Loru Forest Project - Project Description (PD)
Part B: PES Accounting

An avoided deforestation project at Loru, Santo, Vanuatu
D3.2b v1.0 20151009

The Nakau Programme:
An indigenous forest conservation programme
through Payment for Environmental Services (PES)

European Union

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Cover Photo: Weaver - view towards the coastal fringe of the Loru Project site from the sea, east Espiritu Santo, Vanuatu.

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1. Eligibility & Guidance

According to Section 5 of the Plan Vivo Standard (2013, p16):

5.1. The project must develop technical specifications for each of the project interventions, describing:

5.1.1. The applicability conditions, i.e. under what baseline conditions the technical specification may be used

5.1.2. The activities and required inputs

5.1.3. What ecosystem service benefits will be generated and how they will be quantified. (NB Technical specification templates can be provided by the Plan Vivo Foundation)

According to Section 5.1 of the ISO 14064-2 standard (2006):

The project proponent shall ensure the GHG project conforms to relevant requirements of the GHG programme to which it subscribes (if any), including eligibility or approval criteria, relevant legislation or other requirements.

In fulfilling the detailed requirements of this clause, the project proponent shall identify, consider and use relevant current good practice guidance. The project proponent shall select and apply established criteria and procedures from a recognized origin, if available, as relevant current good practice guidance.

In cases where the project proponent uses criteria and procedures from relevant current good practice guidance that derive from a recognized origin, the project proponent shall justify any departure from those criteria and procedures.

In cases where good practice guidance from more than one recognized origin exists, the project proponent shall justify the reason for using the selected recognized origin.

Where there is no relevant current good practice guidance from a recognized origin, the project proponent shall establish, justify and apply criteria and procedures to fulfill the requirements in this part of ISO 14064.

Technical Specifications Module/s applied:

Technical Specifications Module (C) 2.1 (AD-DtPF) Avoided Deforestation – Deforestation to Protected Forest V1.0. D2.2.1 v1.0, 20150815.

1.1 ELIGIBILITY

According to section 5.2 (j) of the ISO 14064-2 standard (2006):

This includes any information relevant for the eligibility of a GHG project under a GHG programme and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.

1.1.1 General Eligibility

According to Section 5 of the Plan Vivo Standard (2013, p17):

5.14. To avoid 'double counting' of ecosystem services, project intervention areas must not be in use for any other projects or initiatives, including a national or regional level mandatory GHG emissions accounting programme, that will claim credits or funding in respect of the same ecosystem services, unless a formal agreement is in place with the other project or initiative that avoids double-counting or other conflicting claims, e.g. a formal nesting agreement with a national PES scheme.

According to Section 1.1.1 of TS Module AD-DtPF:

All projects applying this Technical Specifications Module must meet the following eligibility criteria:

a. Eligible forests will be indigenous forests that qualified as 'forest land' as of 31 December 2009 (excluding forests on peat lands).
b. Baseline activities in eligible forests comprise deforestation and associated GHG emissions.
c. Project activities in eligible forests comprise forest protection.
d. Projects will account for AFOLU GHG emissions and removals in the baseline and project scenarios.
e. Eligible forests are not subject to carbon credit or other carbon or PES unit claims by any other entity (including governments) as part of any other programme at the national, jurisdictional or project level.

1.1.1a Forest Land

The eligible forest area for the Loru Forest Project qualified as forest land as of 31 December 2009. This forest is a tall coastal rainforest and was established prior to the 20th century.

1.1.1b Deforestation Baseline

The baseline activity for this project is deforestation.

1.1.1c Forest Protection

The project activity in this project is forest protection using a legal instrument of protection.

1.1.1d AFOLU Emissions & Removals

This project accounts for AFOLU emissions and removals in the baseline and project scenarios. See Sections 4 and 5 of this document.

1.1.1e No Double Counting

This project is not subject to any other carbon credit or other PES unit claims by any other entity (including government) at any scale.

1.1.2 Eligible Baseline Activities

According to Section 1.1.2 of TS Module AD-DtPF:

Baseline activities for projects applying this Technical Specifications Module are those implemented on forest land[1] that would be deforested in the baseline and converted to non-forest land use. Only areas that have been designated, sanctioned or approved for such activities (e.g. where there is legal sanction to deforest) by the national and/or local regulatory bodies are eligible for crediting under this activity type.

The Loru Forest Project takes place on land where there is legal sanction to deforest and convert to non-forest landuse. Deforestation is permitted under the Forestry Act 2001.

The Loru Forest Project takes place on land that is suitable for non-forest land uses in the baseline: coconut plantations, cattle grazing. Evidence to support this assertion is the existence (prevalence) of baseline land use activities on land adjacent to the project site (see Figure 2.4.3 of the Loru Forest Project PD Part A.

1.1.3 Eligible Project Activities

According to Section 1.1.3 of TS Module AD-DtPF:

The project activity for each project applying this Technical Specifications Module will involve the legal protection of the eligible forests within the Project Area. This legal protection is required to legally prevent baseline activities and require the on-going

[1] See defintions in Appendix 1.

implementation of project activities for the duration of the Project Period.

The eligible forest area for this project will be protected by means of registration of the land as a Community Conservation Area under the Environment Management and Conservation Act 2002. The project has submitted its request for such registration to the Government of Vanuatu.

1.1.4 Eligible Forest Strata

According to Section 1.1.4 of TS Module AD-DtPF:

Eligible forests will include unlogged forest or forest that has previously been logged and is currently regenerating. Eligible forests will include two forest management strata as follows:

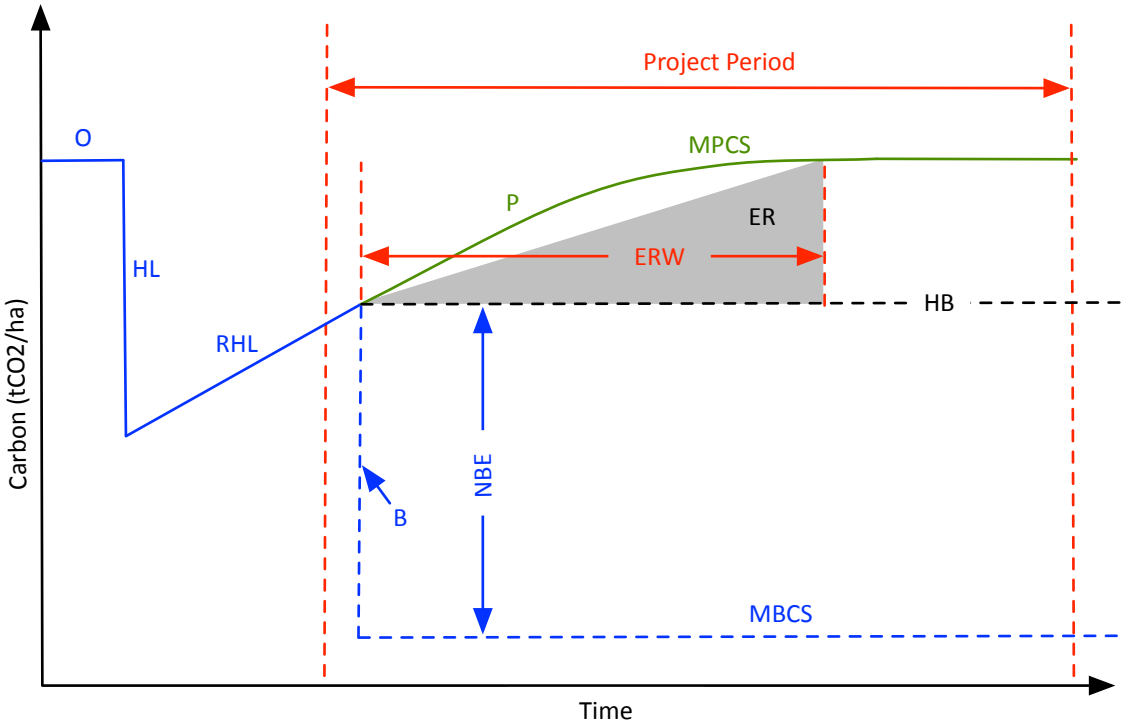
a. Unlogged Forest: Where there is no evidence of prior logging or no record of prior logging. Unlogged Forest is not eligible to claim enhanced removal carbon benefits in this methodology. Project activities will protect this unlogged forest from timber harvesting, apart from *de minimis*[2] non-commercial wood harvesting for local house-building or other cultural purposes.
b. Logged Forest: With supporting evidence showing that the area has been previously logged between 1 January 1930 and 31 December 2009, or where the commercial wood harvesting operation currently occurring in these forests began prior to 31 December 2009, or where there is evidence that the forest is regenerating and not in an 'old growth' condition. Logged Forest is eligible to claim enhanced removal carbon benefits in this methodology. Project activities will prevent this previously logged forest from timber harvesting (apart from *de minimis* harvests mentioned in a. above).

