoid double counting deforestation, the area overlap was deducted from total deforestation identified in the 2018 land cover change assessment (see AS_2019_PNG Forest Classification Report). For the IFM project area, the overlap of 54.728 ha was deducted from the total of 965.21 ha detected in the land cover change assessment, resulting in the deforestation in this area being taken as 910.48 ha (see AS_2019_PNG Forest Classification Report). For the REDD project area, the overlap of 0.156 ha was deducted from the total of 7.04 ha detected in the land cover change assessment, resulting in the deforestation in this area being taken as 6.9 ha (see AS_2019_PNG Forest Classification Report). As an outcome of this deviation, the overlap representing a total of 15,839 tCO₂e has been deducted from the total deforestation. This does not impact the applicability of methodology, additionality or the appropriateness of baseline scenario. It is also noted that both project areas saw much greater regrowth detected than deforestation in the land cover change assessment.

3.2.2.6 Monitoring of APi

This has been changed to allow the source data to be remote sensing and field monitoring. If changes are identified, then ground measurement is required. The outcome of this deviation will be a considerable cost saving for the project in not having to monitor a section that has not changed. This does not impact the applicability of methodology, additionality or the appropriateness of baseline scenario.

3.2.2.7 Ground Truthing

This Monitoring Report has been prepared without independent ground truthing of the aerial imagery assessment. The period for preparation of this Monitoring Report has coincided with the Covid-19 pandemic, which has had a very substantial and ongoing impact on travel, local safety, and interaction with local communities. Although access to PNG is slightly improving, the Covid-19 situation remains acute and a further substantial delay in the verification of this monitoring period would be required to conduct independent ground truthing. This in turn, would substantially impact the ability of the project to provide timely financial support to local communities, which is required to maintain ongoing project success.

A time-series aerial imagery assessment indicates that there is less than 2% change in ground cover since the previous 2009-2012 monitoring period and most of this appears to be small areas of clearing directly adjacent to existing villages, including previously cleared fallow garden areas.

As an outcome of this deviation, land cover losses have been conservatively accounted as “deforestation” (see Figure 4 and comments in section 3.2.2.2). Accordingly, we request approval for this deviation and note that a new baseline report is required from 2019, which will include independent ground truthing to improve mapping accuracy. This does not impact the applicability of methodology, additionality or the appropriateness of baseline scenario.

3.2.2.8 Quantification of Emission reductions

A number of updates and error corrections impacting the emission reductions results have been implemented in the M2 calculation sheet (VCS_7_10_Calculator_M2_24_07_2023.xlsx) and has the following outcomes:

1. In the PD and M1 report calculation sheet, harvested wood products were deducted from biomass loss under the project scenario. However, as there is no commercial logging under the project scenario, parameter $C_{WP,i}$ has been set to 0. This is considered conservative as the biomass loss for forest cover loss in the project scenario is now 100% (i.e., without deduction for long-term carbon storage in wood products). This change leads to a reduction in calculated VCUs for the entire project duration, including the first monitoring period.
2. In the PD and M1 report, the split of year 4 has led to a double counting of cumulated annual emission from previous years. This has been corrected, leading to reduced estimated baseline emissions for year 4 (104,050 tCO₂e instead of the 113,411 tCO₂e listed in the PD, Table 43). The change, implemented in the second half of year 4, i.e. in the monitoring period covered by this monitoring report, is considered conservative as it leads to lower baseline emissions and thus lower benefits.

To be consistent, the split of annual emissions in year 10 in the current monitoring period (M2) has been calculated in proportion to the number of days in the year that falls within the monitoring period (224 days from 22nd May 2018 to 31st December 2018). While this is not conservative for M2, it accurately splits the emission reductions into the second and third monitoring period and does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

Table 7 of the PD also has a typographic error in the sum of REDD emission reductions estimate, which is indicated as 1,090,453 tCO₂e instead of 1,090,136 tCO₂e, however this has not propagated in the subsequent calculations as can be verified from the total emissions reductions in the same table, and therefore has no impact on the final calculations.

3. According to verification report for the project, a leakage factor of 0.2 is to be applied. However, this factor was not applied in PD and M1 quantification for REDD area under VM0007: parameter LF_REDD in sheet Inputs (VM0007) was set to 0 in calculations for PD and M1 report as validated and verified.

As this is perceived to be incorrect, the leakage factor LK_REDD has been updated to 0.2 in the calculation sheet. This change to the leakage factor for the REDD areas impacts net emission reductions from year one (see VCS_7_10_Calculator_M2_24_07_2023.xlsx, tab VM0007-LK-ASP, column c) and thus reduces net benefits for the entire project duration, including M1 period (cf tab VM0007-REDD-MF). This change is considered conservative as it reduces net benefits from the project activity.

Table 35 in Section 5.4 of this report shows the original and corrected values for the first monitoring period M1 (per deviations in section 3.2.2.8), the difference indicating in an **over-issuance of 97,580 tCO₂e for M1**:

- Long term wood stock and leakage calculation errors, VM0007
 - Removed accounting for long-term wood products pool: -1,078 tCO₂e
 - Added correct leakage factor: -68,862 tCO₂e
 - Corrected conversion factor tC/tCO₂e for leakage: -14,302 tCO₂e
 - **Total deduction for M1 correction (VM0007)** **-84,242 tCO₂e**
 - Buffer pool calculation errors, VM0010
 - **Additional VCUs to be allocated to buffer** **-13,338 tCO₂e**
- Total deduction for M1 correction in first year of M2: - 97,580 tCO₂e**

A corresponding deduction of 97,580 tCO₂e is made from the VCUs issued in the the second monitoring period to account for the over-issuance in M1. These changes do not impact the applicability of methodology, additionality or the appropriateness of baseline scenario. As additional supporting documents to this monitoring report, two spreadsheets are provided to facilitate review and assessment of above quantitative changes:

- VCS_7_10_Calculator M1 to M2 CHANGE TRACKER_24_07_2023.xlsx lists VCU summary tables after each of the above changes and indicates impacts on net project benefits for each step.
- VCS_7_10_Calculator_M2_24_07_2023 MARKUP.xlsx is a copy of the full calculation sheet containing color coded cells to identify each change in the change tracker file above.

3.2.2.9 Root-to-Shoot Ratio

All calculations for the project, including the quantifications in the first monitoring report and the PD, are applying a root-to-shoot ratio of 0.24, corresponding to NCR #57 in the project validation report (VALID_REP_1122_08OCT2013.pdf) and based on the parameter table for root to shoot ratio in VMD0007 CP-AB (page 17).

This deviates from the root-to-shoot ratio of 0.37 listed in the Project Description (pages 101,103, 105) and MR 1 section 4.2 which remained after validation despite the calculations being corrected. As an outcome of this deviation, for the second monitoring report, all citations and calculations have been implemented with the correct value of 0.24. This does not impact the applicability of methodology, additionality or the appropriateness of baseline scenario.

3.2.2.10 Project crediting period

We have observed a typographical error in the 2013 Project Description at Table 2 – Project Crediting Period. The dates in this section incorrectly reflect the harvest plan period of 40 years and not the project crediting period of 38 years. This crediting period has now been amended in Table 2 of this 2nd Monitoring Report to reflect the project crediting period of 38 years, from 22 May 2009 to 21 May 2047. The deviation has no outcome or impact on the project crediting period.

3.2.2.11 Volume of timber extracted

We have observed an error in Table 37 of section 3.7.3 in the 2013 Project Description (Page 97) where the parameter for $V_{BSL,EX,i,t}$, the projected timber extraction in stratum i in year t , erroneously lists 460,000 m³ ha⁻¹ yr⁻¹ as “value applied”. However, 460,000 m³ is the overall projected extraction per year (as correctly stated in section 2.5.2 of the PD). 37.7 is the extracted volume per ha per year, which is used in conjunction with the

projected harvested area (the stratum) to calculate m^3 per year. This deviation has no outcome or impact on the emission reduction calculations and the correct value for $V_{\text{BSL,EX},i,t}$ is updated in Table 15 of this 2nd Monitoring report as $37.7 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$

3.3 Grouped Projects

The project is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

- [VM0007](#)

Table 13. M-MON Data and Parameters not Monitored (default or measured one time).

Data / Parameter	Project Forest Cover Benchmark Map
Data unit	Dimensionless (Map)
Description	Map showing the location of forest land within the project area at the beginning of each monitoring period. If within the Project Area some forest land is cleared, the benchmark map must show the deforested areas at each monitoring event
Source of data	Remote sensing in combination with GPS data collected during ground truthing.
Value applied	N/A (map)
Justification of choice of data or description of measurement methods and procedures applied	As per approved Project Description and Validation report. The minimum map accuracy must be 90% for the classification of forest/non forest in the remote sensing imagery. If the classification accuracy is less than 90% then the map is not acceptable for further analysis. More remote sensing data and ground truthing data will be needed to produce a product that reaches the 90% minimum mapping accuracy.
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	Where forest land contains more than one forest class, the map must be stratified into forest classes using module X-STR.

Data / Parameter	A_i
Data unit	ha
Description	Area of stratum, i

Source of data	Project shape files, according to PD
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	Frequency: At a minimum, every ten years prior to baseline renewal. Area determined ex-ante and assumed that total strata area will remain constant (no change in project area).
Purpose of Data	Determination of baseline scenario (AFOLU projects only) Calculation of project emissions
Comments	Where forest land contains more than one forest class, the map must be stratified into forest classes using module X-STR

Table 14. BL-PL Data and Parameters not Monitored (default or measured one time).

Data / Parameter	D%planned,i,t
Data unit	% year ⁻¹
Description	Projected annual proportion of land that will be deforested in stratum i at year t
Source of data	Analysis of land use land change remote sensing data within six proxy areas over a period of nine years.
Value applied	Over the fixed baseline period 22nd May 2009 – 21st May 2019 Infrastructure related deforestation was found to be 0.07% as a percentage of the entire Project Area.
Justification of choice of data or description of measurement methods and procedures applied	<i>Following guidance in BL-PL to get project-relevant deforestation rate, data from proxy areas (active concessions) was assessed to quantify average annual losses from deforestation for infrastructure (PD section 3.5.5).</i>
Purpose of Data	<i>Determination of baseline scenario (AFOLU projects only)</i>
Comments	Used in BL-PL 4 These figures will be revisited at the time of baseline revision.

Data / Parameter	L-D
Data / Parameter	PF _c
Data unit	Dimensionless
Description	Proportion of available area for production of commodity c that is currently forested
Source of data	
Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	This value will be assumed to be 1 (i.e., displacement is to 100% forested areas), since displacement of logging activities dictates that the displacement area must be forested.
Purpose of Data	Calculation of leakage

Comments	Used in equation LK-ASP 9
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Table 15. LK-ME Data and Parameters not Monitored (default or measured one time).

Data / Parameter	CF
Data unit	t C t d.m. ⁻¹
Description	Carbon Fraction of Dry Matter
Source of data	IPCC Good Practice Guidance
Value applied	Default value 0.47 t C t ⁻¹ d.m
Justification of choice of data or description of measurement methods and procedures applied	No species-specific values available nor national specific information.
Purpose of Data	Calculation of leakage
Comments	Used in equation LK-ME 4 in the PD.

Data / Parameter	D _j
Data unit	t d.m.m ⁻³
Description	Mean wood density of commercially harvested species
Source of data	Weighted average of tree species identified in the project area (see sheet "WdDensity" in calculation tool.
Value applied	0.57
Justification of choice of data or description of measurement methods and procedures applied	Data specific to species on-site is preferred over international defaults (e.g., IPCC 2006)
Purpose of Data	Calculation of leakage
Comments	Used in equation LK-ME 4 in the PD.

Data / Parameter	LDF
Data unit	t C m ⁻³
Description	Factor for calculating the biomass of dead wood created during logging operations per cubic meter extracted
Source of data	Measured by Winrock International from 774 logging gaps in Bolivia, Belize, the Republic of Congo, Brazil and Indonesia.

Value applied	Default value for broadleaf and mixed forests of 0.53 t C m ⁻³
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable.
Purpose of Data	Calculation of leakage
Comments	Used in equation LK-ME 4 in the PD. This value will be updated if improved and/or locally specific data becomes available. This update may occur prior to the 10 year mandatory baseline revision.

Data / Parameter	LIF
Data unit	t C m ⁻³
Description	Factor for calculating the emissions arising from the creation of logging infrastructure (roads, skid trails and decks) during logging operations per cubic meter extracted.
Source of data	Calculated from 1,839 hectares of logging concessions analysed by Winrock International in the Republic of Congo and Brazil, may be used for tropical broadleaf forests.
Value applied	0.29
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable
Purpose of Data	Calculation of leakage
Comments	Used in equation LK-ME 4 in the PD. This value will be updated if improved and/or locally specific data becomes available. This update may occur prior to the 10-year mandatory baseline revision.

Data / Parameter	PML _{FT}
Data unit	%
Description	Mean merchantable biomass (annual allowable cut) as a proportion of total FMA Area
Source of data	Forest Trends analysis of FMA operations in Papua New Guinea (Forest Trends, 2011)
Value applied	0.34
Justification of choice of data or description of measurement methods and procedures applied	National relevant information.
Purpose of Data	Calculation of leakage

Comments	Not used directly in any equations, but input factor for LF, used in equation LK-ME 2.
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Data / Parameter	PMP _i
Data unit	%
Description	Merchantable biomass as a proportion of total aboveground tree biomass for stratum i within the project boundaries
Source of data	Forest Trends analysis of FMA operations in Papua New Guinea (Forest Trends, 2011)
Value applied	0.18
Justification of choice of data or description of measurement methods and procedures applied	National relevant information.
Purpose of Data	Calculation of leakage

Data / Parameter	V _{BSL,EX,i,t}
Data unit	m ³ ha ⁻¹
Description	Volume of timber projected to be extracted from within the project boundary during the baseline in stratum i at time t.
Source of data	The Forest Development and Management Plan (FDMP) prepared by Road Timber Co combined with the April River Timber Harvest Plan.
Value applied	37.7 m ³ ha ⁻¹ yr ⁻¹
Justification of choice of data or description of measurement methods and procedures applied	Site specific information.
Purpose of Data	Calculation of leakage
Comments	Used in equation LK-ME 4 in the PD. This value will not be updated, as the plan is considered the best estimate of the logging practices that would have occurred in the Project Area.

Table 16. CP-AB Data and Parameters not Monitored (default or measured one time).

Data / Parameter	CF
Data unit	tC t ⁻¹ d.m.
Description	Carbon fraction of dry matter
Source of data	IPCC 2006 INV GLs AFOLU Chapter 4, Table 4.3
Value applied	Default value 0.47 tC t ⁻¹ d.m. was used.
Justification of choice of data or description of	In the absence of national specific data internationally recognised sources are acceptable.

measurement methods and procedures applied	
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in equation CP-AB 1, 14. The default values should be used for all species.

Data / Parameter	$f_j(x,y)$
Data unit	kg d.m.
Description	Allometric equation for species j linking measured tree variable(s) to aboveground biomass of living trees, expressed as t d.m. tree ⁻¹
Source of data	In the absence of a National allometric equation specific to Papua New Guinea, an allometric was selected based on DBH and species-specific wood density from Chave, J., C. Andalo, S. Brown, M. A. Cairns, J. Q. Chambers, D. Eamus, H. Folster, F. Fromard, N. Higuchi, T. Kira, J.-P. Lescure, B. W. Nelson, H. Ogawa, H. Puig, B. Riera, T. Yamakura. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. <i>Oecologia</i> 145: 87-99. The equation was developed from 416 trees (42 of which were from Papua New Guinea), and is based on a statistically significant regression with an $r^2 = 0.99$
Value applied	$f_j(DBH, p)_{ab} = p \times \exp(-1.239 + 1.98 \times \ln(DBH) + 0.207 \times \ln(DBH)^2 - 0.0281 \times \ln(DBH)^3)/1000$ Where: $f_j(DBH, p)_{ab}$ = aboveground biomass kg d.m p = species specific wood density g cm ⁻³ DBH = diameter at breast height (i.e., 1.3m) cm
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Should allometric equations specific for Papua New Guinea be available when the baseline is renewed, the equation from Chave et al., 2005 will be replaced by the locally developed equation

Data / Parameter	R
Data unit	t root d.m. t ⁻¹ shoot d.m.
Description	Root to shoot ratio appropriate to species or forest type/biome. The root to shoot ratio is applied as belowground biomass per unit area: aboveground biomass per unit area (not on a per stem basis)
Source of data	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol 4, Chapter 4 (Forest Land), Table 4.4 (Updated)

Value applied	A root:shoot ratio of 0.24 t root dm/t AGB was applied, based on the value for tropical rainforest.
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Global values from Table 4.4 of the IPCC 2006 Guidelines were selected by choosing the climatic zone and forest type that most closely matches the April Salumei Project Area. The mean values of default values selected from Table 4.4 of the IPCC 2006 Guidelines are considered conservative. Used in equations CP-AB 5, 13

Table 17. CP-L Data and Parameters not Monitored (default or measured one time).

Data / Parameter	CF _j
Data unit	tC t ⁻¹ d.m.
Description	Carbon fraction of dry matter in litter
Source of data	CP-L Module
Value applied	Default value 0.37 tC t ⁻¹ d.m. is used.
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in equations CP-L 1

Table 18. CP- W Data and Parameters not Monitored (default or measured one time).

Data / Parameter	CF _j
Data unit	t C t ⁻¹ d.m.
Description	Carbon fraction of dry matter in t C t ⁻¹ d.m. for species j
Source of data	IPCC 2006 INV GLs AFOLU Chapter 4
Value applied	0.47 (default value)
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in equation CP-W 1

Data / Parameter	D _j
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Data unit	t d.m.m ⁻³
Description	Mean wood density of commercially harvested species
Source of data	Weighted average of tree species identified in the project area (see sheet “WdDensity” in calculation tool.
Value applied	0.57
Justification of choice of data or description of measurement methods and procedures applied	Data specific to species on-site is preferred over international defaults (e.g., IPCC 2006)
Purpose of Data	Calculation of leakage
Comments	Used in equation LK-ME 4. Calculation is performed in Project calculation spreadsheet on tab labelled WdDensity.

Data / Parameter	SLF _{ty}
Data / Parameter	WW _{ty}
Data unit	Dimensionless
Description	Fraction of extracted biomass effectively emitted to the atmosphere during production by class of wood product ty
Source of data	Winjum et al., 1998
Value applied	0.24 for developing countries.
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in equation CP-W 2. Parameter values to be updated if new empirically based peer- reviewed findings become available.
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable.
Purpose of Data	Determination of baseline scenario (AFOLU projects only) Calculation of project emissions
Comments	Used in equation CP-W 3. Parameter values were updated in accordance with the new VCS Requirements for wood product accounting, as per the values reported in VCS Approved methodology, VM003

Table 19. E-BB Data and Parameters not Monitored (default or measured one time).

Data / Parameter	CF
Data unit	tC t ⁻¹ d.m.
Description	Carbon fraction of dry matter
Source of data	IPCC 2006 INV GLs AFOLU Chapter 4, Table 4.3
Value applied	Default value 0.47 tC t ⁻¹ d.m. is used.
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in equation E-BB 2

Data / Parameter	G _{gi}								
Data unit	g kg ⁻¹ dry matter burnt								
Description	Emission factor for stratum i for gas g								
Source of data	Defaults sourced from Volume 4, Chapter 2 of the IPCC 2006 Inventory Guidelines, Table 2.5.								
Value applied	<table><tr><th>Category</th><th>CO₂</th><th>CH₄</th><th>N₂O</th></tr><tr><td>Tropical Forest</td><td>1580</td><td>6.8</td><td>0.20</td></tr></table>	Category	CO ₂	CH ₄	N ₂ O	Tropical Forest	1580	6.8	0.20
Category	CO ₂	CH ₄	N ₂ O						
Tropical Forest	1580	6.8	0.20						
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable.								
Purpose of Data	• Determination of baseline scenario (AFOLU projects only) • Calculation of project emissions • Calculation of leakage								
Comments	Used in equation E-BB 1. Default values shall be updated whenever new guidelines are produced by the IPCC.								

Data / Parameter	COMF _i
Data unit	Dimensionless
Description	Combustion factor for stratum i (vegetation type)
Source of data	Default values in Table 2.6 of IPCC, 2006 (Annex 2)

Value applied	Vegetation Type	Subcategory	Mean	SD
	Primary Tropical Forest	Primary Tropical Forest	0.32	0.12
	Secondary Tropical Forest (slash and burn)	Young Tropical Forest (3-5 years)	0.46	-
	Secondary Tropical Forest (slash and burn)	Intermediate Tropical Forest (6-10 years)	0.67	0.21
	Secondary Tropical Forest (slash and burn)	Advanced Tropical Forest (14-17 years)	0.50	0.10
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable.			
Purpose of Data	Determination of baseline scenario (AFOLU projects only)			
Comments	Used in equation E-BB 1. The combustion factor is a measure of the proportion of the fuel that is actually combusted, which varies as a function of the size and architecture of the fuel load (i.e., a smaller proportion of large, coarse fuel such as tree stems will be burnt compared to fine fuels, such as grass leaves), the moisture content of the fuel and the type of fire (i.e., intensity and rate of spread). Default values shall be updated whenever new guidelines are produced by the IPCC.			

Table 20. X-UNC Data and Parameters not Monitored (default or measured one time).

Data / Parameter	$C_{REDD,t}$
Data unit	tCO ₂ -e
Description	Net anthropogenic greenhouse emissions reductions at time t
Source of data	Based on calculation.
Value applied	Value is calculated
Justification of choice of data or description of measurement methods and procedures applied	Refer to tab "VM0007-X-UNC" in the spreadsheet.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in equation X-UNC 11 Module parameter originates in REDD-MF
Data / Parameter	$E_{REDD-BSL SS,i, pool\#}$
Data unit	t CO ₂ -e
Description	Carbon stock or GHG sources (e.g. trees, dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in the baseline case
Source of data	The terms denoting significant carbon stocks, GHG sources or leakage emissions from baseline modules (BL-DFW, BL-PL, BL-UP) used to calculate net emission reductions.

Frequency of monitoring/recording	Monitored at least once every ten years (or when the baseline is revisited)
Purpose of the data	<i>Calculation of baseline emissions</i>
Calculation method	Used in equations 4, 5
Comments	Baseline stocks and sources are estimated ex-ante for each baseline period. This parameter was not monitored ex-post and is therefore excluded from this monitoring period in accordance with the validated Project Description

Data / Parameter	$D\%_{pn}$
Data unit	%
Description	Percent of deforestation in land parcel pn etc of a proxy area as a result of planned deforestation as defined in the module
Source of data	Table 32 of Project Description
Value applied	0.7
Description of measurement methods and procedures applied	The data applied in Equation BL-PL - 2 for each of the proxy areas is presented in Table 32 of the Project Description
Purpose of Data	Calculation of uncertainty in the baseline rate
Comments	Data parameter originates in module BL-PL

Data / Parameter	$U_{REDD-BSL,SS,i,pool\#}$
Data unit	%
Description	Percentage uncertainty (expressed as 95% confidence interval as a percentage of the mean where appropriate) for carbon stocks and greenhouse gas sources in the baseline case (1,2,...n represent different carbon pools and/or GHG sources)
Source of data	Calculations arising from field measurement data
Description of measurement methods and procedures to be applied	Uncertainty in pools derived from field measurement with 95% confidence interval calculated as the standard error of the averaged plot measurements in each stratum multiplied by the t value for the 95% confidence level. For wood products the uncertainty should be the confidence interval around the volume of timber extracted from the forest. For emission sources conservative parameters should be used sufficient to allow the uncertainty to be set as zero.
Purpose of the data	<i>Calculation of baseline emissions</i>
Calculation method	<i>Used in equation 4 & 5.</i>
Comments	For use in equation 4 & 5: Baseline stocks and sources are estimated ex-ante for each baseline period. This parameter was not monitored ex-post and is therefore excluded from this monitoring period in accordance with the validated Project Description

Data / Parameter	Yrs _{pn}
Data unit	Years
Description	Number of years over which deforestation occurred in land parcel <i>pn</i> in proxy area;
Source of data	Refer to the tab “VM0007-BL-PL” in the spreadsheet.
Value applied	9
Justification of choice of data or description of measurement methods and procedures applied	In line with the approved project description.

Data / Parameter	DBH
Data unit	cm
Description	Diameter at breast height of a tree in cm
Source of data	Field measurements in sample plots
Value applied	as measured (see VM0007_CP-AB in the spreadsheet).
Justification of choice of data or description of measurement methods and procedures applied	Measured 1.3m aboveground. Measure all trees above minimum DBH of 10cm in the sample plots. Minimum DBH employed in inventories is held constant for the duration of the project. Monitoring must occur at least every ten years for baseline renewal. Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	Used in equation CP-AB 1. Carbon stock estimation occurs only for determination of the baseline this parameter shall be known ex-ante. This parameter was not monitored ex-post and is therefore excluded from this M2 in accordance with the validated Project Description.

- [VM0010](#)

Table 21. VM0010 Data and parameters not monitored (default values or measured one time).

Data / Parameter	$V_{l,j,i,sp}$
Data unit	m^3
Description	Merchantable volume for tree l of species j in sample plot sp in stratum i
Source of data	Merchantable volume for all trees in each plot was calculated using a volume equation specified in the PNG Forest Inventory Planning System database. ¹
Value applied	Average value calculated at $37.7 m^3 ha^{-1}$
Justification of choice of data or description of measurement methods and procedures applied	Merchantable volume was quantified using local equation with measured data from field inventory.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in methodology VM0010, equation 1 Refer to Forest Carbon Stock report

Data / Parameter	CF
Data unit	$tC t^{-1} d.m.$
Description	Carbon fraction of dry matter
Source of data	IPCC 2006 INV GLs AFOLU Chapter 4, Table 4.3
Value applied	Default value $0.47 tC t^{-1} d.m.$ was used.
Justification of choice of data or description of measurement methods and procedures applied	In the absence of national specific data internationally recognised sources are acceptable
Purpose of Data	Determination of baseline scenario (AFOLU projects only) Calculation of project emissions Calculation of leakage
Comments	Used in methodology VM0010, equation 3, 4

Data / Parameter	D_j
Data unit	$t d.m.m^{-3}$
Description	Mean wood density of commercially harvested species
Source of data	Weighted average wood density of commercial species listed in the FDMP as being targeted for timber production, Wood density values were derived from information on local species (see sheet "WdDensity" in calculation tool).
Value applied	0.57

¹ The equation is: $V (m^3 ha^{-1}) = 1.116 * 0.00007854 * (DBH^{2.4762})$

Justification of choice of data or description of measurement methods and procedures applied	Refer to source of data (sheet "WdDensity" in the spreadsheet VCS_7_10_Calculator_M2 24_07_2023.xlsx)
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in methodology VM0010, equation 4

Data / Parameter	PML_{FT}
Data unit	%
Description	Mean merchantable biomass (annual allowable cut) as a proportion of total FMA Area
Source of data	Forest Trends analysis of FMA operations in PNG (Forest Trends, 2011)
Value applied	0.34
Justification of choice of data or description of measurement methods and procedures applied	National relevant information.
Purpose of Data	Calculation of leakage
Comments	Equations in methodology VM0010, refer to Section 8.3.2 - Leakage, Box 2

Data / Parameter	PMP_i
Data unit	%
Description	Merchantable biomass as a proportion of total aboveground tree biomass for stratum i within the project boundaries.
Source of data	In line with PD documentation and deviation notice (PD section 4.3.2,) Annual Allowable Cut as a proportion of total FMA area is used to estimate PMP. Volume of timber that can sustainably be harvested from FMAs, as recommended by an Inter-Agency Forestry Review Committee set up under the auspices of the Department of the Prime Minister and National Executive Council and described in a report published by Forest Trends (2011). Total concession area derived from the same source.
Value applied	0.18
Justification of choice of data or description of measurement methods and procedures applied	National relevant information
Purpose of Data	Calculation of leakage
Calculation method	Used in methodology VM0010 STEP 5 – Leakage, Box 4

Data / Parameter	$V_{EX,j,i BSL}$
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Data unit	m^3ha^{-1}
Description	Mean volume of extracted timber per unit area for species j in stratum i
Source of data	The timber harvest plan sets the allowable mean extracted volume from the merchantable volume of timber in the forest inventory ($V_{j,i BSL}$), based on legal limits.
Value applied	37.70
Justification of choice of data or description of measurement methods and procedures applied	<i>Harvest Plan (annual allowable cut) from PNGFA.</i>
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	Used in equations in methodology VM0010 equation 3,4 and 22

Data / Parameter	A_i
Data unit	ha
Description	Area covered by stratum i
Source of data	Geodetic coordinates and/or Remote Sensing data and/or legal parcel records
Value applied	Project Area determined by PNGFA
Description of measurement methods and procedures applied	The project has fixed boundaries that are verified through remote sensing and annual field patrols and support by our legal binding agreement with the PNG Forest Authority
Purpose of Data	Calculation of baseline emissions
Comments	Used in methodology VM0010, equation 32. It must be assumed ex-ante that land parcel boundaries and strata areas must not change through time.