The entire eligible forest area is comprised of logged forest. The last logging undertaken at the project site occurred during the 1980s. Periodic logging and land clearance in the project area and vicinity has taken place for several decades.

This project therefore applies variant 2 of the two variants for this AD-DtPF activity type as depicted in Figure 1.1.4b of TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815 (reproduced in Figure 1.1.4b below).

[2] I.e. Lower than 5% of the total allowable annual commercial timber harvest volume for the equivalent rotation.

Figure 1.1.4b. Variant 2a - Concept diagram: AD-DtPF$_{LF}$ in Logged (regenerating) Forest.



Key:

	O =	Original mean carbon stocks in old growth undisturbed forest
	HD =	Historical degradation
	B =	Baseline Scenario carbon stocks under timber harvesting regime (harvest/regrowth)
	P =	Project Scenario carbon stocks under forest protection regime
	HB =	Harvest baseline (mean carbon stocks at start of baseline timber harvesting)
	MPCS =	Mean Project carbon stocks
	MBCS =	Mean Baseline carbon stocks
	NBE =	Net Baseline Emissions
	ER =	Enhanced Removals (Project Scenario)
	ERW =	Enhanced Removals Window (Project Scenario)

1.1.5 Specific Conditions

According to Section 1.1.5 of TS Module AD-DtPF:

Specific conditions for projects applying this Technical Specifications Module:

a. The Project Period for all projects using this Technical Specifications Module shall be no less than 30 years, with perpetual right of renewal.
b. Project Owner exists as an entity capable of entering into binding project commitments with the Programme Operator and capable of owning carbon credit assets.
c. Project Owner owns the carbon rights and management rights over the forest lands in the project area.

d. Current and planned land use: land must be legally eligible for deforestation.
e. There may be no leakage through activity shifting to other lands owned or managed by project participants outside the bounds of the carbon project.

The Project Period is 30 years and perpetually renewable.

The Project Owner is Ser-Thiac – a company owned by members of the Serakar Clan, and registered with the Business Name Act (CAP 211).

The Serakar Clan owns the carbon and land management rights associated with the Project Area pursuant to the Forestry Rights Registration and Timber Harvest Guarantee Act 2000.

The land is legally eligible for deforestation as specified in the Forestry Act 2001.

The Project Area is subject to a land use plan (The Nakau Management Plan) that specifies the planned land use for the area. The Management Plan protects the eligible forest area (Zone A as depicted in Figure 2.4c of the PD Part A), and also regenerating forest lying outside the crediting area (Zone B as depicted in Figure 2.4c of the PD Part A). This does not leave any significant forest for activity shifting leakage to be possible.

Table 1.1.5: Evidence Requirement: Specific Conditions	
#	Description
1.1.5a	Documentation to prove that Project Owner exists as a legal entity capable of acting as a counter party to a sale and purchase agreement and capable of owning carbon credit assets. This could be a certificate of incorporation, or similar legal document associated with the establishment of the legal entity sufficient to meet this eligibility criterion.
	To be provided in ER 1.1.5a of the Loru PD Part A: Ser-Thiac Business Name registration certificate.
1.1.5b	Documentation to demonstrate that Project Owner owns the carbon rights and management rights over the forest lands in the project area. This would need to include documentation from the government that clarifies options for carbon rights ownership and the particular option selected in this case. It would also need to include evidence of said rights ownership by the Project Owner legal entity.
	To be provided in ER 1.1.5b. Copy of the Forestry Rights Registration and Timber Harvest Guarantee Act 2000.
1.1.5c	Documentation to demonstrate that Project Owner is legally eligible to deforest the project area.
	To be provided in Appendix 1.1.5c of the PD. Copy of the Forestry Act 2001.
1.1.5d	Evidence of avoidance of activity shifting leakage to take the form of a leakage assessment using Section 5.2 of this Technical Specifications Module.
	To be provided in the leakage assessment undertaken in Section 5.2 below.

1.1.6 Rationale For 30-Year Project Period

According to Section 5 of the Plan Vivo Standard (2013, p16):

5.5. Ecosystem services must be accounted for over a specified quantification period that is of sufficient length to provide a clear picture of the long-term impact of the activity.

5.6. The quantification period must not exceed the period over which participants can make a meaningful commitment to the project intervention, and must be justified in relation to the duration of payment and monitoring obligations.

The Project Period is 30 years and is perpetually renewable as per Section 1.1.6 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

1.2 STANDARDS AND GUIDANCE

This Project is validated to the Plan Vivo Standard (2013). The following standards and guidance were used:

Table 1.2.1: Good Practice Guidance	
#	Good Practice Guidance Element
1.2.1a	Plan Vivo Standard
	This project is validated to the Plan Vivo Standard, and follows the following Plan Vivo guidance documents: • Plan Vivo Standard (2013) • Plan Vivo PDD Template • Plan Vivo PIN Template • Plan Vivo Guidance Manual
1.2.1b	IPCC 2006 Guidelines on National GHG Inventories
	This project is aligned to the IPCC 2006 Guidelines on National GHG Inventories in the following way: • The carbon stock change calculations framework used in this methodology follows Section 2.2.1 of Volume 4 of the IPCC 2006 Guidelines. Specifically, this methodology elaborates on Equation 2.3 of Volume 4 of the IPCC 2006 Guidelines but varies by conservatively neglecting litter and soil carbon. • Wood density and dry wood to carbon default values used in this methodology used the default values from the IPCC 2006 Guidelines on National GHG Inventories.
1.2.1c	ISO 14064-2 Standard
	This project follows the ISO 14064-2 standard in every respect.
1.2.1d	This project uses elements of the Verified Carbon Standard (VCS) with reference to the following VCS documents:

	• VCS AFOLU Requirements V3.4 • VCS Guidance for Loss Events (8 March 2011) • VCS Tool the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities (VT0001, V3.0). • There was a close alignment of this project with the Green Collar IFM methodology Version 1.0 (18 March 2011) approved by the VCS in 2011.
1.2.1e	The Clean Development Mechanism (CDM)
	• The CDM was used as the broad framework for the Programme of Activities/Grouped Project scope of this methodology. • Exclusion of emissions derived from the removal of herbaceous vegetation was based on CDM EB decision reflected in paragraph 11 of the report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023 _rep.pdf • The Additionality test in this project is from the VCS, which in turn is derived from the CDM Tool for Demonstration of Additionality.

1.2.1 Alignment To Plan Vivo Standard (2013)

This Project Description Part B (when used in combination with the Project Description Part A) aligns to every element of the Plan Vivo Standard (2013) as depicted in the following table. Note that this alignment includes elements that are located in the Nakau Methodology Framework.