Data / Parameter	$A_{1,i,p}$
Data unit	ha
Description	The area of stratum i in land parcel p that was harvested 1 year ago.
Source of data	Geodetic coordinates, GIS Files or legal parcel records.
Value applied	6,366.84 (per year)
Justification of choice of data or description of measurement methods and procedures applied	<i>Harvest Plan (annual allowable cut) from PNGFA</i>
Purpose of Data	Calculation of baseline emissions
Comments	Used in methodology VM0010, equation 23.

Data unit	$A_{2-10,i,p}$
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Data unit	ha
Description	The area of stratum i in land parcel p that was harvested between 2 and 10 years ago
Source of data	Geodetic coordinates, GIS Files or legal parcel records.
Value applied	6,366.84 (per year)
Justification of choice of data or description of measurement methods and procedures applied	Harvest Plan (annual allowable cut) from PNGFA
Purpose of Data	Calculation of baseline emissions
Comments	Used in methodology VM0010, equation 24.

Data / Parameter	A_{t^*}
Data unit	ha
Description	Cumulative area harvested until time t^*
Source of data	Geodetic coordinates, GIS Files or legal parcel records.
Value applied	6,366.84 (per year)
Justification of choice of data or description of measurement methods and procedures applied	Harvest Plan (annual allowable cut) from PNGFA
Purpose of Data	Calculation of baseline emissions
Comments	Used in methodology VM0010, equation 26.
data or description of measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	Used in methodology VM0010, equation 25.

Data / Parameter	$BCEFR$
Data unit	t.d.m m ⁻³
Description	Biomass conversion and expansion factor applicable to wood removals in the project area.
Source of data	In the absence of country specific data, a BCEF of 1.67 t d.m m ³ was applied from the IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.5)
Value applied	1.67 t.d.m m ³
Justification of choice of data or description of measurement methods and procedures applied	No national or regional factor available
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	When selecting a BCEFR the minimum DBH must be compatible with the minimum DBH specified in the timber harvest plan. Default values are consistent with the IPCC most updated version.
Data unit	ha
Description	Area of sample plot sp.
Source of data	Recording and archiving of size of sample plots.
Value applied	0.04 ha (20xd20m plot)
Justification of choice of data or description of measurement methods and procedures applied	Standard Operation Procedures for forest timber inventory is used.
Purpose of Data	Calculation of baseline emissions every ten years for baseline emissions.
Comments	Used in methodology VM0010, equation 2 and 19.

Data / Parameter	OF,SLF,WW
Data unit	kg kg ⁻¹
Description	OF = Fraction of wood products that will be emitted to the atmosphere between 3 and 100 years after production; SLF = Fraction of wood products that will be emitted to the atmosphere within 3 years of production; and WW = Fraction of extracted biomass effectively emitted to the atmosphere during production

Source of data	The source of data is the published paper of Winjum et al., 1998² Wood waste fraction (WW): Winjum et al., 1998 indicate that the proportion of extracted biomass that is oxidized (burning or decaying) from the production of commodities to be equal to 19% for developed countries, 24% for developing countries. Short-lived fraction (SLF) Winjum et al., 1998 give the following proportions for wood products with short-term (<3 yr.) uses (applicable internationally): Sawnwood 0.12 Woodbase panels 0.06 Other industrial roundwood 0.18 Paper and Paperboard 0.24 Additional oxidized fraction (OF) Winjum et al 1998 gives annual oxidation fractions for each class of wood products split by forest region (boreal, temperate, and tropical). This methodology projects these fractions over 95 years to give the additional proportion that is oxidized between the 3rd and 100th years after initial harvest: <table><tr><th rowspan="2">Wood Product Class</th><th colspan="3">OF</th></tr><tr><th>Boreal</th><th>Temperate</th><th>Tropical</th></tr><tr><td>Sawnwood</td><td>0.39</td><td>0.62</td><td>0.86</td></tr><tr><td>Woodbase panels</td><td>0.62</td><td>0.86</td><td>0.98</td></tr><tr><td>Other industrial roundwood</td><td>0.86</td><td>0.98</td><td>0.99</td></tr><tr><td>Paper and paperboard</td><td>0.39</td><td>0.62</td><td>0.99</td></tr></table>	Wood Product Class	OF			Boreal	Temperate	Tropical	Sawnwood	0.39	0.62	0.86	Woodbase panels	0.62	0.86	0.98	Other industrial roundwood	0.86	0.98	0.99	Paper and paperboard	0.39	0.62	0.99
Wood Product Class	OF																							
	Boreal	Temperate	Tropical																					
Sawnwood	0.39	0.62	0.86																					
Woodbase panels	0.62	0.86	0.98																					
Other industrial roundwood	0.86	0.98	0.99																					
Paper and paperboard	0.39	0.62	0.99																					
Value applied	See above.																							
Justification of choice of data or description of measurement methods and procedures applied	See above.																							
Purpose of Data	Indicate one of the following: Determination of baseline scenario (AFOLU projects only)																							
Comments	Parameters were updated in accordance with the requirements of the VCS Standard version 3.																							

Data / Parameter	RGR _i
Data unit	tC.ha ⁻¹ .yr ⁻¹
Description	Forest regrowth rate post timber harvest for stratum i
Source of data	Fox et al (2011), value for Southern Highlands.
Value applied	1

² Winjum, J.K., Brown, S. and Schlamadinger, B. 1998. Forest harvests and wood products: sources and sinks of atmospheric carbon dioxide. Forest Science 44: 272-284 31

Justification of choice of data or description of measurement methods and procedures applied	Country specific published data.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	Used in the methodology VM0010 Equation 12

Data / Parameter	COMF _i																				
Data unit	Dimensionless																				
Description	Combustion factor for stratum i (vegetation type)																				
Source of data	Default values in Table 2.6 of IPCC, 2006																				
Value applied	<table><tr><th>Vegetation Type</th><th>Subcategory</th><th>Mean</th><th>SD</th></tr><tr><td>Primary Tropical Forest</td><td>Primary Tropical Forest</td><td>0.32</td><td>0.12</td></tr><tr><td>Secondary Tropical Forest (slash and burn)</td><td>Young Tropical Forest (3-5 years)</td><td>0.46</td><td>-</td></tr><tr><td>Secondary Tropical Forest (slash and burn)</td><td>Intermediate Tropical Forest (6-10 years)</td><td>0.67</td><td>0.21</td></tr><tr><td>Secondary Tropical Forest (slash and burn)</td><td>Advanced Tropical Forest (14-17 years)</td><td>0.50</td><td>0.10</td></tr></table>	Vegetation Type	Subcategory	Mean	SD	Primary Tropical Forest	Primary Tropical Forest	0.32	0.12	Secondary Tropical Forest (slash and burn)	Young Tropical Forest (3-5 years)	0.46	-	Secondary Tropical Forest (slash and burn)	Intermediate Tropical Forest (6-10 years)	0.67	0.21	Secondary Tropical Forest (slash and burn)	Advanced Tropical Forest (14-17 years)	0.50	0.10
Vegetation Type	Subcategory	Mean	SD																		
Primary Tropical Forest	Primary Tropical Forest	0.32	0.12																		
Secondary Tropical Forest (slash and burn)	Young Tropical Forest (3-5 years)	0.46	-																		
Secondary Tropical Forest (slash and burn)	Intermediate Tropical Forest (6-10 years)	0.67	0.21																		
Secondary Tropical Forest (slash and burn)	Advanced Tropical Forest (14-17 years)	0.50	0.10																		

Data / Parameter	G _{gi}								
Data unit	g kg ⁻¹ dry matter burnt								
Description	Emission factor for stratum i for gas g								
Source of data	Defaults can be found in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5.								
Value applied	<table><tr><th>Category</th><th>CO₂</th><th>CH₄</th><th>N₂O</th></tr><tr><td>Tropical Forest</td><td>1580</td><td>6.8</td><td>0.20</td></tr></table>	Category	CO ₂	CH ₄	N ₂ O	Tropical Forest	1580	6.8	0.20
Category	CO ₂	CH ₄	N ₂ O						
Tropical Forest	1580	6.8	0.20						
Justification of choice of data or description of measurement methods and procedures applied	Default values shall be updated whenever new guidelines are produced by the IPCC.								
Purpose of Data	Determination of baseline scenario (AFOLU projects only)								

Comments

Used in methodology VM0010 Equation 21

4.2 Data and Parameters Monitored

- **VM0007**
 - **REDD Methodology Framework (REDD-MF)**

Table 22. VM0007 Data and parameters monitored.

Data / Parameter	Project Forest Cover Monitoring Map
Data unit	N/A as it is a map
Description	<i>Map showing the location of forest land within the project area at the beginning of each monitoring period. If some land is cleared within the Project Area, the benchmark map must show the deforested areas at each monitoring event.</i>
Source of data	<i>For the first monitoring period; remote sensing</i> <i>For subsequent monitoring periods: remote sensing in combination with GPS data collected during ground truthing.</i>
Description of measurement methods and procedures to be applied	<i>Spatial data selected for the development of the Forest Cover Monitoring Map shall be sourced from the Landsat data files. Images shall be selected to minimize cloud cover issues.</i>
Frequency of monitoring/recording	<i>Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event</i>
Value monitored	<i>Will be in Ha based on mapping results</i>
Monitoring equipment	<i>The minimum map accuracy must be 90% for the classification of forest/non-forest in the remote sensing imagery. If the classification accuracy is less than 90% then the map is not acceptable for further analysis. More remote sensing data and ground truthing data will be needed to produce a product that reaches the 90% minimum mapping accuracy.</i>
QA/QC procedures to be applied	<i>Classification accuracy is assessed through a confusion matrix of automatic classification and visual interpretation of Landsat imagery (see AS_2019_PNG Forest Classification report (Appendix C) for details).</i>
Purpose of the data	<i>Determine net forest cover losses and gains in the project area to quantify project emissions</i>

Calculation method	<i>Used in equation 3</i>
Comments	<i>Where forest land contains more than one forest class, the map must be stratified into forest classes using module X-STR.</i>

Data / Parameter	<i>Degradation PRA Results</i>
Data unit	<i>N/A verbal responses</i>
Description	<i>Participatory Rural Appraisal</i>
Source of data	<i>Rapid Rural Appraisal documents and Questionnaires</i>
Description of measurement methods and procedures to be applied	<i>The PRA included semi-structured consultation sessions and questionnaires conducted by the elected Chairmen of each of the 6 Landowner companies within the project area. The Chairmen of these companies are responsible for undertaking consultation sessions with all ILGs represented by their respective landowner companies. It is confirmed that all the 164 ILGs were consulted through these annual processes, representing 100% of the population in the project area. The process for this annual consultation follows the SOP titled “AS_SOP_Field Monitoring_v1.4”. The results of these are consolidated and discussed in the Annual Meeting and made available in the Annual Report by the April Salumei Working Group.</i> <i>The PRA evaluates the extent of the following activities within the project area:</i> <i>Illegal commercial harvesting</i> <i>harvesting of fuel wood</i> <i>harvesting of wood for charcoal production</i> <i>timber harvest</i> <i>The questions in the survey include:</i> <i>Is there any illegal logging?</i> <i>Is there any forest fire?</i> <i>Is there any illegal hunting?</i> <i>Are there any other activities that could result in forest carbon loss?</i> <i>If ≥10% of those interviewed/surveyed believe that degradation may be occurring within the project boundary, then the limited on-the-ground degradation survey shall be triggered. If there are reports of activities could result in net forest loss, this is reported immediately and managed through the “Net Loss Response Tree” as detailed in the SOP.</i> <i>An additional output of the PRA shall be a depth of penetration of degradation pressure. A maximum distance shall be recorded for penetration into the forest from access points (such as roads, rivers, already cleared areas) for the purpose of harvesting fuel wood, charcoal and/or timber. It is likely that differing distances shall exist for each degradation pressure. If multiple pressures exist in the same stratum the deepest depth of penetration shall be used to define $A_{deg,i}$.</i>
Frequency of monitoring/recording	<i>Every two years.</i>
Value monitored	<i>N/A</i>

Monitoring equipment	<i>Interviews and stakeholder consultation.</i>
QA/QC procedures to be applied	<i>The person leading the PRA process shall be experienced/trained in conducting PRAs and all communications will be documented and stored.</i>
Purpose of the data	<i>Calculation of project emissions.</i>
Calculation method	N/A
Comments	Summary of the stakeholder consultation is provided in the “Field Monitoring Report”. An independent verification of the summary of the field monitoring activities is provided in “AS_2013-2018_Field Monitoring Letter” – refer to the appendix list.

Data / Parameter	Result of Limited Degradation Survey
Data unit	Dimensionless.
Description	Community consultation survey
Source of data	PRA and annual field monitoring surveys.
Description of measurement methods and procedures to be applied	Sampled by surveying several transects of known length and width across the access-buffer area (equal in area to at least 1% of $A_{Deg,i}$) to check whether new tree stumps are evident or not. Ex-ante, an estimation shall be made of degradation in the project case. If the clear that zero degradation will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent deforestation.
Frequency of monitoring/recording	Must be repeated each time the PRA indicates a potential for degradation.
Value monitored	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	<i>Refer to section 4.3 in relation to project QA/QC procedures</i>
Purpose of the data	Calculation of project emissions
Calculation method	N/A
Comments	There was no potential for degradation identified during the PRAs and the Annual surveys.

Data / Parameter	$A_{DefPA,i,u,t}$
Data unit	ha
Description	Area of recorded deforestation in the project area in stratum i converted to land use u at time t
Source of data	Remote sensing imagery

Description of measurement methods and procedures to be applied	Ex-ante, an estimation shall be made of deforestation in the project case. If it is clear that zero deforestation will occur within the project boundaries, then this parameter may be set to zero
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.
Value monitored	PRA and forest cover analysis indicated limited clearing activities (~1.1 ha/year) from shifting cultivation on managed lands around settlements (for details see section 3.2.2.3 of this report)
Monitoring equipment	N/A (area calculations based on forest cover analysis AS_2019_PNG Forest Classification report (Appendix C)).
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of project emissions
Calculation method	Used in equation 3.
Comments	<i>Provide any additional comments</i>

Data / Parameter	$A_{DegW,i}$
Data unit	ha
Description	Area potentially impacted by degradation processes in stratum i
Source of data	GIS delineation and ground truthing
Description of measurement methods and procedures to be applied	$A_{DegW,i}$ shall be composed of a buffer from all access points (access buffer), such as roads and rivers or previously cleared areas. The width of the buffer shall be determined by the depth of degradation penetration as defined as a PRA output.). Ex-ante, a limited survey can be used to determine a likely depth of degradation penetration
Frequency of monitoring/recording	Must be repeated each time the PRA indicates a potential for degradation.
Value monitored	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A We have no information is on whether any survey of potential degradation was performed. N/A was added as no degradation was reported in PRA and thus it is assumed that no survey for verification/quantification was performed.
Purpose of the data	Calculation of project emissions
Calculation method	Used in equation 8.
Comments	There was no potential for degradation identified during the PRAs and the annual surveys.

/ Parameter	$A_{DistPA,q,l,t}$
Data unit	ha
Description	Area impacted by natural disturbance in the project stratum l converted to natural disturbance stratum q at time t; ha
Source of data	Remote Sensing imagery combined with ground verification or GPS coordinates
Description of measurement methods and procedures to be applied	Minimum monitoring unit shall be equal to a minimum of 11 Landsat pixels or one hectare. Ex-ante, estimations of emissions from natural disturbances shall be based on historic incidence of such event in the Project region
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value monitored	~0.21 ha/year across the entire project area
Monitoring equipment	Minor changes were observed in on forest cover analysis AS_2019_PNG Forest Classification report (Appendix C)).
Purpose of the data	Calculation of project emissions
Calculation method	Used in equation 20.

Data / Parameter	AP_i
Data unit	ha
Description	Total area of degradation sample plots in stratum i
Source of data	Remote Sensing imagery combined with ground verification or GPS coordinates
Description of measurement methods and procedures to be applied	The sampling plan must be designed using plots systematically placed over the buffer zone so that they sample at least 3% of the area of the buffer zone. Ex-ante an estimation must be made of area of plots. This must be set to exactly 3% of the buffer zone $A_{Deg,i}$.
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value monitored	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of baseline emissions
Calculation method	Used in equation 8. Ex-ante an estimation must be made of area of plots. This must be set to exactly 3% of the buffer zone $A_{Deg,i}$.
Comments	No degradation reported, no sampling performed.

Data / Parameter	$C_{DegW,i,t}$
Data unit	tCO_2-e
Description	Biomass carbon of trees cut and removed through illegal logging and fuelwood and charcoal extraction degradation process from plots measured in stratum i at time t
Source of data	Field Measurement
Description of measurement methods and procedures to be applied	The diameter of all tree stumps in the designated plots will be measured and conservatively assumed to be the same as the DBH. If the stump is a large buttress, identify several individuals of the same species nearby and determine a ratio of the diameter at DBH to the diameter of buttress at the same height above ground as the measured stumps. This ratio will be applied to the measured stumps to estimate the likely DBH of the cut tree. The above and below ground carbon stock of each harvested tree must be estimated using the same allometric regression equation and root to shoot ratio used in the module for estimating the carbon pool in trees (CP-AB) in the baseline scenario. See detailed guidance in CP-AB for aboveground biomass estimation.
Frequency of monitoring/recording	Frequency: Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value monitored	Not monitored
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of baseline emissions
Calculation method	Used in equation 8. Ex-ante an estimation shall be made of likely degradation in the with- project case. Such an estimation shall be based on rates of degradation in surrounding areas and the degree of protection that will be in place (e.g. forest guards) in the with-project case.
Comments	No degradation reported, no sampling performed.

- **Baseline Carbon Stock Changes and Greenhouse Gas Emissions from Planned Deforestation (BL-UP)**

See parameters under CP-AB, E-BB, CP-LI

- **Carbon Stocks in the above-and belowground biomass of live trees and non-tree pools (CP- AB)**

Table 23. Data and parameters monitored.

Data / Parameter	A_{sp}
Data unit	ha

Description	Area of sample plots in Ha
Source of data	Recording and archiving of number and size of sample plots.
Description of measurement methods and procedures to be applied	See Carbon Field Inventory Manual.
Frequency of monitoring/recording	Monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included monitoring shall occur at least every five years.
Value monitored	0.04 (established at project registration for baseline calculation for 10 years inclusive of this monitoring period)
QA/QC procedures to be applied	See Carbon Field Inventory Manual
Purpose of the data	Calculation of baseline emissions
Calculation method	Where carbon stock estimation occurs only for determination of the baseline this parameter shall be known ex-ante. This parameter was not monitored ex-post and is therefore excluded from this monitoring period in accordance with the validated Project Description.
Comments	Used in equation CP-AB 2,6,14

Data / Parameter	N
Data unit	Dimensionless
Description	Number of sample points
Source of data	Recording and archiving of number of sample points.
Description of measurement methods and procedures to be applied	As carbon stock estimation occurs only for the determination of the baseline this parameter is known as ex-ante. This parameter was not monitored ex-post and is therefore excluded from this monitoring period in accordance with the validated Project Description.
Frequency of monitoring/recording	Monitoring must occur at least every ten years for baseline renewal.
Value monitored	18
QA/QC procedures to be applied	See Carbon Field Inventory Manual
Purpose of the data	Calculation of baseline emissions.
Comments	Used in equation CP-AB 4

Data / Parameter	A _{Sf}
Data unit	m ⁻²

Description	Area of one sampling frame
Source of data	Recording and archiving of number of sample points.
Description of measurement methods and procedures to be applied	This parameter was not monitored ex-post and is therefore excluded from this monitoring period in accordance with the validated Project Description.
Frequency of monitoring/recording	Monitoring must occur at least every ten years for baseline renewal.
Value monitored	400
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of baseline emissions
Calculation method	Shall be known ex-ante. This parameter was not monitored ex-post and is therefore excluded from this monitoring period in accordance with the validated Project Description.
Comments	Used in equation CP-AB 10

○ Greenhouse Gas Emissions from Biomass Burning (E-BB)

Table 24. Data and parameters monitored.

Data / Parameter	$A_{burn,i,t}$
Data unit	ha
Description	Area burnt in stratum i at time t
Source of data	GPS coordinates and/or Remote Sensing data
Description of measurement methods and procedures to be applied	Areas burned shall be identified and quantified based on PRA and remote sensing or terrestrial delineation
Frequency of monitoring/recording	Areas disturbed shall be monitored at in accordance with the monitoring and reporting schedule.
Value monitored	0 – no burns reported in PRA
Monitoring equipment	N/A (PRA)
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of project emissions
Calculation method	Used in equation E-BB 1
Comments	No fire scarring evident in the remote sensing data and fire reported in annual field monitoring surveys.

Data / Parameter	$C_{AB,tree,i}$
Data unit	t CO ₂ -e ha ⁻¹
Description	Carbon stock in aboveground biomass in trees in stratum, i
Source of data	<i>Calculated in CP-AB based on inventory data</i>
Description of measurement methods and procedures to be applied	Module parameter originates in CP-AB
Frequency of monitoring/recording	This parameter is calculated at project start for the forest area. It has not been recalculated, but would have to be if there were degradation and respective change in quantification (i.e. for a new, degraded forest stratum).
Value monitored	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of project emissions
Calculation method	<i>Calculated in CP-AB</i>
Comments	Used in equation E-BB 2

Data / Parameter	$C_{LI,i}$
Data unit	t CO ₂ -e ha ⁻¹
Description	Carbon stock in aboveground biomass in trees in stratum i
Source of data	<i>Calculated in CP-LI based on inventory data</i>
Description of measurement methods and procedures to be applied	Module parameter originates in CP-L
Frequency of monitoring/recording	N/A
Value monitored	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of project emissions
Calculation method	<i>Calculated in CP-LI</i>
Comments	Used in equation E-BB 2

○ Carbon Stocks in the Long-term Wood Product Pool (CP-W)

Table 25. Data and parameters monitored.

Data / Parameter	A_i
Data unit	ha
Description	Total area of stratum i
Source of data	Direct forest inventory of the project area, distinguishing commercially viable stocks on the basis of species and tree size, referencing local expert knowledge or a participatory rural assessment (PRA) of harvest practices and markets.
Description of measurement methods and procedures to be applied	This parameter is updated at baseline renewal when aboveground biomass is re-inventoried as per module CP-AB (at least every 10 years).
Frequency of monitoring/recording	Monitoring must occur at least every ten years for baseline renewal. Ex-ante it is assumed that the strata remain constant during the baseline period This parameter was not monitored ex-post and is therefore excluded from this monitoring period in accordance with the validated Project Description.
Value monitored	N/A (no change in project area or renewal of baseline)
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of baseline emissions
Calculation method	Used in equation CP-W 1

Data / Parameter	$V_{ex,i}$
Data unit	m^3
Description	The volume of timber in m^3 extracted from within the stratum (does not include slash left onsite), reported by wood product class and preferably species.
Source of data	Timber harvest records and/or estimates derived from field measurements or remote assessments with aerial photography or satellite imagery.
Description of measurement methods and procedures to be applied	<i>Based on management plan</i>
Frequency of monitoring/recording	Monitoring must occur at least every ten years for baseline renewal.
Value monitored	37.7
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of baseline emissions
Calculation method	Used in equation CP-W1

- **Estimation of Emissions from activity shifting (LK-ASP)**

Table 26. Data and parameters monitored.

Data / Parameter	$A_{\text{planned},i}$
Data unit	ha
Description	Total area of planned deforestation over the entire project lifetime for stratum i
Source of data	GPS coordinates and/or Remote Sensing data and/or legal parcel records.
Description of measurement methods and procedures to be applied	Ex-ante, $A_{\text{planned},i}$ shall be determined as described in BL-PL.
Frequency of monitoring/recording	Must be examined at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.
QA/QC procedures to be applied	See section 9.3 of REDD+ MF or other VCS methodology that uses this module.
Purpose of the data	<i>Calculation of project emissions</i>
Calculation method	Used in equation 4

- **Uncertainty for REDD Project Activities (X-UNC)**

Table 27. Data and parameters monitored.

Data / Parameter	$E_{\text{REDD-WPS,SS},i, \text{Pool\#}}$
Data unit	t CO ₂ -e
Description	Carbon stock or GHG sources (e.g., trees, down dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in the with-project case
Source of data	The terms denoting significant carbon stocks, GHG sources or leakage emissions used in calculating net emission reductions from the following relevant modules: CP-AB, CP-D, CP-L, CP-S, CP-W, E- BB, E-FFC, E-NA
Description of measurement methods and procedures to be applied	See relevant modules
Frequency of monitoring/recording	Monitored at least once every five years. Reported in the Project Monitoring report.
Purpose of the data	<i>Calculation of leakage</i>

Calculation method	Used in equation 7, 8.
Data / Parameter	$U_{REDD-WPS,SS,i,pool\#}$
Data unit	%
Description	Percentage uncertainty (expressed as 95% confidence interval as a percentage of the mean where appropriate) for carbon stocks and greenhouse gas sources in the baseline case (1,2...n represent different carbon pools and/or GHG sources)
Source of data	Calculations arising from field measurement data
Description of measurement methods and procedures to be applied	Uncertainty in pools derived from field measurement with 95% confidence interval calculated as the standard error of the averaged plot measurements in each stratum multiplied by the t value for the 95% confidence level. For wood products the uncertainty should be the confidence interval around the volume of timber extracted from the forest. For emission sources conservative parameters should be used sufficient to allow the uncertainty to be set as zero.
Frequency of monitoring/recording	Monitored at least once every five years
Purpose of the data	Calculation of baseline emissions
Calculation method	Used in equation 7
Comments	For use in equation 7: Ex-ante the uncertainty in the with-project carbon stocks and sources shall be equal to the calculated baseline uncertainty.

■ VM0010

Table 28. Data and parameters monitored.

Data / Parameter	Illegal Logging PRA results
Data unit	N/A
Description	Annual Monitoring Reports
Source of data	PRA
Description of measurement methods and procedures to be applied	The PRA shall evaluate whether timber harvest may be occurring in the project area and shall consist of semi-structured interviews / questionnaires. If $\geq 10\%$ of those interviewed/surveyed believe that illegal logging may be occurring within the project boundary, then the limited on-the- ground illegal logging survey shall be triggered. An additional output of the PRA shall be a depth of penetration of illegal logging pressure. A maximum distance shall be recorded for penetration into the forest

	from access points (such as roads, rivers, already cleared areas) for the purpose of harvesting timber.
Frequency of monitoring/recording	Every two years from the first verification.
Value monitored	Reports of Illegal logging
Monitoring equipment	Annual PRAs
QA/QC procedures to be applied	Refer to section 4.3
Purpose of the data	Calculation of project emissions
Calculation method	Used in methodology VM0010 Step 4.
Comments	Ex ante estimation shall be made of illegal logging in the with-project case. If the belief is that zero illegal logging will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent illegal logging. For this monitoring no event of illegal logging was reported or identified in the remote sensing results.

Data / Parameter	Result of Limited Illegal Logging Survey
Data unit	N/A
Source of data	<i>Limited on-the-ground illegal logging survey.</i>
Description of measurement methods and procedures to be applied	Sampled by surveying multiple transects of known length and width across the access-buffer area to check whether new tree stumps are evident or not. The access-buffer area shall be equal in area to at least 1% of ADIST_IL,i
Frequency of monitoring/recording	Must be repeated each time the PRA indicates a potential for illegal logging.
Value monitored	Reports of Illegal logging
Monitoring equipment	Annual PRAs
QA/QC procedures to be applied	Refer to section 4.3
Purpose of the data	<i>Calculation of baseline emissions</i>
Calculation method	Used in methodology VM0010 Step 4
Comments	Ex ante an estimation shall be made of illegal logging in the with- project case. If the belief is that zero illegal logging will occur within the project boundary then this parameter may be set to zero. For this monitoring no event of illegal logging was reported or identified in the remote sensing results.