Table 1.2.2 Plan Vivo Standard Alignment Table

Plan Vivo Standard Element	Location in Project Description Part A	Location in Project Description Part B (this document)
1		
1.1	1.3.2	
1.2	1.3.2	
1.2.1	1.3.2	
1.2.2	1.3.2	
1.2.3	1.3.2	
1.2.4	1.3.2	
2		
2.1	1.3.3	
2.1.1	1.3.3	
2.1.2	1.3.3	
2.1.3	1.3.3	
2.1.4	1.3.3	
2.2	2.8	
2.3	2.10	
2.4	2.5	
2.4.1	2.5	
2.4.2	2.5	
3		
3.1	2.13.1	
3.2	2.13.3	
3.3	2.13.5	
3.4	2.13.4	
3.5	2.13.4	
3.6	2.13.9	
3.7	2.13.10	
3.8	2.13.11	
3.9	2.13.12, 4.2	
3.10	2.13.13, 4.2.2	
3.11	2.13.14	
3.12	2.13.15	
3.13	2.13.16	
3.14	2.13.17	
3.15	2.13.18	
3.16	2.13.19	
4		
4.1	3.1.2	
4.1.1	3.1.2	
4.1.2	3.1.2	
4.1.3	3.1.2	
4.1.4	3.1.2	
4.1.5	3.1.2	
4.1.6	3.1.2	
4.1.7	3.1.2	
4.2	3.1.2.2	
4.3	3.1.2.2	
4.4	3.1.3	
4.5	3.1.4	
4.6	3.1.5.1	
4.7	3.1.5.1	
4.8	3.1.5.1	
4.9	3.1.5.1	
4.10	3.1.5.1	
4.11	2.4	
4.12	3.1.6	
4.13	3.1.6	
4.14	3.2	
5		
5.1	5.1	
5.1.1	5.1	
5.1.2	5.1	
5.1.3	5.1	
5.2		4, 5
5.3		3.1.6
5.4		3.1.5
5.4.1		3.1.5
5.4.2		3.1.5
5.5		1.1.6
5.6		1.1.6
5.7	5.1	
5.8	1.3.3	
5.9		8
5.9.1		8
5.9.2		8
5.9.3		8
5.9.4		8
5.9.5	6.2.2	
5.9.6		8.1.8
5.9.7		8.1.8
5.9.8		8.1.8
5.10		8.1.8
5.11		7
5.12		3.1.1
5.13	5.3	
5.14		1.1.1
5.15		2
5.16		5.6
5.17		4.1
5.18		4.1
5.19		5.2
5.20		5.2
6		
6.1		5.4
6.2		5.4
6.3		5.4.1
6.4		5.4.1
7		
7.1	5.2.2	
7.2	5.2.1, 5.2.2	
7.2.1	5.2.1	
7.2.2	5.2.1	
7.2.3	5.2.1	
7.2.4	5.2.1	
7.2.5	5.2.1	
7.2.6	5.2.1	
7.2.7	5.2.1	
7.2.8	5.2.1	
7.3	5.2.2	
7.4	5.2.3	
7.4.1	5.2.3.2	
7.4.2	5.2.3.5	
7.5	5.2.3.6	
8		
8.1	4	
8.2	4.1.1	
8.2.1	4.1.1	
8.2.2	4.1.1	
8.2.3	4.1.1	
8.2.4	4.1.1	
8.2.5	4.1.1	
8.2.6	4.1.1	
8.2.7	4.1.1	
8.2.8	4.1.1	
8.2.9	4.1.1	
8.2.10	4.1.1	
8.3	4.1.2	
8.4	4.1.1	
8.5	4.1.3	
8.5.1	4.1.3	
8.5.2	4.1.3	
8.5.3	4.1.3	
8.6	4.1.3	
8.7	4.1.3	
8.8	4.3	
8.9	4.3	
8.10	4.3	
8.11	4.3	
8.12	4.3	
8.13	4.3	

2. Identifying GHG Sources, Sinks and Reservoirs

According to Section 5 of the Plan Vivo Standard (2013, p18):

5.15. All carbon pools and emissions sources used to quantify climate services must be specified with justification for their inclusion. Carbon pools expected to decrease, and emissions sources expected to increase as a result of the project intervention must be included, unless decreases or emissions are likely to be insignificant, i.e. less than 5% of total climate benefits.

Section 5.3 of the ISO 14064-2 Standard requires project proponents to:

Select or establish criteria and procedures for identifying and assessing GHG sources, sinks and reservoirs controlled, related to, or affected by the project.

Based on selected or established criteria and procedures, the project proponent shall identify GHG sources, sinks and reservoirs as being:

a) Controlled by the project proponent,
b) Related to the GHG project, or
c) *Affected by the GHG project.*

Section 5.5 of the ISO 14064-2 Standard requires project proponents to:

[Identify] *GHG sources, sinks and reservoirs relevant to the baseline scenario, and for each*

a) Consider criteria and procedures used for identifying the GHG sources, sinks and reservoirs relevant for the project,
b) *If necessary, explain and apply additional criteria for identifying relevant baseline GHG sources, sinks and reservoirs, and*
c) *Compare the project's identified GHG sources, sinks and reservoirs with those identified in the baseline.*

Section 5.6 of the ISO 14064-2 Standard requires project proponents to:

Select or establish criteria and procedures for selecting relevant GHG sources, sinks and reservoirs for either regular monitoring or estimation.

Justify not selecting any relevant GHG source, sink and reservoir for regular monitoring.

Criteria For Selecting Relevant GHG Sources, Sinks and Reservoirs

The GHG sources, sinks and reservoirs estimated in this project are restricted to LULUCF sector carbon emissions and removals as follows:

Table 3a: GHG Sources, Sinks, and Reservoirs: Pacific REDD+ Program	
Sources	CO_2e emissions from above ground woody biomass removed from the forest.
	CO_2e emissions from above ground woody biomass entering the deadwood pool in the form of discarded crown and branches of harvested (target) trees.
	CO_2e emissions from additions to the above ground deadwood carbon pool resulting from collateral damage to non-target trees due to wood harvest activities.
	CO_2e emissions from the decomposition of below ground biomass resulting from above ground wood harvesting and collateral damage.
Sinks	CO_2e sequestered in the natural background rate of natural forest regeneration.
	CO_2e sequestered in harvest patches as a consequence of the opening the forest canopy.
Reservoirs	The GHG assessment in this project estimates the change in carbon stocks contained in carbon reservoirs (and associated emissions and/or removals), rather than the total content of carbon stored in the forest carbon reservoirs/pools.

The total volume of carbon stored in the above ground carbon pools is measured in this project by means of a carbon stock inventory. Carbon stored below ground is derived from the application of a root-shoot ratio. Furthermore, the GHG sources and sinks estimated in this project are restricted to LULUCF carbon pools that are controlled by the Project Owners and lie within the Eligible Forest Area of the project.

The carbon pools used in this project are:

Table 3b: Carbon Pools Used in this Methodology		
Carbon Pool	Included/ Excluded	Justification
Above ground biomass (AGB)	Included	At a minimum, the stock change in the above-ground tree biomass shall be estimated.
Below ground biomass (BGB)	Included	When you kill a tree you also kill its roots (unless the tree is of a species that coppices). The 2006 IPCC Guidelines on GHG Inventories uses a BGB default value of 0.37 of AGB for tropical rainforest. The only exception to this default rule for this methodology applies to species that are known to be capable of regenerating from cut stumps. Project Coordinators shall identify the proportion of the above ground biomass emitted (AGBE) attributable to these species in the Baseline, and remove the below ground biomass emitted (BGBE) portion for these species in the baseline calculation.

Dead-wood (DW)	Included	Required under VCS Tool for AFOLU Methodological Issues.
Harvested Wood Products	Included	Required under VCS Tool for AFOLU Methodological Issues, even though harvested wood products are usually not considered when estimating the baseline or project scenarios under the Plan Vivo Standards for RED projects (Estrada (CIFOR) 2011, p49). Included in this methodology to maintain consistency with the VCS on this point.
Litter	Excluded	Insignificant and exclusion is conservative.
Soil organic carbon	Excluded	Exclusion is conservative.

The inclusion/exclusion of greenhouse gases in this project are shown in Table 3c.

Table 3c: Emission sources other than resulting from changes in stocks in carbon pools

Gas	Sources	Included / Excluded	Justification
Carbon dioxide (CO_2)	Removal of woody vegetation through commercial logging activity	Included	Such removal of vegetation causes CO_2 emissions to the atmosphere.
	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Not required by Plan Vivo Standards.
	Removal of herbaceous vegetation	Excluded	Based on CDM EB decision reflected in paragraph 11 of the report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023_rep.pdf
Methane (CH_4)	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Not required by Plan Vivo Standards.
	Burning of biomass	Excluded	Exclusion is conservative.
Nitrous oxide (N_2O)	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Not required by Plan Vivo Standards.
	Nitrogen based fertilizer	Excluded	Potential emissions are conservatively neglected.
	Burning of biomass	Excluded	Potential emissions are conservatively neglected.

Comparison Between Baseline & Project

The sources, sinks and reservoirs defined in the baseline scenario are the same for the project scenario.

3. Determining The Baseline Scenario

Section 5.4 of the ISO 14064-2 Standard requires project proponents to:

1. Select or establish criteria and procedures for identifying and assessing potential baseline scenarios considering the following:

a) *The project description, including identified GHG sources, sinks and reservoirs ([see Section 3 above]);*
b) *Existing and alternative project types, activities and technologies providing equivalent type and level of activity of products or services to the project;*
c) *Data availability, reliability and limitations;*
d) *Other relevant information concerning present or future conditions, such as legislative, technical, economic, socio-cultural, environmental, geographic, site-specific and temporal assumptions or projections.*

2. Demonstrate equivalence in type and level of activity of products or services provided between the project and the baseline scenario and shall explain, as appropriate, any significant differences between the project and the baseline scenario.

3. Select or establish, explain and apply criteria and procedures for identifying and justifying the baseline scenario.

4. [Develop] the baseline scenario, the project proponent shall select the assumptions, values and procedures that help ensure that GHG emissions reductions or removal enhancements are not over-estimated.

Baseline activities for this project are restricted to deforestation[3] implemented on forest lands[4] and are included in the IPCC category "forest land converted to non-forest land".

Only areas that have been designated, sanctioned or approved for such activities (e.g. where there is legal sanction to deforest) by the national and/or local regulatory bodies are eligible for crediting under this project.

[3] Using the FAO FRA 2010 definition (see Explanatory Notes in Appendix 1).