Data / Parameter	A _{burn,i,t}
Data unit	ha
Description	Area burnt in stratum i at time t
Source of data	GPS coordinates and/or Remote Sensing data
Description of measurement methods and procedures to be applied	Areas burned shall be identified and quantified based on PRA and remote sensing or terrestrial delineation
Frequency of monitoring/recording	Areas disturbed shall be monitored at in accordance with the monitoring and reporting schedule.
Value monitored	0 – no burns reported in PRA
Monitoring equipment	N/A (PRA)
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended.
Purpose of the data	Calculation of project emissions
Calculation method	Used in methodology VM0010 Equation 17
Comments	Ex ante estimations of areas burned shall be based on historic incidence of fire in the Project region. Analysis of satellite imagery over a historical reference period of 2000-2009 presented no evidence of fire scars in the Project Area.

Data / Parameter	A _{dist,i,t}
Data unit	ha
Description	Area disturbed in stratum i at time t
Source of data	GPS coordinates and/or Remote Sensing data
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	Areas disturbed shall be monitored at in accordance with the monitoring and reporting schedule.
Value monitored	No disturbance identified in PRA, however a value of 927.74 ha (151.75 per year) from LULC report is used in the ERR calculations.
Monitoring equipment	N/A
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or

	available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of the data	Calculation of project emissions
Calculation method	Used in methodology VM0010 Equation 35.
Comments	Ex ante estimations of areas disturbed shall be based on historic incidence of natural disturbance in the Project region. Analysis of satellite imagery over a historical reference period of 2000-2009 presented no evidence of natural disturbance in the Project Area.

Data / Parameter	$ADIST_{IL,i}$
Data unit	ha
Description	Area potentially impacted by illegal logging in stratum i
Source of data	GIS delineation and ground truthing
Description of measurement methods and procedures to be applied	$ADIST_{IL,i}$ shall be composed of a buffer from all access points (access buffer), such as roads and rivers or previously cleared areas. The width of the buffer shall be determined by the depth of degradation penetration as defined as a PRA output.
Frequency of monitoring/recording	Repeated each time the PRA indicates a potential for degradation.
Value monitored	0 – PRA did not indicate potential for degradation
Monitoring equipment	N/A (PRA)
QA/QC procedures to be applied	Cross-checking with forest classification, i.e., dynamics of forest cover change
Purpose of the data	Calculation of project emissions
Calculation method	Used in methodology VM0010 equation 36
Comments	Ex-ante a limited survey can be used to determine a likely depth of degradation penetration.

Data / Parameter	$CDIST_{IL,i,t PRJ}$
Data unit	t CO ₂ -e
Description	biomass carbon of trees cut and removed through illegal logging in stratum i at time t
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	The sampling plan must be designed using plots systematically placed over the buffer zone so that they sample at least 3% of the area of the buffer zone ($ADIST_{IL,i}$). The diameter of all tree stumps will be measured and conservatively assumed to be the same as the DBH. Where the stump is a large buttress, several individuals of the same species nearby shall be located and a ratio of the diameter at DBH to the diameter of buttress at the same height above ground as the measured stumps shall be determined. This ratio will be applied to the measured stumps to estimate the likely DBH of the cut tree.

	The aboveground carbon stock of each harvested tree will be estimated using the allometric regression equations chosen for forest growth in the project scenario. The mean aboveground carbon stock of the harvested trees is conservatively estimated to be the total emissions and to all enter the atmosphere.
Frequency of monitoring/recording	Repeated each time limited sampling of A_{DIST_IL} , indicates illegal logging
Value monitored	0 – PRA did not indicate illegal logging activities
Monitoring equipment	N/A
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended.
Purpose of the data	Calculation of project emissions
Calculation method	Used in methodology VM0010 Equation 37
Comments	If species-specific equations are used and species cannot be identified from stumps, then it shall be assumed that the harvested species is the species most harvested. A PRA shall be used to determine the most harvested species.

Data / Parameter	A_{Pi}
Data unit	ha
Description	Total area of illegal logging sample plots in stratum I
Source of data	Ground measurement.
Description of measurement methods and procedures to be applied	A sampling plan must be designed using multiple sample plots systematically placed across the buffer zone so that they sample at least 3% of the area of the buffer zone.
Frequency of monitoring/recording	Not more than five years.
Value monitored	N/A (no sampling performed)
Monitoring equipment	N/A (no sampling performed) – see deviation listed in section 3.2.1
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended.
Purpose of the data	Calculation of project emissions
Calculation method	Used in methodology VM0010 equation 36.
Comments	Ex ante estimation should be made of area of plots. This should be set to exactly 3% of the buffer zone $A_{DIST_IL,i}$

4.3 Monitoring Plan

The primary objective of the monitoring plan is to provide the information necessary to:

- Undertake periodic verification of the project against the VCS; and
- Revisit the baseline at the conclusion of each fixed baseline period (i.e., every 10 years).

The Monitoring Plan employs direct field monitoring patrols as well as indirect satellite images and analysis tools to systematically monitor land cover change in the Project Area. Any detection of change from direct or indirect monitoring will trigger a land use change assessment and increased patrols in identified vulnerable areas. Increased patrols would be aimed at reducing future impact on identified 'at risk areas' for more intense patrols. Figure 6 shows an overview of the Project monitoring and reporting process.

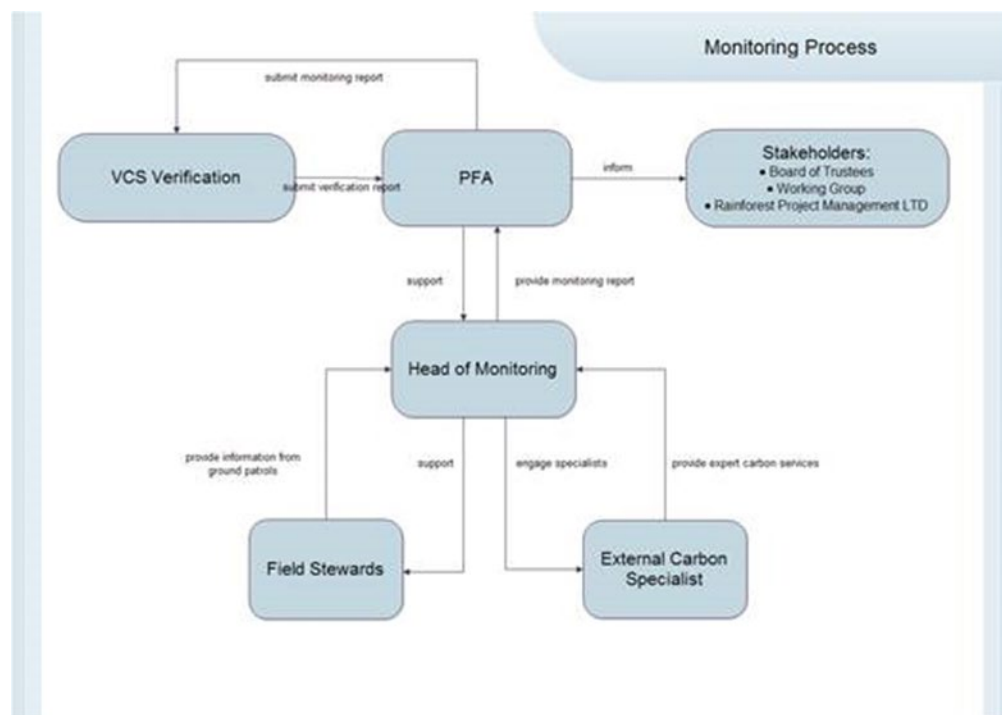


Figure 6. Monitoring Process.

The monitoring reports will be used to identify project risks and non-conformances which will in turn trigger a corrective action plan (CAPs), if required, which is created between the Head of Monitoring and the Field stewards. These CAPs inform of any necessary revision of the field standard operating procedures (SOPs), or additional training requirements, thereby enabling a process of continuous improvement through an adaptive management process.

Ground surveys will be conducted to gather information from the Project Area. Ground surveys may fall under the following categories:

- Routine Field Patrol

- Incident Based Non-Routine Patrol (where an incident has been reported)

Each field patrol requires completion of a field sheet or survey. The information required to be collected from the routine field patrols is detailed against each parameter listed in Monitoring Report.

- Illegal commercial harvesting
- harvesting of fuel wood
- harvesting of wood for charcoal production

Routine (annual) field patrols will be conducted by the Field stewards and reported to the Head of Monitoring. Incident based non-routine patrols will also be completed by the Field stewards and reported to the Head of Monitoring. Below is the Net Loss Response Decision Tree to be used where a field patrol has identified a net loss of the projects carbon stock. For more details see AS_SOP_Field Monitoring_v1.4 in the Appendix A.

An internal auditing function is performed through the review of all field reports by the External Carbon Specialist (Professor Chalapan Kaluwin) and his review report has been provided as a separate document through the verification process. QA/QC is achieved by cross-checking the field reports against remote sensing that has been undertaken as part of this Monitoring Report. Where there is a net loss identified, the response process shown in Figure 7 is implemented. Please refer to section 2.3.2 which demonstrates the implementation of this process for the current period.

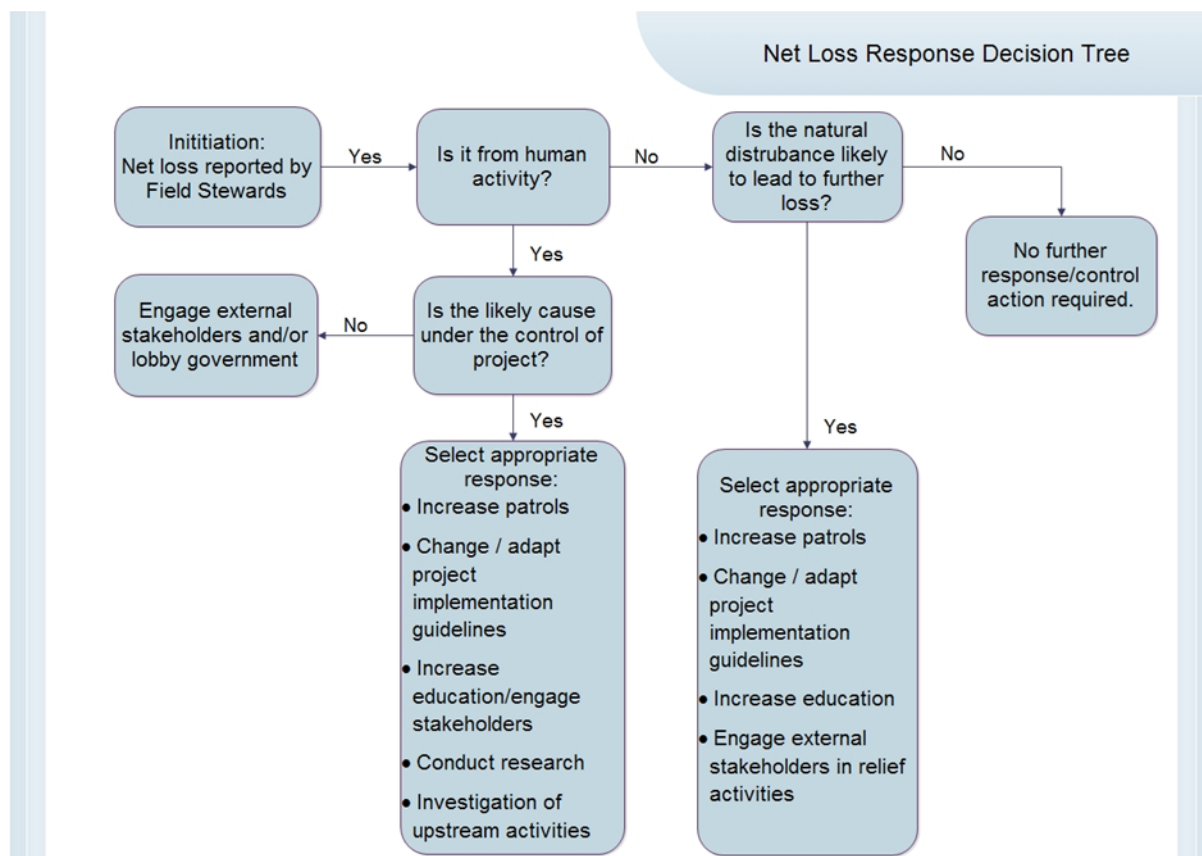


Figure 7. Net Loss Response Decision Tree.

Table 29. Monitoring Organization and responsibilities.

Entity	Role and responsibilities	Reports to
Landowner Company Chairman	Collecting data from field and communities. Reporting observations and conducting investigations where required.	Project Manager
Project Manager	Supervision of data collection and collating of reports. Immediate action and investigation of reporting of illegal activities. See Figure 7 'Net Loss Response Decision Tree'	Project Proponent

Entity	Role and responsibilities	Reports to
Independent Overseer	University of Papua New Guinea provide suitably qualified forestry experts to report on data collected and findings of project manager.	Project Proponent
Technical Expert	Undertakes the remote sensing data collection and analysis, carbon stock calculations, storage of data, quality control checks and reports to project proponent. Responsible to managing and coordinating field measurements where required, investigating illegal logging as reported or identified and training of local people for data collection.	Project Proponent
Project Proponent	Overall responsibility for monitoring of project. Storage of data	Verra

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

Sections below present summaries of the calculation performed according to the project documentation and calculation sheets provided. A full list of equations according to the methodologies and modules, as well as parameter values and sources is provided in Appendix D, Section D.1 for the REDD area (applying VM0007) and Section D.2 for IFM-LtPF (applying VM0010).

5.1 Baseline Emissions

Baseline emissions for the current monitoring period (01 January 2013 – 31 December 2018) were calculated in accordance with the emissions calculations in accordance with methodologies VM0010 and VM0007.

This approach assumed a linear deforestation, which resulted in baseline emissions by year as listed in the Table 30 below, as calculated in the attached excel spreadsheet: VCS_7_10_Calculator_M2_24_07_2023.xlsx - refer to tabs “Section 5.1 (Table 30)”, “VM0007-REDD-MF” and “VM0010-8.1.4-5”.

Table 30. Baseline Emissions for Monitoring Period M1 and M2.