[4] Using the FAO FRA 2010 definition: Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. Source: http://www.fao.org/docrep/014/am665e/am665e00.pdf

3.1 BASELINE SELECTION, ADDITIONALITY AND BASELINE MODELLING

3.1.1 Selection of Baseline

According to the Plan Vivo Standard (2013, p17):

5.12. A baseline scenario must be provided for each project intervention, describing current land uses and habitat types and existing major ecosystem services provided in the area, and how these are most likely to change over the quantification period in the absence of project interventions.

The baseline scenario for each land parcel in this project is deforestation.

According to the TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815:

In justifying the Baseline Activity, Project Coordinators must determine the most likely land use in the absence of the project, through the identification of possible land uses using the following criteria, and an assessment of land use options according to the following criteria:

a. Land suitability
b. Technical barriers
c. Economic barriers
d. *Institutional constraints*

The most likely land use in the absence of the project is deforestation and land conversion to coconut plantations in combination with cattle grazing. This land use is the prevalent land use in the lands surrounding the Project Area and is the most common land use in eastern Santo, Vanuatu. The land is suitable to the baseline activity in terms of aspect, soils, and topography as evidenced by the land use in lands surrounding the Project Area.

There are no technical barriers to deforestation at the project site because the land is on flat terrain, is accessible by road and has been logged in the past.

There are no economic barriers to deforestation at the project site. In fact the opposite is true. There are economic incentives for deforestation given the need among the land owning community for economic development and the existing markets for copra and beef.

There are no institutional constraints to deforestation at the project site.

3.1.2 Justification of Selected Baseline

The scale of the baseline activity is restricted to deforestation of tall indigenous forest at the project site located in Zone A (see Figure 2.4c of the PD Part A). Baseline deforestation also

extends to Zone B (Figure 2.4c) but Zone B was not subjected to an inventory survey during project development. For this reason Zone B is not included in carbon accounting at first verification. The baseline emissions assertion at first verification will therefore comprise an underestimation of the full scale of baseline emissions. Forest inventory survey of Zone B following first verification will enable inclusion of Zone B in baseline emissions calculations.

Baseline activities at the scale described above is supported by legal sanction to deforest.

The commercial viability of the baseline activity at the scale of the baseline scenario assertion (deforestation of Zone A and B) is evidenced by the scale of equivalent activities on lands surrounding the Project Area (see Figure 2.4.3 in PD Part A).

3.1.2.1 Commercially Viable Baseline

According to the TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815:

Projects are also required to undertake an economic analysis for establishing the scale of baseline activity and demonstrating that the baseline activity is commercially viable.

This Technical Specifications Module establishes the baseline on historical activities in the project and/or reference area, so is similar to making the assumption that the baseline scenario will continue for the Project Period. Project Coordinators are required to update the baseline every ten years from the Project Start Date.

Economic analysis of the baseline scenario undertaken during project development is based on the following assumptions:

- 50% of the adult population participates in baseline copra production earning VUV12,000 per month.
- Adult population: approximately 50 people available for copra labour but only half of these participating in copra production.
- Serakar Clan unlikely to invite external labour to work their land thus reducing the labour pool to Serakar Clan adults.

These results yield anticipated annual aggregated revenues from copra production at US$33,442. Initial costs of deforestation and plantation establishment would be offset by timber revenues. Net positive copra revenues would begin after 5 years but be supported by revenue generation from beef grazing from the year following deforestation in lands allocated to beef grazing.

This analysis shows that copra production combined with beef grazing and timber revenues is commercially viable as the baseline scenario.

3.1.3 Justification for Excluding Alternative Baselines

Possible alternative baselines:

Forest Protection

This is not likely given the need for economic development among the landowners in the Serakar Clan whose economic development needs are unable to be met under existing land use arrangements. Note also that all neighbouring landowner groups have greater access to economic development because they have copra plantations and beef grazing lands instead of tall rainforest.

Deforestation but not copra and beef

Alternative baselines that also involve deforestation are unlikely due to the smallholder nature of land tenure in this part of Vanuatu and this site in particular. For other larger scale agricultural activities (e.g. oil palm) larger land aggregations would be necessary.

3.1.4 Stratification

According to the TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815:

All projects applying this Technical Specifications Module shall stratify the baseline scenario into the following strata:

a. *Forest composition stratification.*
b. *Forest management stratification.*

This project has three strata:

1. Zone A = tall regenerating coastal rainforest depicted as Zone A in Figure 4.2c of the PD Part A. Zone A is allocated to forest protection during the Project Period. Zone A is logged forest as defined in Section 3.1.4 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.
2. Zone B = degraded regenerating coastal rainforest depicted as Zone B in Figure 4.2c of the PD Part A. Zone B is allocated to forest protection during the Project Period. Zone B is logged forest as defined in Section 3.1.4 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.
3. Zone C = non-forest land. Zone C is allocated to agroforestry activities during the Project Period.

3.1.5 Additionality

According to Section 5 of the Plan Vivo Standard (2013, p16):

5.4. Ecosystem services forming the basis of Plan Vivo projects must be additional i.e.

would not have been generated in the absence of the project, which involves as a minimum demonstrating that:

5.4.1. Project interventions are not required by existing laws or regulations, unless it can be shown that those laws are not enforced or commonly met in practice and the support of the project is therefore justified;

5.4.2. There are financial, social, cultural, technical, scientific or institutional barriers preventing project interventions from taking place.

According to section 5.4 of the ISO 14064-2 standard (2006):

The project proponent shall select or establish, justify and apply criteria and procedures for demonstrating that the project results in GHG emissions reductions or removal enhancements that are additional to what would occur in the baseline scenario.

This Project tests the additionality of the project using the most recent version of the VCS AFOLU Additionality Tool. The Additionality Assessment is presented in Appendix 10.

3.1.6 Baseline Revision

According to Section 5.3 of the Plan Vivo Standard (2013):

Technical specifications must be updated at least every 5 years where they are still being used to sign new PES Agreements, by reviewing both available data from project monitoring results, e.g. species growth data, and new available data from outside the project.

All projects are required to undertake a baseline revision every 5 years. This baseline revision will include revision of the technical data used to create the Baseline and Project Scenarios from an ecosystem service accounting perspective.

4. Quantifying Baseline GHG Emissions and Removals

According to Section 5 of the Plan Vivo Standard (2013):

5.2. Sources of data used to quantify ecosystem services, including all assumptions and default factors, must be specified and as up-to-date as possible, with a justification for why they are appropriate.

5.18. An approved approach must be used to quantify initial carbon stocks and emissions sources, and estimate how they are most likely to change over the project period, as part of the baseline scenario.

According to Section 5.7 of the ISO 14064-2 Standard:

The project proponent shall select or establish criteria, procedures and/or methodologies for quantifying GHG emissions and/or removals for selected GHG sources, sinks and/or reservoirs (see Section 6 above).

Based on selected or established criteria and procedures, the project proponent shall quantify GHG emissions and/or removals separately for

a) Each relevant GHG for each GHG source, sink and/or reservoir relevant for the project, and
b) Each GHG source, sink and/or reservoir relevant for the baseline scenario.

When highly uncertain data and information are relied upon, the project proponent shall select assumptions and values that ensure that the quantification does not lead to over-estimation of GHG emissions reductions or removal enhancements.

The project proponent shall estimate GHG emissions and/or removals by GHG sources, sinks and reservoirs relevant for the project and relevant for the baseline scenario, but not selected for regular monitoring.

The project proponent shall establish and apply criteria, procedures and/or methodologies to assess the risk of a reversal of a GHG emission reduction or removal enhancement (i.e. permanence of GHG emission reduction or removal enhancement).

If applicable, the project proponent shall select or develop GHG emissions or removal factors that:

- *are derived from a recognized origin,*
- *are appropriate for the GHG source or sink concerned,*

- *are current at the time of quantification,*
- *take account of the quantification uncertainty and are calculated in a manner intended to yield accurate and reproducible results, and*
- *are consistent with the intended use of the GHG report.*

This Technical Specifications Module calculates the net anthropogenic GHG emissions and removals in the Baseline Scenario, and then calculates the net anthropogenic GHG emissions and removals in the Project Scenario.

4.1 CALCULATION OF GHG EMISSIONS AND REMOVALS

The highest-level equation for carbon stock change measurement in this Technical Specifications Module for baseline and project scenarios is equivalent to Equation 2.3 of Volume 4, Chapter 2 of the 2006 IPCC Guidelines for National GHG Inventories:

EQUATION 2.3
ANNUAL CARBON STOCK CHANGES FOR A STRATUM OF A LAND-USE CATEGORY AS A SUM OF CHANGES IN ALL POOLS

$$\Delta C_{LU_i} = \Delta C_{AB} + \Delta C_{BB} + \Delta C_{DW} + \Delta C_{LI} + \Delta C_{SO} + \Delta C_{HWP}$$

Where: ΔC_{LUi} = Carbon stock changes for a stratum of land-use category; and subscripts denote the following carbon pools: AB = Above Ground Live Biomass; BB = Below Ground Live Biomass; DW = Deadwood; LI = Litter; SO = Soils; HWP = Harvested Wood Products.