Monitoring Period	Project Year	Year Ending	$\Delta C_{BSL, VM0007,t}$ (tCO ₂ e)	$\Delta C_{BSL, VM0010,t}$ (tCO ₂ e)	$\Delta C_{BSL, Total,t}$ (tCO ₂ e)	$\Delta C_{BSL, Total, cumulative}$ (tCO ₂ e)
M1	1	2010	96,001	146,619	242,619	242,619
	2	2011	98,684	180,783	279,467	522,086
	3	2012	101,367	214,948	316,315	838,401
	4a	2012	56,050	124,557	180,606	1,019,007
M2	4b	2013	48,000	124,557	172,557	1,191,564
	5	2014	106,733	283,278	390,011	1,581,575
	6	2015	109,416	317,443	426,859	2,008,434
	7	2016	112,099	351,608	463,707	2,472,141
	8	2017	114,782	385,773	500,555	2,972,696
	9	2018	117,465	419,938	537,403	3,510,098
	10a	2018	73,735	278,682	352,417	3,810,884
Total	M1	3 yrs	352,100	666,907	1,019,007	
	M2	6 yrs	682,230	2,161,278	2,843,508	

The second monitoring period is for 6 years, and the gross baseline emissions covered by this monitoring period (M2) are equivalent to **2,843,508 tCO₂e**.

Note that the baseline emissions for monitoring period M1 are included for information purposes only and are not related to this report (see also deviation notes in paragraph 3.2.2.8).

5.2 Project Emissions

The project emissions calculation details are shown in Table 31, as calculated in the attached excel spreadsheet: VCS_7_10_Calculator_M2_24_07_2023.xlsx - *refer to tabs Section 5.2 (Table 31), VM0007-REDD-MF and VM0010-8.2.2.*

Table 31 includes M1 original (as in first monitoring report) and M1 corrected project emissions (deviations described in in section 3.2.2.8) for information. Net impacts for changed emission reductions (i.e. increased project emissions and leakage) are presented and discounted in section 5.4 and Tables 35 and 36.

Table 31. Project emissions calculated in accordance with VM0007 and VM0010.

Monitoring Period	Project Year	Year Ending	ΔC_P , VM0007,t (tCO ₂ e)	ΔC_P , VM0010,t (tCO ₂ e)	ΔC_P , Total,t (tCO ₂ e)	ΔC_P , Total, cumulative (tCO ₂ e)
M1 (original)	1	2010	2,624	55,453	58,077	58,077
	2	2011	2,624	55,453	58,077	116,155
	3	2012	2,624	55,453	58,077	174,232
	4a	2012	1,312	27,743	29,055	203,288
M1 (corrected)	1	2010	2,967	55,453	58,420	58,420
	2	2011	2,967	55,453	58,420	116,839
	3	2012	2,967	55,453	58,420	175,259
	4a	2012	1,483	27,743	29,226	204,485
M2	4b	2013	328	27,999	28,327	232,812
	5	2014	656	55,998	56,654	289,466
	6	2015	656	55,998	56,654	346,119
	7	2016	656	55,998	56,654	402,773
	8	2017	656	55,998	56,654	459,427
	9	2018	656	55,998	56,654	516,080
	10a	2018	402	34,366	34,768	550,849
Total	M1 original	3 yrs	9,185	194,102	203,288	
	M1 corrected	3 yrs	10,383	194,102	204,485	
	M2	6 yrs	4,008	342,356	346,363	

The total project emissions for monitoring period M2 are **346,363 tCO₂e** (Table 31).

5.3 Leakage

In accordance with the deviation described in the PD, section 4.3.2, as well as procedures in PD section 3.6.2 (Table 36), the project is applying a leakage factor deduction approach (using a leakage factor value of 0.2). Thus, no leakage monitoring is required by either methodology. The leakage deductions are based on the default leakage factors and have been incorporated into the net GHG emissions calculations. For REDD-APD, equations from module VMD009 are used for calculating activity shifting leakage and equations from VMD0011 for calculating market leakage. For IFM LtPF, section 8.3 of VM0010 indicates that activity shifting leakages do not exist and only market leakage needs to be calculated using the equations mentioned in the same section (refer to tab “Table 3 (Leakage)” and

VM0010-8.3 of the attached excel spreadsheet VCS_7_10_Calculator_M2_24_07_2023.xlsx). Leakage result summary is presented in Table 32.

Table 32 includes M1 original (as in first monitoring report) and M1 corrected leakage volumes (deviations described in in section 3.2.2.8) for information. Net impacts for changed emission reductions (i.e. increased project emissions and leakage) are presented and discounted in section 5.4 and Tables 35 and 36.

Table 32. Leakage calculated in accordance with VM0007 and VM0010.

Monitoring Period	Project Year	Year Ending	ΔC_{LK} , VM0007,t (tCO ₂ e)	ΔC_{LK} , VM0010,t (tCO ₂ e)	ΔC_{LK} , Total,t (tCO ₂ e)	ΔC_{LK} , Total, cumulative (tCO ₂ e)
<i>M1 (original)</i>	1	2010	-	29,324	29,324	29,324
	2	2011	-	36,157	36,157	65,480
	3	2012	-	42,990	42,990	108,470
	4a	2012	-	24,911	24,911	133,381
M1 (corrected)	1	2010	23,025	29,324	52,349	52,349
	2	2011	23,454	36,157	59,611	111,960
	3	2012	23,884	42,990	66,873	178,833
	4a	2012	12,800	24,911	37,712	216,545
M2	4b	2013	11,513	24,911	36,424	252,969
	5	2014	24,742	56,656	81,398	334,367
	6	2015	25,172	63,489	88,660	423,027
	7	2016	25,601	70,322	95,923	518,950
	8	2017	26,030	77,155	103,185	622,134
	9	2018	26,459	83,988	110,447	732,581
	10a	2018	16,502	55,736	72,238	804,819
Total	<i>M1 original</i>	3 yrs	-	133,382	133,382	
	M1 corrected	3 yrs	83,163	133,382	216,545	
	M2	6 yrs	156,019	432,256	588,275	

5.4 Net GHG Emission Reductions and Removals

Net GHG emission reductions have been calculated according to the methodologies described and results are listed in Tables 33 through 36. Tables 33 and 34 show corrected emission reduction values for first monitoring period M1 (according to the deviations described in section 3.2.2.8). Differences to original M1 values and corrective deduction in the first year of M2 are shown in Tables 35 and 36, with further details listed below.

A risk buffer of 10% has been deducted for both REDD-APD as well as IFM strata as determined in the updated permanence risk report.

The net GHG emission reductions and removals covered by this Monitoring Period (M2) by VM0007 is equivalent to 454,382 tCO₂e VCUs (Table 33).

Table 33. Summary of net GHG emissions from VM0007 for period M2.

Monitoring period	Project Year	Year Ending	CREDD,t	Buffer TOTAL	VCU
			tCO ₂ -e	tCO ₂ -e	t CO ₂ -e
M1 (original)	1	2010	93,376	9,338	84,039
	2	2011	96,059	9,606	86,453
	3	2012	98,742	9,874	88,868
	4a	2012	54,737	5,474	49,264
M1 (corrected)	1	2010	70,009	9,303	60,705
	2	2011	72,263	9,572	62,691
	3	2012	74,516	9,840	64,676
	4a	2012	41,766	5,457	36,309
M2	4b	2013	36,160	4,767	31,393
	5	2014	81,335	10,608	70,727
	6	2015	83,589	10,876	72,713
	7	2016	85,843	11,144	74,698
	8	2017	88,096	11,413	76,684
	9	2018	90,350	11,681	78,669
	10a	2018	56,831	7,333	49,498
Total	M1 (original)	3 years	342,915	34,292 ³	308,624
	M1 (corrected)	3 years	258,554	34,172	224,382
	M2	6 years	522,204	67,822	454,382

³ An additional 120 tCO₂e was additionally allocated than required due to the wrong M1 calculations.

The net GHG emission reductions and removals covered by this Monitoring Period (M2) by VM0010 is equivalent to 1,204,774 tCO₂e VCUs (Table 34).

Table 34. Summary of net GHG emissions from VM0010 for period M2.

Monitoring period	Project Year	Year Ending	Total credits	Total buffer withheld	VCU Total
M1 (original)	1	2010	61,842	6,184	55,658
	2	2011	89,174	8,917	80,256
	3	2012	116,506	11,651	104,855
	4a	2012	71,902	7,190	64,712
M1 (corrected)	1	2010	61,842	9,117	52,725
	2	2011	89,174	12,533	76,641
	3	2012	116,506	15,950	100,556
	4a	2012	71,902	9,681	62,221
M2	4b	2013	71,646	9,656	61,990
	5	2014	170,624	22,728	147,896
	6	2015	197,956	26,144	171,812
	7	2016	225,288	29,561	195,727
	8	2017	252,620	32,977	219,643
	9	2018	279,952	36,394	243,558
	10a	2018	188,580	24,432	164,148
Total	M1 (original)	3 years	339,423	33,942	305,481
	M1 (corrected)	3 years	339,423	47,280	292,143
	M2	6 years	1,386,666	181,892	1,204,774

The combined net GHG emission reductions and removals from the entire Project Area covered by this Monitoring Period (M2), after corrective deduction of M1 over-issuance (see below) are equivalent to **1,561,576tCO₂e** VCUs (Table 35). Respective annual distribution of reductions and removals by calendar year is shown in Table 36.

Table 35. Total combined VCUs eligible for issuance for M2.

Monitoring period	Project Year	Year Ending	VCU _{VM0007} (tCO ₂ e)	VCU _{VM0010} (tCO ₂ e)	VCU _{Total} (tCO ₂ e)	VCUs eligible for issuance
M1 <i>(original)</i>	1	2010	84,039	55,658	139,696	139,696
	2	2011	86,453	80,256	166,710	166,710
	3	2012	88,868	104,855	193,723	193,723
	4a	2012	49,264	64,712	113,976	113,976
M1 <i>(corrected)</i>	1	2010	60,705	52,725	113,431	113,431
	2	2011	62,691	76,641	139,332	139,332
	3	2012	64,676	100,556	165,232	165,232
	4a	2012	36,309	62,221	98,530	98,530
M2	4b	2013	31,393	61,990	93,383	93,383
	5	2014	70,727	147,896	218,624	218,624
	6	2015	72,713	171,812	244,525	244,525
	7	2016	74,698	195,727	270,425	270,425
	8	2017	76,684	219,643	296,326	296,326
	9	2018	78,669	243,558	322,227	322,227
	10a	2018	49,498	164,148	213,646	213,646
Total	M1 <i>(original)</i>	3 years	308,624	305,481	614,105	614,105
	M1 <i>(corrected)</i>	3 years	224,382	292,143	516,525	516,525
	M2	6 years	454,382	1,204,774	1,659,156	1,659,156
Discount for M1 corrections	M1 difference		-84,242	-13,338	-97,580	-97,580
	M2 (after discount)		370,140	1,191,436	1,561,576	1,561,576

Table 35 also shows original and corrected values for the first monitoring period M1 (per deviations in section 3.2.2.8), the difference indicating in an **over-issuance of 97,580 tCO₂e for M1**:

- Long term wood stock and leakage calculation errors, VM0007
 - Removed accounting for long-term wood products pool: -1,198 tCO₂e
 - Adjustment for extra buffer in M1 +120 tCO₂e
 - Added correct leakage factor: -68,862 tCO₂e
 - Corrected conversion factor tC/tCO₂e for leakage: -14,302 tCO₂e
 - **Total deduction for M1 correction (VM007) -84,242 tCO₂e**
 - Buffer pool calculation errors, VM0010
 - **Additional VCU's to be allocated in 2013 buffer pool -13,338 tCO₂e**
- Total deduction for M1 correction in first year of M2: - 97,580 tCO₂e**

Table 36. Quantify the net GHG emission reductions and removals Total combined VCUs eligible for issuance for M2, including discount for M1 over-issuance.

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)	Buffer pool allocation (tCO ₂ e)	M1 discount (tCO ₂ e)	VCUs eligible for issuance (tCO ₂ e)
2013	411,906	63,095	86,378	262,433	48,219 ⁴	-84,242	129,972
2014	412,625	56,654	85,855	270,116	35,597		234,519
2015	449,472	56,653	93,117	299,702	39,282		260,420
2016	486,320	56,654	100,379	329,287	42,967		286,320
2017	523,168	56,653	107,642	358,873	46,651		312,222
2018	560,017	56,654	114,904	388,459	50,336		338,123
Total	2,843,508	346,363	588,275	1,908,870	263,052	-84,242	1,561,576

⁴ Includes an additional 13,338 tCO₂e as part of the adjustment for lower buffer allotment from 1st Monitoring period.

Table 37. Estimated ex-ante GHG emission reductions and removals in the PDD; and the achieved emission reductions and removals for M2.

	<u>Ex-ante emissions reductions /removals</u>	<u>Achieved emissions reductions /removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
<u>VM0007</u>	682,230	522,204	-23.4%	1. Project emissions were not estimated in the PDD (12.2%) 2. Leakage emissions were not estimated in the PDD (20.6%)
<u>VM0010</u>	2,161,278	1,386,666	-35.8%	
<u>Total</u>	2,843,508	1,908,870	-32.9%	

APPENDIX A: DOCUMENTS PROVIDED TO AUDITOR

- *Annual Reports (2013-2018)*
 - *AS_2013-2014_Annual Report*
 - *AS_2015_Annual Report*
 - *AS_2016_Annual Report*
 - *AS_2017_Annual Report*
 - *AS_2018_Annual Report*
- *Other Relevant Reports*
 - *AS_2012_Complaints Handling and Dispute Resolution Policy*
 - *AS_2012_SOP Field Monitoring_v1.4*
 - *AS_2013_Project Description*
 - *AS_2013_Project Validation*
 - *AS_2013-2018_Field Monitoring Letter*
 - *AS_2016_Light up April Salumei Video*
 - *AS_2018_Eaglewood Growers Guide*
 - *AS_Adaptive Management Plan*
 - *AS_2022_Audit Letter*

APPENDIX B: SPATIAL FILES

- *AS_GIS Files Metadata TREES*
- *AS_Project Boundaries*
- *AS_Change Analysis TREES*

APPENDIX C: PAPUA NEW GUINEA FOREST CLASSIFICATION REPORT

The land cover change assessment was undertaken by Emapper Pty Ltd. The results were provided in a report along with associated land cover classification files.

Available on request.

APPENDIX D: CALCULATION EQUATIONS AND PARAMETER TABLES

Following tables summarize the calculation equations and parameters applied in accordance with the Project Description and underlying methodologies VM0007 and VM0010. Calculations were performed in spreadsheet VCS_7_10_Calculator_M2_24_07_2023.xlsx

D.1 REDD Area Calculation Summary

Table D-01. REDD Methodology Modules, Equations and Parameters used in GHG impact quantifications

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
VM0007 REDD-MF V1.3	1	$C_{REDD,t} = \Delta C_{BSL} - \Delta C_P - \Delta C_{LK}$	ΔC_{BSL}	682230	REDD-MF Eq. 2
			ΔC_P	4008	M-REDD Eq. 1
			ΔC_{LK}	156019	REDD-MF Eq. 3
	2	$\Delta C_{BSL} = \Delta C_{BSL,planned} + \Delta C_{BSL,unplanned} + \Delta C_{BSL,degrad-FW/C}$	$\Delta C_{BSL,planned}$	682230	BL-PL Eq. 1
			$\Delta C_{BSL,unplanned}$	n/a	BL-UP*
			$\Delta C_{BSL,degrad-FW/C}$	n/a	BL-DFW*
	3	$\Delta C_{LK} = \Delta C_{LK-AS,planned} + \Delta C_{LK-AS,unplanned} + \Delta C_{LK-AS,degrad-FW/C} + \Delta C_{LK-ME}$	$\Delta C_{LK-AS,planned}$	109157	LK-ASP Eq. 9
			$\Delta C_{LK-AS,unplanned}$	n/a	LK-ASU*
			$\Delta C_{LK-AS,degrad-FW/C}$	n/a	LK-DFW*

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
			ΔC_{LK-ME}	46862	LK-ME Eq. 1
VMD0006 BL-PL V1.3	1	$\Delta C_{BSL,planned} = \sum_{t=1}^{t^*} \sum_{i=1}^M (\Delta C_{BSL,i,t} + GHG_{BSL-E,i,t})$	$\Delta C_{BSL,i,t}$	682230	BL-PL Eq. 13
			$GHG_{BSL-E, infra}$	0	BL-PL Eq. 15
	4	$D\%_{planned,i,t} = \left(\sum_{pn=1}^{n^*} \left(D\%_{pn} / Yrs_{pn} \right) \right) / n$	$D\%_{pn}$	Multiple**	Proxy sample
			Yrs_{pn}	9	Proxy sample
			n	7	Proxy sample
	5	$AA_{planned,i,t} = (A_{planned,i} * D\%_{planned,i,t}) * L - D_i$	$A_{planned,i}$	382,017	
			$D\%_{planned,i,t}$	0.0007	BL-PL Eq. 4
			$L-D_i$	1.0	Full deforestation on roads
	6	$\Delta C_{ABtree,i} = C_{ABtreebsl,i} - C_{ABtreepost,i}$	$C_{AB,tree,bsl,i}$	369.02	CP-AB Eq. 2
			$C_{AB,tree,post,i}$	0	PD assuming full deforestation on roads
	7	$\Delta C_{ABnon-tree,i} = C_{ABnon-treebsl,i} - C_{ABnon-treepost,i}$	$C_{AB,non-tree,bsl,i}$	14.8	CP-AB Eq. 9
			$C_{AB,non-tree,post,i}$	0	PD assuming full deforestation on roads
	8	$\Delta C_{BBtree,i} = C_{BBtreebsl,i} - C_{BBtreepost,i}$	$C_{BB,tree,bsl,i}$	88.57	CP-AB Eq. 6
			$C_{BB,tree,post,i}$	0	PD assuming full deforestation on roads

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
	9	$\Delta C_{BB_{non-tree},i} = C_{BB_{non-tree},bsl,i} - C_{BB_{non-tree},post,i}$	$C_{BB,non-tree,bsl,i}$	2.6625	CP-AB Eq. 13
			$C_{BB,non-tree,post,i}$	0	PD assuming full deforestation on roads
	10	$\Delta C_{DW,i} = C_{DW,bsl,i} - C_{DW,post,i}$	$C_{DW,bsl,i}$	n/a	CP-D*
			$C_{DW,post,i}$	n/a	CP-D*
	11	$\Delta C_{LI,i} = C_{LI,bsl,i} - C_{LI,post,i}$	$C_{LI,bsl,i}$	12.7	CP-L Eq. 1
			$C_{LI,post,i}$	0	PD assuming full deforestation on roads
	12	$\Delta C_{SOC,i} = C_{SOC,bsl,i} - C_{SOC,PD-BSL,i}$	$C_{SOC,bsl,i}$	n/a	CP-S*
			$C_{SOC,PD-BSL,i}$	n/a	CP-S*
	13	$\Delta C_{BSL,i,t} = AA_{planned,i,t} * (\Delta C_{AB_{tree},i} - \Delta C_{WP,i} + \Delta C_{AB_{non-tree},i} + \Delta C_{LI,i})$ $+ (\sum_{t=10}^t A_{planned,i,t}) * (\Delta C_{BB_{tree},i} + \Delta C_{BB_{non-tree},i} + \Delta C_{DW,i}) * \left(\frac{1}{10}\right)$ $+ (\sum_{t=20}^t AA_{unplanned,i,t}) * (C_{WP100,i} + \Delta C_{SOC,i}) * \left(\frac{1}{20}\right)$	$AA_{planned,i,t}$	255	BL-PL Eq. 5
			$\Delta C_{AB,tree,i}$	369	BL-PL Eq. 6
			$\Delta C_{WP,i}$	27.96	CP-W Eq. 2
			$\Delta C_{AB,non-tree,i}$	15	BL-PL Eq. 7
			$\Delta C_{LI,i}$	10	BL-PL Eq. 11
			$\Delta C_{BB,tree,i}$	89	BL-PL Eq. 8
			$\Delta C_{BB,non-tree,i}$	3	BL-PL Eq. 9
			$\Delta C_{DW,i}$	n/a	CP-D*
			$\Delta C_{WP100,i}$	27.75	CP-W Eq. 3
			$\Delta C_{SOC,i}$	n/a	CP-S*
	15	$GHG_{BSL,E,i,t} = E_{FC,i,t} + E_{BiomassBurn,i,t} + N_2O_{direct-N,i,t}$	$E_{FC,i,t}$	n/a	E-FFC*
			$E_{Biomassburn,i,t}$	0	E-BPB Eq. 1

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
			$N_2O_{direct-N,i,t}$	n/a	E-NA*
VMD0013 E-BPB V1.2	1	$E_{biomassburn,i,t} = \sum_{g=1}^G \left(\left(A_{burn,i,t} \times B_{i,t} \times COMF_i \times G_{g,i} \right) \times 10^{-3} \right) \times GWP_g$	$A_{burn,i,t}$	0	Monitoring report: no biomass burning
			$B_{i,t}$	219.74	E-BPB Eq. 2
			$COMF_i$	0.5	IPCC 2006
			$G_{g,i}$	6.8	IPCC 2006
			GWP_g	25	IPCC AR4
	2	$B_{i,t} = (C_{AB_tree,i,t} + C_{DW,i,t} + C_{LI,i,t}) \times 12/44 \times (1/CF)$	$C_{AB_tree,i,t}$	369.02	CP-AB Eq.2
			$C_{DW,i,t}$	n/a	CP-D*
			$C_{LI,i,t}$	12.27	CP-L Eq. 1
			CF	0.47	IPCC / E-BPB
	VMD0001 CP-AB V1.1	1	CF_j	0.47	IPCC 2006
			$f_j(X,Y)$	DBH-based allometric function from Chave et al. 2005 (cf. PD table 38)	
		2	$C_{AB_tree,sp,i}$	Multiple**	Survey data
			$A_{sp,i}$	0.04	20x20m plot
		5	R	0.24	IPCC 2006
			$C_{AB_tree,sp,i}$	Multiple**	Survey data
		6	$C_{BB_tree,sp,i}$	Multiple**	CP-AB Eq. 5
			$A_{sp,i}$	0.04	20x20m plot
		9	$C_{AB_nontree-sample,i}$	14.82	CP-AB Eq. 10
			$C_{AB_nontree-allometric,i}$	n/a	CP-AB Eq. 11*

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
	10	$C_{AB_nontree_sample,i} = \sum_{sf=1}^{SFP_i} \frac{C_{AB_nontree_samplesf,i}}{A_{sf,i}} * CF * \frac{44}{12}$	$C_{AB_nontree_sample,sf,i}$	0.0086	Survey data
			$A_{sf,i}$	0.001	Survey data
			CF	0.47	IPCC 2006
	13	$C_{BB_nontree,i,sp} = C_{AB_nontree,i,sp} * R$	$C_{AB_nontree,i,sp}$	Multiple**	Survey data
			R	0.2	IPCC 2006
	14	$C_{BB_nontree,i} = \sum_{sp=1}^{P_i} \frac{C_{BB_nontree,sp,i}}{A_{sp,i}} * \frac{44}{12}$	$C_{BB_nontree,sp,i}$	Multiple**	CP-AB Eq. 13
			$A_{sp,i}$	0.0001	1x1m plot
	VMD0003 CP-L	$C_{LI,i} = \frac{10}{A_{sp,i}} * \sum_{sp=1}^{P_i} B_{LI,sp,i} * CF * \frac{44}{12}$	$A_{sp,i}$	10	Sample
			$B_{LI,sp,i}$	0.71	Sample
			CF	0.37	CP-L
VMD0005 CP-W V1.1	1	$C_{XB,ty,i} = \frac{1}{A_i} * \sum_{j=1}^S (V_{ex,ty,j,i} * D_j * CF_j * \frac{44}{12})$	A_i	1	(proportion of harvest area)
			$V_{ex,ty,j,i}$	37.7	(annual extraction per hectare)
			D_j	0.566	Calculated from wood density database (Calculator sheet "WdDensity")
			CF_j	0.47	IPCC 2006
	2	$C_{WP,i} = \sum_{ty=s,w,oir,p,o} C_{XB,ty,i} * (1 - WW_{ty})$	$C_{XB,ty,i}$	36.79	CP-W Eq. 1
			WW_{ty}	0.24	CP-W
	3	$C_{WP100,i} = C_{WP,i} - C_{WP,i} * (1 - SLF_p) * (1 - ofp)$	$C_{WP,i}$	27.96	CP-W Eq. 2
			SLF_p	0.24	CP-W

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
			Ofp	0.99	CP-W
VMD0009 LK-ASP V1.3	8	$LK_{MAF} = 1 - (PROD_{LMA,c,t} / PROD_{BL,c,t})$	$PROD_{LMA,c,t}$	n/a	*
			$PROD_{BL,c,t}$	n/a	*
	9	$\Delta C_{LK-AS,planned} = \sum_{t=1}^{t^*} \sum_{i=1}^M \sum_{c=1}^C (\Delta C_{BSL,planned} \times PF_c \times LK_{CP-ME,c,i} \times LK_{MAF})$	$\Delta C_{BSL,planned}$	682230	BL-PL Eq. 13
			PF_c	0.8	PD conservative assumption
			$LK_{CP-ME,c,i}$	0.2	Default leakage factor
			LK_{MAF}	1	LK-ASP Eq. 8*
VMD0011 LK-ME V1.1	1	$\Delta C_{LK-ME} = LK_{MarketEffects,timber} + LK_{MarketEffects,FW/C} + LK_{MarketEffects,Peat}$	$LK_{MarketEffects,timber}$	46862	LK-ME Eq. 2
			$LK_{MarketEffects,FW/C}$	n/a	LK-ME Eq. 6*
			$LK_{MarketEffects,Peat}$	n/a	LK-ME Eq. 7*
	2	$LK_{MarketEffects,timber} = \sum_{i=1}^M (LF_{ME} \times LK_{MAF} \times AL_{T,i})$	LF_{ME}	0.2	Default leakage factor
			LK_{MAF}	1	LK-ME Eq. 3*
			$AL_{T,i}$	234308.98	LK-ME Eq 4
	3	$LK_{MAF} = 1 - (PRODMB_{LMA,t} / PRODMB_{BL,t})$	$PRODMB_{LMA,t}$	n/a	*
			$PRODMB_{BL,t}$	n/a	*
	4	$AL_{T,i} = \sum_{t=1}^t (C_{BSL,XBT,i,t})$	$C_{BSL,XBT,i,t}$	38325.24	LK-ME Eq. 5
	5	$C_{BSL,XBT,i,t} = ((V_{BSL,XE,i,t} \times D_{mn} \times CF) + (V_{BSL,XE,i,t} \times LDF) + (V_{BSL,XE,i,t} \times LIF)) \times \frac{44}{12}$	$V_{BSL,XE,i,t}$	9623.03	AA _{planned,i,t} * V _{BSL,i,t}
			D_{mn}	0.566	Calculated from wood

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
					density database (Calculator sheet "WdDensity")
			CF	0.47	IPCC 2006
			LDF	0.53	LK-ME
			LIF	0.29	LK-ME
VMD0015 M-REDD V2.2 (formerly M-MON)	1	$\Delta C_{WPS-REDD} = \sum_{t=1}^{L*} \sum_{i=1}^M (\Delta C_{P,DefPA,i,t} + \Delta C_{P,Deg,i,t} + \Delta C_{P,DistPA,i,t} + GHG_{P-E,i,t} - \Delta C_{P,Enh,i,t})$	$\Delta C_{P,DefPA,i,t}$	556	M-REDD Eq. 3
			$\Delta C_{P,Deg,i,t}$	n/a	*
			$\Delta C_{P,DistPA,i,t}$	99	M-REDD Eq. 20
			$GHG_{P-E,i,t}$	0	M-REDD Eq. 30
			$\Delta C_{P,Enh,i,t}$	n/a	*
	20	$\Delta C_{P,DistPA,i,t} = \sum_{q=1}^Q (A_{DisPA,q,i,t} * \Delta C_{P,Dist,q,i,t})$	$A_{DisPA,q,i,t}$	0.205	Forest cover monitoring report (flooded areas)
			$\Delta C_{P,Dist,q,i,t}$	485	M-REDD Eq. 23
	30	$GHG_{P-E,i,t} = E_{FC,i,t} + E_{BiomassBurn,i,t} + N_2O_{direct-N,i,t}$	$E_{FC,i,t}$	0	no fossil fuel use in project activity
			$E_{BiomassBurn,i,t}$	0	E-BPB Eq. 1
			$N_2O_{direct-N,i,t}$	0	no fertilizer application
	3		$A_{DefPA,u,i,t}$	255	Forest cover monitoring report