Annual carbon stock change calculations for baseline and project scenarios are based on Equation 2.7 (Chapter 2, Volume 4) of the IPCC 2006 Guidelines on National GHG Inventories.

EQUATION 2.7
ANNUAL CHANGE IN CARBON STOCKS IN BIOMASS IN LAND REMAINING IN A PARTICULAR LAND-USE CATEGORY (GAIN-LOSS METHOD)

$$\Delta C_B = \Delta C_G - \Delta C_L$$

Where: ΔC_B = Annual change in carbon stocks in biomass, (tonnes C yr^{-1}); ΔC_G = Annual gain (removals) of carbon in biomass due to biomass growth considering the total area (tonnes C yr^{-1}); ΔC_L = Annual loss (emissions) of carbon in biomass due to biomass loss considering the total area (tonnes C yr^{-1}).

The following table lists the baseline GHG sources and sinks modelled by this methodology:

Table 4.1: Baseline GHG Sources and Sinks	Acronym
Included in Modelling:	
Above Ground Biomass Emitted as a result of baseline deforestation	AGBE
Below Ground Biomass Emitted as a result of baseline activity	BGBE
Removals sequestered into the long-term wood product pool	ltWP
Residual Live Biomass in post deforestation woody vegetation	RLB_{PD}
Excluded from Modelling:	
Emissions from fossil fuel components of baseline activity	

Calculation of Baseline Scenario carbon dioxide emissions and removals involves the application of the equations presented in this section of this methodology to complete the carbon accounting for all land parcels in the Baseline Scenario. The baseline and project emissions and removal calculations are based on conservative default values applied to empirical measurement of baseline timber harvesting rates.

According to Section 5 of the Plan Vivo Standard (2013, p18):

5.17. Where climate services are affected by cyclical management activity, e.g. harvesting or naturally occurring cycles, the quantification period must be representative of the services provided throughout the full cycle of events.

4.1.1 Step 1 – Above Ground Biomass Emitted (AGBE)

This project applied the field inventory methodology specified in Section 4.1.1 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

AGBE was estimated using the allometric equation recommended by Chave et al. (2005) for moist tropical forests (Equation. 4.1.1a).

Equation 4.1.1.7a: $AGB = \exp(-2.977 + \ln(\rho D^2 H)) = 0.0509 \times \rho D^2 H$

Parameters

AGB	Above ground live biomass within sample plot for stratum i (kg)
D	Stem diameter at breast height within sample plot (cm)
H	Top height of sampled tree (m) derived from a diameter-height equation
ρ	Density of sampled tree wood (g/cm^3) derived from regional defaults.

AGBE = 39,419 m^3 aggregated for the Project Period (i.e. this number is not an annual number – carbon accounting is annualised in Step 4.1.5 in this project). See Appendix 5, sheet Loru Carbon.

Diameter – Height Ratio

Tree height (H in Equation 4.1.1.7a) estimations for each tree measured in the forest

inventory is provided in Appendix 5, sheet 'Loru Forest Inventory – Tree', column G.

Stem height - diameter curves for this project were calculated as follows:

Method

Most standard two-parameter height-diameter functions listed in Husch et al. (2003) were tested. Curves were fitted with non-linear mixed effect models using the *nlme* function (Pinheiro et al. 2015) in the R statistical package with random coefficients for species.

Results

Only a subset of those equations tested is presented below. Model fits and diagnostics for the models with strong support (eq. 1-3) and for an allometric equation of standard use, but with poor support (eq. 4) are shown in the table. The parameters reported for each:

	Equation
eq. 1	$H = \frac{dbh^2}{(a + b \times dbh)^2} + 1.35$
eq. 2	$H = 1.35 + \left(a + \frac{b}{dbh}\right)^{-2.5}$
eq. 3	$H = \frac{a \times dbh}{b + dbh} + 1.35$
eq. 4	$H = 1.35 + (a - 1.35)(1 - e^{-b \times dbh})$

Equation	estimated		AICc	*R2* adjusted	slope obs vs. predicted	Source
	a	*b*				
1	2.465118	0.174846	293.2	0.81	1.015	a.
2	0.249432	2.588026	293.5	0.80	1.007	a.
3	32.59106	37.81761	294.2	0.81	1.082	b.
4	21.30214	0.049395	304.4	0.77	1.092	d.
Sources: a. Prodan 1997, Husch et al. 2003; b. Bates and Watts 1980; c. Thomas 1996						

Figure 4.1.1.7ai Tree height – diameter curve, Loru Forest

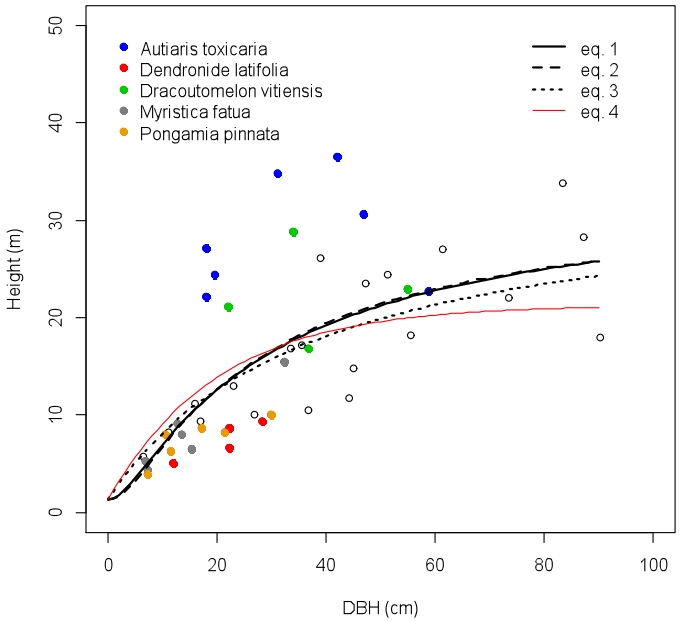
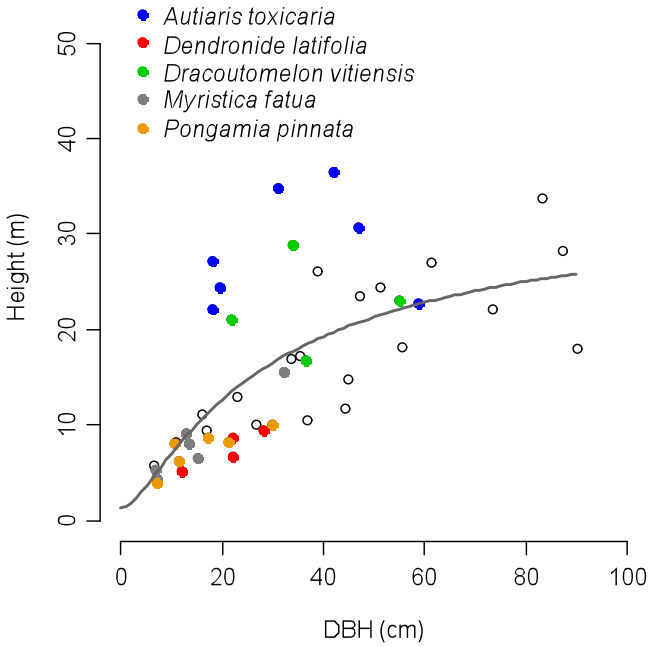


Figure 4.1.1.7aii Best supported model (eq. 1)



Interpretation

Equations 1, 2 and 3 have equivalent statistical support (AICc values). The figure shows that the curves for eq. 1 and eq. 2 overlap and are almost identical to each other. Eq. 3 tends to estimate taller height for small trees and lower heights for larger trees. That tendency is even more marked with eq. 4, which clearly gets lower statistical support compared to the other equations. Accordingly, equation 1 was applied in this project (replacing Equation 4.1.1.7b in the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

Equation 4.1.1.7b: $\text{Height}_{(\text{Indigenous forest species})} = 1.52 \times \text{DBH}^{0.31}$

Parameters

DBH	Stem diameter at breast height within sample plot (cm)

Wood Density

Wood density measured in (g/cm^3). Wood density is calculated for each species measured in the forest inventory (Appendix 5, sheet 'Loru Forest Inventory – Tree' column H).