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
		$\Delta C_{P,DefPA,i,t} = \sum_{u=1}^U (A_{DefPA,u,i,t} * \Delta C_{pools,P,Def,u,i,t})$			(forest cover loss)
			$C_{pools,Def,u,i,t}$	485	M-REDD Eq. 5
	5	$\Delta C_{pools,Def,i,t} = C_{BSL,i} - C_{P,post,i} - C_{WP,i}$	$C_{BSL,i}$	485	
			$C_{P,post,i}$	0	M-REDD Eq. 6
			$C_{WP,i}$	0	no commercial logging in project area
	6	$C_{post,u,i} = C_{AB_tree,i} + C_{BB_tree,i} + C_{AB_non-tree,i} + C_{BB_non-tree,i} + C_{DW,i} + C_{LI,i} + C_{SOC,PD-BSL,i}$	$C_{AB_tree,i}$	0	PD
			$C_{BB_tree,i}$	0	assuming full and
			$C_{AB_non-tree,i}$	0	permanent
			$C_{BB_non-tree,i}$	0	deforestation on roads
			$C_{DW,i}$	n/a	*
			$C_{LI,i}$	0	PD assuming full and permanent deforestation on roads
			$C_{SOC,PD-BSL,i}$	n/a	*
	21	$A_{burn,i,t} = \sum_{q=1}^Q A_{burn,q,i,t}$	$A_{burn,q,i,t}$	0	Monitoring report
	22	$A_{burn,q,i,t} = A_{DisPA,q,i,t}$	$A_{DisPA,q,i,t}$	0	Monitoring report: no burning
	23	$\Delta C_{P,Dist,q,i,t} = C_{BSL,i} - C_{P,Dist,q,i} - C_{WP,q,i}$	$C_{BSL,i}$	485	BL-PL
			$C_{P,Dist,q,i}$	0	PD assuming full and

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
VMD0017 X-UNC V2.0					permanent deforestation
			$C_{WP,q,i}$	0	commercial logging in project area
	4	$U_{REDD-BSL,SS,i} = \frac{\sqrt{\sum_1^n (U_{REDD-BSL,SS,i,pool\#} \times E_{REDD-BSL,SS,i,pool\#})^2}}{\sum_1^n E_{REDD-BSL,SS,i,pool\#}}$ pools# →	$C_{AB-tree}$	11.55%	Calculated based on CP-AB data
			$C_{BB-tree}$	11.55%	Calculated based on CP-AB data
			C_{LI}	20.5	Calculated based on CP-AB data
			$E_{BiomassBurn}$	0	No biomass burning
	5	$Uncertainty_{REDD-BSL,SS} = \frac{\sqrt{\sum_{i=1}^M (U_{REDD-BSL,SS,i} \times E_{REDD-BSL,SS,i})^2}}{\sum_{i=1}^M E_{REDD-BSL,SS,i}}$	see above (only 1 REDD stratum under VM0007)		
	6	$Uncertainty_{REDD-BSL,t*} = \sqrt{Uncertainty_{BSL,RATE,t*}^2 + Uncertainty_{REDD-BSL,SS}^2}$	$D\%_{planned}$	6.15%	Calculated based on proxy samples data
	7	$Uncertainty_{P,i} = \frac{\sqrt{\sum_1^n (U_{P,SS,i,pool\#} \times E_{P,SS,i,pool\#})^2}}{\sum_1^n E_{P,SS,i,pool\#}}$ pools# →	$C_{AB-tree}$	n/a	X-UNC* (no remeasurements)
			$C_{BB-tree}$	n/a	
			C_{DW}	n/a	
			C_{LI}	n/a	
			C_{SOC}	n/a	
			C_{WP}	n/a	
			$E_{BiomassBurn}$	n/a	
			EFC	n/a	

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
			$N_2O_{direct-N}$	n/a	
	8	$Uncertainty_p = \frac{\sqrt{(Uncertainty_{p1} * E_{p,j1})^2 + (Uncertainty_{p12} * E_{p,j2})^2 + \dots + (Uncertainty_{p,iM} * E_{p,iM})^2}}{E_{p,j1} + E_{p,j2} + \dots + E_{p,iM}}$	see above (only 1 REDD stratum under VM0007)		
	10	$C_{REDD_ERROR,t*} = Uncertainty_{BSL,t*}$ (no remeasurements)	$Uncertainty_{BSL,t}$	11.03%	X-UNC Eq. 6
	11	$Adjusted_C_{REDD,t} = C_{REDD,t} * (100\% - C_{REDD_ERROR,t*} + 15\%)$	$C_{REDD-ERROR,t}$	100%	X-UNC Eq.10
* Emission sources excluded from calculation in accordance with PD. ** for “multiple” values (samples, annual results), please refer to Excel calculation sheet or summary tables in section 5 of this monitoring report.					

D.2 IFM Area Calculation Summary

Table D-02. IFM-LtPF Methodology Modules, Equations and Parameters used in GHG impact quantifications

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
VM0010 V1.3	1	$V_{j,i,sp} = \sum_{l=1}^L V_{l,j,i,sp}$	$V_{l,j,i,sp}$	Multiple**	Survey data
	2	$V_{j,i BSL} = \frac{1}{SP} * \sum_{sp=1}^{SP} \frac{V_{j,i,sp}}{A_{sp}}$	$V_{j,i,sp}$	Multiple**	Survey data
			SP	18	Survey data
			A_{sp}	0.04	FMDP
	3	$C_{HB,j,i BSL} = (V_{EX,j,i BSL} + V_{EX,INF,j,i BSL}) * BCEF_R * CF_j$	$V_{EX,j,i BSL}$	37.70	Harvest plan
			$V_{EX,INF,j,i BSL}$	n/a*	Refer to calculator sheet "VM0010-8.1.1 (2)"
			$BCEF_R$	1.670	IPCC 2006
			CF_j	0.47	IPCC 2006
	4	$C_{EX,j,i BSL} = (V_{EX,j,i BSL} + V_{EX,INF,j,i BSL}) * D_j * CF_j$	$V_{EX,j,i BSL}$	37.70	Harvest plan
			$V_{EX,INF,j,i BSL}$	n/a*	Refer to calculator sheet "VM0010-8.1.1 (2)"
			D_j	0.57	Calculated from wood density database (Calculator sheet "WdDensity")

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
			CF_j	0.47	IPCC 2006
	5	$\Delta C_{DWSLASH,i,p BSL} = \left[\sum_{j=1}^J [(C_{HB,j,i BSL} - C_{EX,j,i BSL}) + C_{RSD,j,i BSL} + C_{notHB,inf,j,i BSL}] \right]$	$C_{HB,j,i BSL}$	Multiple**	Refer to calculator sheet "VM0010-8.1.1 (2)"
			$C_{EX,j,i BSL}$	Multiple**	Refer to calculator sheet "VM0010-8.1.1 (3)"
			$C_{RSD,j,i BSL}$	0	Conservatively assumed
			$C_{notHB,inf,j,i BSL}$	n/a	*
	9	$C_{WP0,i BSL} = \sum_k C_{EX,i,k BSL} * (WW_k + SLF_k)$	WW_k	0.24	VM0010 v1.3
			SLF_k	0.24	VM0010 v1.3
	10	$C_{WPI BSL} = \sum_k C_{EX,i,k BSL} - C_{WP0,i BSL}$	$C_{EX,i,k BSL}$	Multiple**	Refer to calculator sheet "VM0010-8.1.1 (3)"
			$C_{WP0,i BSL}$	4.82	Eq 9
	11	$C_{WP100,i BSL} = C_{WP,i BSL} * OF_k$	$C_{WP,i BSL}$	5.22	Eq 10
			OF_k	0.99	VM0010 v1.3
	12	$C_{RG,i,p BSL} = \sum_i RGR_i$	RGR_i	1	Fox et al (2011) based on plot measurements

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
	23	$\Delta C_{NET BSL(1)} = \sum_{i,p} A_{1,i,p} * \sum_{i=1}^M (C_{DWSLASH,i,p BSL}/10) + C_{WP0,i,p BSL} + (C_{WP100,i,p BSL}/20)$	$\Delta C_{DWSLASH,i,p BSL}$	19.55	Calculated VM0010 Eq 5
			$\Delta C_{WP0,i,p BSL}$	4.82	Calculated VM0010 Eq 9
			$\Delta C_{WP100,i,p BSL}$	5.17	Calculated VM0010 Eq 11
			$A_{1,i,p}$	Multiple**	Refer to calculator sheet "VM0010-8.1.4-5"
	24	$\Delta C_{NET BSL(2-10)} = \sum_{i,p} A_{2-10,i,p} * \sum_{i=1}^M ((\Delta C_{DWSLASH,i,p BSL}/10) + (\Delta C_{WP100,i,p BSL}/20))$	$\Delta C_{DWSLASH,i,p BSL}$	19.55	Calculated VM0010 Eq 5
			$\Delta C_{WP100,i,p BSL}$	5.17	Calculated VM0010 Eq 11
			$A_{2-10,i,p}$	Multiple**	Refer to calculator sheet "VM0010-8.1.4-5"
	25	$\Delta C_{NET BSL(11-20)} = \sum_{i,p} A_{11-20,i,p} * \sum_{i=1}^M (\Delta C_{WP100,i,p BSL}/20)$	$\Delta C_{WP100,i,p BSL}$	5.17	Calculated VM0010 Eq 11
			$A_{11-20,i,p}$	Multiple**	Refer to calculator sheet "VM0010-8.1.4-5"
	26	$\Delta C_{NET BSL(1+)} = \sum_{i,p} A_{t*} * \sum_{i=1}^M (-\Delta C_{RG,i,p BSL})$	$\Delta C_{RG,i,p BSL}$	1	Calculated VM0010 Eq 12

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
			A_{t*}	Multiple**	Refer to calculator sheet "VM0010-8.1.4-5"
	27	$\Delta C_{NET BSL,t*} = \sum_{p=1}^P [\Delta C_{NET,p BSL(1)} + \Delta C_{NET,p BSL(2-10)} + \Delta C_{NET,p BSL(11-20)} + \Delta C_{NET,p BSL(+1)} + C_{FUEL}]$	$\Delta C_{NET BSL,t}$	Multiple**	Refer to calculator sheet "VM0010-8.1.4-5"
			$\Delta C_{NET,p BSL(1)}$		
			$\Delta C_{NET,p BSL(2-10)}$		
			$\Delta C_{NET,p BSL(11-20)}$		
			$\Delta C_{NET,p BSL(+1)}$		
			C_{FUEL}	n/a	*
	28	$GHG_{NET BSL,t*} = \Delta C_{NET BSL,t*} * \frac{44}{12}$	$\Delta C_{NET BSL}$	771323	Calculated VM0010 Eq 27
	33	$\Delta C_{DIST-FR,t PRJ} = \sum_{i=1}^M A_{burn,i,t} * B_{i,t PRJ} * COMF_i * G_{g,i} * 10^{-3} * GWP_{CH4}$	$A_{burn,i,t}$	0	Data from PRA
			$B_{i,t PRJ}$	62.95	Calculated VM0010 Eq 34
			$COMF_i$	0.5	IPCC 2006
			$G_{g,i}$	6.8	IPCC 2006
			GWP_{CH4}	25	IPCC AR4
	34	$B_{i,t PRJ} = \sum_{j=1}^J \{V_{EX,i,j BSL} * BCEF_R\}$	$V_{EX,i,j BSL}$	37.70	Harvest plan
			$BCEF_R$	1.670	IPCC 2006
	35	$\Delta C_{DIST,t PRJ} = \sum_{i=1}^M \left(A_{dist,i,t} * \sum_{j=1}^J \{C_{AB,j,i BSL}\} \right) * \frac{44}{12}$	$A_{dist,i,t}$	Multiple values**	Refer to calculator sheet "VM0010-8.2.2"
			$C_{AB,i BSL}$	369.02	CP-AB Eq. 2

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
	38	$\Delta C_{NET,t PRJ} = (\Delta C_{DIST-FR,t PRJ} + \Delta C_{DIST,t,PRJ} + \Delta C_{DIST-IL,t PRJ}) - \Delta C_{AB,t PRJ}$	$\Delta C_{DIST-FR,t PRJ}$	0	Calculated VM0010 Eq 33
			$\Delta C_{DIST,t,PRJ}$	Multiple values**	Refer to calculator sheet "VM0010-8.2.2"
			$\Delta C_{DIST-IL,t PRJ}$	0	Data from PRA
			$\Delta C_{AB,t PRJ}$	0	Conservatively omitted
	39	$GHG_{NET PRJ} = \sum_{t=1}^{t^*} \Delta C_{NET,t PRJ}$	$\Delta C_{NET,t PRJ}$	Multiple values**	Refer to calculator sheet "VM0010-8.2.2"
	40	$GHG_{LK LTPF,t^*} = LF_{ME} * GHG_{NET BSL,t^*}$	LF_{ME}	0.2	Default leakage factor
			$GHG_{NET BSL,t^*}$	2828185	Calculated VM0010 Eq 28
	41	$GHG_{CREDITS LTPF,t^*} = GHG_{NET BSL,t^*} - GHG_{NET PRJ,t^*} - GHG_{LK LTPF,t^*}$	$GHG_{NET BSL,t^*}$	2828185	Calculated VM0010 Eq 28
			$GHG_{NET PRJ,t^*}$	536458	Calculated VM0010 Eq 39
			$GHG_{LK LTPF,t^*}$	565637	Calculated VM0010 Eq 40
	42	$U_{TOTAL LTPF} = \sqrt{U^2_{ PRJ} + U^2_{ BSL}}$	$U_{ PRJ}$	0	*
			$U_{ BSL}$	11.5%	Calculated VM0010 Eq 43

Methodology Module	Eq. No.	Equation	Parameter name	Values applied	Source
	43	$Credits_{total LtPF} = GHG_{credits LtPF} * (1 - U_{total LtPF})$	$GHG_{credits LtPF}$	1726089	Calculated VM0010 Eq 41
			$U_{total LtPF}$	n/a	As per VM0010 Eq 43, less than 15%
	44	$VCU_{net LtPF} = (Credits_{total,t2 LtPF} - Credits_{total,t1 LtPF}) - Bu_{ IFM-VCS}$	$Credits_{total,t1 LtPF}$	339423**	Refer to calculator sheet “VM0010-8.4.1.1”
			$Credits_{total,t2 LtPF}$	1726089	
			$Bu_{ IFM-VCS}$	181892	
			$VCU_{net LtPF}$	1204774	
* Emission sources excluded from calculation in accordance with PD. ** for “multiple” values (samples, annual results), please refer to Excel calculation sheet or summary tables in section 5 of this monitoring report.					