Above Ground Dead Biomass (AGDB)

The calculation of Above Ground Dead Biomass (AGDB) is not measured in this project.

4.1.2 Step 2 – Below Ground Biomass Emitted (BGBE)

Below Ground Biomass Emitted (BGBE) in this project uses the IPCC ratio of below-ground biomass to above ground biomass for tropical rainforest of 0.37[5]. The default factor used in this methodology is 0.37 of AGBE and is calculated using the following equation:

Equation 4.1.2: $\text{BGBE} = \text{AGBE} \times 0.37$

Parameters

BGBE	Below ground biomass emitted within EFA (m^3yr^{-1})
AGBE	Above ground biomass emitted within EFA ($m^3\ yr^{-1}$)

Below ground biomass for this project is:

$39{,}419 \times 0.37 = 23{,}151\ m^3yr^{-1}$

(See Appendix 5 Loru Carbon Budget & Pricing, sheet Loru Cabon, cell E5)

4.1.3 Step 3 – Total Emitted Wood Volume in Cubic Metres (TM3)

Total Emitted Wood Volume in cubic meters (TM3) represents the volume of above ground and below-ground live wood volume that is emitted as a result of deforestation.

[5] IPCC 2006. 2006 IPCC Guidelines on National Greenhouse Gas Inventories. Vol. 4 Ch 4. p49.

TM3 is calculated using the following equation:

Equation 4.1.3: TM3 = AGBE + BGBE

Parameters

TM3	Total emitted wood volume in cubic meters within EFA (m^3yr^{-1})
AGBE	Above ground biomass within EFA ($m^3 yr^{-1}$)
BGBE	Below ground biomass within EFA ($m^3 yr^{-1}$)

TM3 for this project is:

TM3 = 39,419 + 23,151 = 62,570 $m^3 yr^{-1}$

(See Appendix 5 Loru Carbon Budget & Pricing, sheet Loru Cabon, cell E6.)

4.1.4 Step 4 – Gross Total Emissions in tCO_2e (GTCO2)

According to TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815:

Gross Total Emissions in tCO_2e from deforestation (GTCO2) is calculated by means of converting TM3 (cubic meters) to tCO_2e using the following procedure:[6] The estimation of greenhouse gases that would result from the combustion or decomposition of wood is calculated in the following three steps as specified in this methodology:

1. *Convert green wood volume to dry tonnes of wood*
2. *Convert dry tonnes of wood to carbon*
3. *Convert carbon to carbon dioxide*

This project calculated GTCO2 by means of applying equations in Section 4.1.4 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815). The result of these calculations can be found in Appendix 5, Loru Forest Inventory, Sheet 'Carbon Stocks – Slope Corrected', cell H28, and Appendix 5, Loru Carbon Budget & Pricing, Sheet 'Loru PHI', cell F31 (deriving the latter by multiplying the former by the eligible forest area).

GTCO2 = 53,862 tCO_2e (one-off in baseline deforestation) and later adjusted to an annual baseline emission in the calculation of Gross Baseline Emissions Avoided (GBEA) below.

[6] From IPCC (2006) Vol 4. Ch 2. p11 (section 2.2.3)

4.1.4a Convert Green Wood Volume To Dry Tonnes Of Wood

Wood density calculations can be found in Appendix 5, 'Loru Forest Inventory', Sheet 'Wood Density', Column E; Sheet 'Carbon Dataset' (column H); and Sheet 'Carbon Calculations – Tree', Column I.

The mean wood density for this forest was calculated as = 0.479, although higher resolution species-specific wood density calculations were applied in the calculation of GTCO2 for this project.

4.1.4b Calculate Carbon Content Of Dry Wood

Carbon fraction calculations for this project can be found in Appendix 5 Loru Forest Inventory, Sheet 'Carbon Calculations – Tree', Column Q.

4.1.5 Step 5 – Gross Baseline Emissions (GBEWP)

Gross Baseline Emissions over the 30 year project period assuming a deforestation event at the start of the baseline period, and taking into account carbon sequestered into the long term Wood Products pool (GBEWP) is calculated using the methodology presented in Section 4.1.5 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

GBEWP = 52,808 tCO_2e (one-off in baseline deforestation) and later adjusted to an annual baseline emission in the calculation of Gross Baseline Emissions Avoided (GBEA) below.

(See Appendix 5, Sheet Loru Carbon, Cell E8.)

4.1.6 Step 6 – Sequestration into Long Term Wood Products (ltWP)

Removals sequestered into the long-term Wood Products pool (ltWP) is calculated using the methodology presented in Section 4.1.6 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

ltWP = 1,054 tCO_2e (one-off in baseline deforestation) and later adjusted to an annual baseline emission in the calculation of Gross Baseline Emissions Avoided (GBEA) below.

(See Appendix 5, Sheet Loru Carbon, Cell O20.)

4.1.7 Step 7 – Gross Baseline Emissions Avoided (GBEA)

Gross Baseline Emissions Avoided (GBEA) is calculated using the methodology presented in Section 4.1.7 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

GBEA = 1,760 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru Carbon, Cell E9.)

4.1.8 Step 8 – Baseline Removals (BR)

Baseline Removals (BR) is calculated using the methodology presented in Section 4.1.8 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

BR = 34 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru Carbon, Cell E10.)

4.1.9 Step 9 – Net Baseline Emissions Avoided (NBEA)

Net Baseline Emissions Avoided (NBEA) is calculated using the methodology presented in Section 4.1.9 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

NBEA = 1,726 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru Carbon, Cell E11.)

4.1.10 Baseline Scenario Variants

This project applies Variant 2 (Logged Forest) of the baseline scenario variants presented in Section 4.1.10 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

5. Quantifying Project Emission Reductions & Removal Enhancements

According to Section 5 of the Plan Vivo Standard (2013):

5.2. Sources of data used to quantify ecosystem services, including all assumptions and default factors, must be specified and as up-to-date as possible, with a justification for why they are appropriate.

According to Section 5.8 of the ISO 14064-2 Standard:

The project proponent shall select or establish criteria, procedures and/or methodologies for quantifying GHG emission reductions and removal enhancements during project implementation.

The project proponent shall apply the criteria and methodologies selected or established to quantify GHG emission reductions and removal enhancements for the GHG project. GHG emission reductions or removal enhancements shall be quantified as the difference between the GHG emissions and/or removals from GHG sources, sinks and reservoirs relevant for the project and those relevant for the baseline scenario.

The project proponent shall quantify, as appropriate, GHG emission reductions and removal enhancements separately for each relevant GHG and its corresponding GHG sources, sinks and/or reservoirs for the project and the baseline scenario

The project proponent shall use tonnes as the unit of measure and shall convert the quantity of each type of GHG to tonnes of CO_2e using appropriate GWPs.

5.1 PROJECT GHG EMISSIONS AND REMOVALS

Project activity emissions are excluded from this methodology and as such Project GHG emissions focuses on Enhanced Removals (ER) where relevant (expressed as a negative number to denote a removal). Enhanced Removals are calculated for annual forest growth in Logged Forest land parcels for the Project Period. The rate of Enhanced Removals is set at the mean sequestration rate for the forest type.

The next step is to determine the period for which projects can claim ER for Logged Forest land parcels. This will depend on the timing of historical logging for each Logged Forest land parcel and the sequestration curve for that forest type.

Figure 4.1.7b depicts a grey triangle representing (not to scale) enhanced removals in the project scenario. Enhanced Removals represent carbon benefits that can be credited in addition to Baseline Emissions Avoided, but only for Logged Forest areas that are actively regenerating and naturally increasing in carbon stocks annually in the original condition (i.e. in the baseline but prior to any projected baseline logging activity). If the baseline logging activity is undertaken then this would prevent natural regeneration from occurring and carbon stocks would not naturally increase. Displacing the baseline scenario by imposing the project scenario would enable natural regeneration to continue uninterrupted and this would represent the enhanced removal made possible by the project.

Enhanced Removals are creditable for a limited time period called the Enhanced Removals Window (ERW). This is depicted in Figure 4.1.7b but in a miniature form to fit it into the graph. In practice the ERW is likely to be close to 100 years given that it takes at least this long for a forest to regenerate to a fully old-growth mature forest system.

5.1.1 Step 10 – Enhanced Removals (ER)

Enhanced Removals (ER) is calculated using the methodology presented in Section 5.1.1 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

ER = 1,326 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru Carbon, Cell E11. This depicts Net Project Removals, which is equal to ER – Total Leakage.)

The Mean Sequestration Rate applied in this project is conservatively set at 9 $tCO_{2e}ha^{-1}yr^{-1}$. This has been conservatively set below the IPCC regional default value for carbon sequestration tropical rainforest for the region Asia (other) of 11.78$tCO_{2e}ha^{-1}yr^{-1}$ - assuming a 0.47 carbon fraction (IPCC 2006, Ch 4, p 4.59 – Table 4.10).

5.1.2 Step 11 – Enhanced Removals Window (ERW)

The Enhanced Removals Window (ERW) is calculated using the methodology presented in Section 5.1.2 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815).

ERW = 16 January 2013 to 16 January 2072

5.2 PROJECT LEAKAGE

According to Section 5 of the Plan Vivo Standard (2013, p18):

5.19. All potential sources of leakage and the location of areas where leakage could occur must be identified and any appropriate mitigation measures described.

5.20. Where leakage is likely to be significant, i.e. likely to reduce climate services by more than 5%, an approved approach must be used to monitor leakage and subtract actual leakage from climate services claimed, or as a minimum, make a conservative estimation of likely leakage and deduct this from the climate services claimed.

According to the VCS AFOLU Requirements, VCS Version 3, 2011:

Methodologies shall establish procedures to quantify all significant sources of leakage. Leakage is defined as any increase in GHG emissions that occurs outside the project boundary (but within the same country), and is measurable and attributable to the project activities. All leakage shall be accounted for, in accordance with this Section 4.6. The three types of leakage are:

1. *Market leakage occurs when projects significantly reduce the production of a commodity causing a change in the supply and market demand equilibrium that results in a shift of production elsewhere to make up for the lost supply.*
2. *Activity shifting leakage occurs when the actual agent of deforestation and/or degradation moves to an area outside of the project boundary and continues their deforesting activities elsewhere.*
3. *Ecological leakage occurs in PRC projects where a project activity causes changes in GHG emissions or fluxes of GHG emissions from ecosystems that are hydrologically connected to the project area.*

5.2.1 Step 12 – Total Activity Shifting Leakage (TAL)

According to the GreenCollar IFM LtPF v1.0 VCS approved Methodology VM0010 (2011):

There may be no leakage due to activity shifting.

Where the project proponent controls multiple parcels of land within the country the project proponent must demonstrate that the management plans and/or land-use designations of other lands they control have not materially changed as a result of the planned project (designating new lands as timber concessions or increasing harvest rates in lands already managed for timber) because such changes could lead to reductions in carbon stocks or

increases in GHG emissions.

This must be demonstrated through:

- *Historical records showing trends in harvest volumes paired with records from the with-project time period showing no deviation from historical trends;*
- *Forest management plans prepared ≥24 months prior to the start of the project showing harvest plans on all owned/managed lands paired with records from the with-project time period showing no deviation from management plans.*

At each verification, documentation must be provided covering the other lands controlled by the project proponent where leakage could occur, including, at a minimum, their location(s), area and type of existing land use(s), and management plans.

Where activity shifting occurs or a project proponent is unable to provide the necessary documentation at first and subsequent verification, the project shall not meet the requirements for verification. Therefore, the project shall be subject to the conditions described in the VCS AFOLU Guidance Document on projects, which fail to submit periodic verification after the commencement of the project. Project proponents may optionally choose to submit a methodology deviation with their future verifications to address activity shifting leakage.

Where the project proponent has control only over resource use in the project area and has no access to other forest resource, then the only type of leakage emissions calculated is GHG emissions due to market effects that result from project activity.

Total Activity Shifting Leakage (TAL) is calculated = 0. There is no activity shifting leakage in this project. All tall forest within the Project Area is protected under this project. This includes the Eligible Forest Area (Zone A in Figure 2.4c of the PD Part A) and forest outside the Eligible Forest Area (Zone B in Figure 2.4c of the PD Part A).

5.2.2 Step 13 - Total Leakage (TLK)

Market leakage is not measured in this Technical Specifications Module because the driver for deforestation is small-scale, village based agricultural production. Furthermore, the relatively small volume of merchantable timber in the 165.6 ha eligible forest area is unlikely to create a scarcity in national timber supplies sufficient to drive up domestic timber prices.

TLK = 0.

5.3 NET GREENHOUSE GAS EMISSION REDUCTIONS

5.3.1 Step 14 – Net Project Removals

Net Project Removals (NPR) is calculated using the methodology presented in Section 5.3.1 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

NPR = 1,326 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru Carbon, Cell E15.)

5.4 NON-PERMANENCE RISK AND BUFFER DETERMINATION

According to Section 6 of the Plan Vivo Standard (2013, p19):

6.1. Risks to the delivery of ecosystem services and sustainability of project interventions must be identified and appropriate mitigation measures described.

6.2. Projects must review their risk assessment at least every 5 years and resubmit to the Plan Vivo Foundation.

5.4.1 Step 15 – Buffer Credits

According to Section 6 of the Plan Vivo Standard (2013, p19):

6.3. A proportion of expected climate services must be held in a risk buffer to protect the project from unexpected reductions in carbon stocks or increases in emissions, unless there is no risk of reversal associated with the project intervention.

6.4. The level of risk buffer must be determined using an approved approach and be a minimum of 10% of climate services expected.

5.4.1.1 Project Buffer Rating

The Project Buffer Rating (PBR) is used to calculate the Buffer for the baseline timeline. The Project Buffer Rating (PBR) is equal to 0.2 in this Technical Specifications Module.

5.4.1.2 Buffer Credits For Net Baseline Emissions Avoided

Buffer Credits associated with Net Baseline Emissions Avoided (NBEA) for the baseline timeline for the Project Scenario are calculated using the methodology presented in Section 5.4.1.2 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

BUFNBEA = 345 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru Carbon, Cell E13.)

5.4.1.3 Buffer Credits For Net Project Removals

Buffer Credits associated with Net Project Removals (NPR) for the baseline timeline for the Project Scenario are calculated using the methodology presented in Section 5.4.1.3 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

BUFNPR = 265 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru Carbon, Cell E16.)

5.4.1.4 Buffer Account Attributes

This project applies the Buffer Account Attributes specified in Section 5.4.1.4 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

5.5 NET CARBON CREDITS

Net carbon credits issued to the project are calculated as the sum of Net Baseline Emissions Avoided (NBEA) (the avoided emissions component) and Net Project Benefits (NPB) (the enhanced removals component) for each land parcel and stratum, minus the buffer for each.

5.5.1 Step 16 – Net Carbon Credits (NCC)

Net Carbon Credits (NCC) is calculated using the methodology presented in Section 5.5.1 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

NCC = 2,442 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru Carbon, Cell E19.)

5.6 MANAGING LOSS EVENTS

According to Section 5 of the Plan Vivo Standard (2013, p18):

5.16. Any alteration of project intervention areas during the project, or before the project starts but attributable to the project, that results in a loss of ecosystem services, e.g. clearing of vegetation or other site preparation prior to afforestation, must be accounted for in the technical specification.

This project applies rules for managing loss events as specified in Section 5.6 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

6. Quantifying Project Habitat Hectare Enhancements

According to Section 5 of the Plan Vivo Standard (2013):

5.2. Sources of data used to quantify ecosystem services, including all assumptions and default factors, must be specified and as up-to-date as possible, with a justification for why they are appropriate.

This project has elected to produce Habitat Hectare units as mutually exclusive units to Carbon Credits as specified in Section 6 of the TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815.

This project elects to issue Habitat Hectare units through the issuance/retirement of the equivalent volume of Carbon Credits per Habitat Hectare sold (i.e. a registry proxy). In this way, Habitat Hectare units are mutually exclusive to Carbon Credits from an ecosystem accounting perspective for this project. For example, when this project sells one habitat hectare unit, the equivalent volume of Carbon Credits issued to this project will be retired at the point of sale (i.e. there will be no secondary market for Habitat Hectare units for this project as required in Section 6 of the TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815.

6.1 BASELINE HABITAT HECTARES

According to TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815:

Projects are required to quantify baseline hectares of protected rainforest within the eligible forest area including any qualitative condition of rainforest in the case of a forest-remaining-as-forest activity type. Rainforest protection can include:

1. *Prevention of rainforest deforestation*
2. *Prevention of rainforest degradation*
3. *Rainforest habitat enhancements*

The baseline activity for Habitat Hectare production is the same as that identified for Carbon Credit production as specified in Section 3 of this document. The description of the baseline for Habitat Hectare production shall specify the habitat impacts of baseline activity.

Quantification of the baseline hectares of rainforest protection can include a statement of the deforestation and/or degradation expected as a result of baseline activities, but must include the number of hectares so affected.

The baseline for Habitat Hectare units is deforestation of 100% of the eligible forest area (BHH). Baseline Habitat Hectare units (BHH) is equal to the number of Habitat Hectare units to be produced in the baseline.

BHH = 0 ha yr^{-1}

6.2 PROJECT HABITAT HECTARES

According to TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815:

Projects are required to quantify project hectares of protected rainforest within the eligible forest area including any qualitative condition of rainforest in the case of a forest-remaining-as-forest activity type.

The eligible forest area (EFA) is 165.6 ha in size. Project Habitat Hectares of rainforest protected inside the eligible forest area: 118 ha yr^{-1}. This amounts to the EFA – 20%.

6.3 LEAKAGE

According to TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815:

Projects are required to quantify leakage of project hectares using the leakage assessment provided in Section 5 of this document.

The leakage assessment for Habitat Hectares in this project equals the leakage assessment for Carbon Credits as specified in Section 5.2 of this document. Accordingly, there has been no activity shifting leakage. There has been no market leakage in this monitoring period (due to the insignificant volume of baseline timber harvesting in relation to the national domestic timber market).

Annual leakage (*ceteris paribus*) for this project = 0ha.

6.4 QUANTIFICATION OF HABITAT HECTARE UNITS

According to TS Module (C) 2.1 (AD-DtPF) D2.2.1 v1.0 20150815:

Projects are required to quantify the net Habitat Hectare units to be issued to the project, noting that Habitat Hectare units are mutually exclusive to Carbon Credits issued by the same project.

6.4.1 Gross Habitat Hectares

Gross Habitat Hectares (GHH) is calculated by applying the methodology specified in Section 6.4.1 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

EFA = GHH = 147 ha.

(See Appendix 5, Sheet Loru HH, Cell E5.)

6.4.2 Habitat Hectare Buffer

The Habitat Hectare Buffer (BUFHH) is calculated by applying the methodology specified in Section 6.4.2 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

BUFHH = 29 ha.

(See Appendix 5, Sheet Loru HH, Cell E6.)

6.4.3 Net Habitat Hectares

Net Habitat Hectares (NHH) is calculated by applying the methodology specified in Section 6.4.3 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

NHH = 147 – (147 x 0.2) = 118 ha

(See Appendix 5, Sheet Loru HH, Cell E8.)

6.4.4 Net Carbon Credit Equivalent

Net Carbon Credit Equivalent (NCCE) is calculated by applying the methodology specified in Section 6.4.4 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

NCCE = 118 x 20.72 = 2,442 $tCO_2e\ yr^{-1}$

(See Appendix 5, Sheet Loru HH, Cell E9.)

6.4.5 Net Carbon Credits Per Habitat Hectare

Net Carbon Credits Per Habitat Hectare (NCC/HH) is calculated by applying the methodology specified in Section 6.4.5 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

NCC/HH = (1,381 + 1,061) / 118 = 20.72 $tCO_2e\ ha^{-1}\ yr^{-1}$

Net Habitat Hectares (NHH) is calculated as follows:

Table 6.4 Quantification of Habitat Hectare units						
Year	Gross Habitat Hectares (GHH) (ha)	Buffer (GHH) (ha)	Leakage (ha)	Net Habitat Hectares (NHH) (ha)	Net Carbon Credits equivalent (mutually exclusive to HHs) (tCO_2e)	Net Carbon Credits / Habitat Hectare (tCO_2e)
x	147	29	0	118	2,442	20.72

(See Appendix 5, Sheet Loru HH, Cell E10.)

6.5 MANAGING LOSS EVENTS

Managing loss events is addressed in Section 5.6 of this document and focuses on the Carbon Credit losses and converts them back to HH losses using the equations above.

7. Assessment of Uncertainty

This project is guided by the uncertainty assessment developed by the VCS.

According to the Plan Vivo Standard (2013, p17):

5.11. Projects must identify and describe where uncertainty exists in quantifications of ecosystem services and estimate the approximate level or range of uncertainty. The level of uncertainty must be factored into the level of conservativeness applied in the accounting method for quantifying ecosystem services.

According to the Approved VCS Tool for the Estimation of Uncertainty for IFM Project Activities VT0003 V1.0 (2010):

Conservative estimates can be used instead of uncertainties, provided that they are based on verifiable literature sources or expert judgment. In this case the uncertainty is assumed to be zero. However, this tool provides a procedure to combine uncertainty information and conservative estimates resulting in an overall ex-post project uncertainty.

It is important that the process of project planning consider uncertainty. Procedures including stratification and the allocation of sufficient measurement plots can help ensure that low uncertainty in carbon stocks results and ultimately full crediting can result.

7.1 UNCERTAINTY IN BASELINE GHG EMISSIONS AND REMOVALS

7.1.1 Above Ground Biomass Emitted

The core of the avoided emissions component of the baseline calculation is based on a conservative estimate of the woody biomass volume to be removed (deforested) in the baseline activity. Uncertainty is addressed by means of a forest biomass inventory required to gather data aiming at a precision of ±10% of the true value of the mean at the 95% confidence level for above ground live biomass in each stratum. Plot location uses a stratified random sampling approach.

This project conservatively applies allometry from Chave et al. (2005) (see Figure 4.1.1b), in turn using a conservative diameter:height ratio derived from Payton and Weaver 2011 (derived from diameter:height data from indigenous forest in Fiji).

Wood density data in this project is derived from wood density data for the species, genus or family of each tree species measured. This produced a higher resolution wood density calculation that required by the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

Uncertainty in above ground dead biomass leaf litter, as well as soil carbon is addressed by exclusion where exclusion is conservative.

7.1.2 Below Ground Biomass Emitted

Uncertainty in the calculation of Below Ground Biomass Emitted (BGBE) is addressed in this project by applying the default value for below ground biomass used by the IPCC 2006 Inventory Guidelines (Chapter 4, pg. 49) of 0.37. When the target tree species for commercial timber harvesting in the baseline includes species known to regrow from stumps Project Coordinators are required to:

1. Calculate the proportion of AGBE attributable to these species
2. Include the AGBE attributable to these species and remove the corresponding BGBE attributable to these species in the baseline.

The baseline in this project is coconut plantations, and for this reason regrowth from stumps was not calculated because all woody vegetation is removed in the baseline scenario.

7.1.3 Gross Total Emissions in tCO_2

Uncertainty in the calculation of Gross Total Emissions in tCO_2e (GTCO2) is addressed in this project by:

a. Following the IPCC procedure for converting moist wood volume to carbon dioxide, and
b. Using species-by-species wood density for the species mix contained in the forest inventory data (and reverting to genus or family when species data was unavailable).

7.2 PROJECT GHG EMISSIONS AND REMOVALS

7.2.1 Enhanced Removals

A conservativeness factor was built into the calculation of Enhanced Removals in the form of a conservative default value for the sequestration rate. This reduced the sequestration rate from 11.78 tCO_2e to 9 tCO_2e.

8. Monitoring The Project

According to Section 5 of the Plan Vivo Standard (2013, p17):

5.9. A monitoring plan must be developed for each project intervention which specifies:

- *5.9.1. Performance indicators and targets to be used and how they demonstrate if ecosystem services are being delivered. Performance targets may be directly or indirectly linked to the delivery of ecosystem services, e.g. based on successful implementation of management activities or other improvements but must serve to motivate participants to sustain the project intervention*
- *5.9.2. Monitoring approaches (methods)*
- *5.9.3. Frequency of monitoring*
- *5.9.4. Duration of monitoring*

According to section 5.10 of the ISO 14064-2 Standard:

The project proponent shall establish and maintain criteria and procedures for obtaining, recording, compiling and analysing data and information important for quantifying and reporting GHG emissions and/or removals relevant for the project and baseline scenario (i.e. GHG information system). Monitoring procedures should include the following:

- *a) Purpose of monitoring;*
- *b) Types of data and information to be reported, including units of measurement;*
- *c) Origin of the data;*
- *d) Monitoring methodologies, including estimation, modelling, measurement or calculation approaches;*
- *e) Monitoring times and periods, considering the needs of intended users;*
- *f) Monitoring roles and responsibilities;*
- *g) GHG information management systems, including the location and retention of stored data.*

Where measurement and monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to current good practice.

The project proponent shall apply GHG monitoring criteria and procedures on a regular basis during project implementation.

The purpose of project monitoring is to measure, report, and verify ecosystem service outcomes delivered by the project. While a project may generate multiple ecosystem service and social outcomes, the scope of project monitoring is restricted to the specific outcomes represented by PES units.

Two PES unit types are produced by this project: Carbon Offsets and Habitat Hectare units. Both of these unit types are mutually exclusive to each other and cannot be double counted. The core PES unit for purposes of project monitoring is carbon offsets. Habitat Hectares are a proxy for general rainforest protection whereby the assertion of value delivered in project implementation is dominated by project implementation activities associated with the creation of carbon offsets.

The particular type of carbon offset produced by this project is a Plan Vivo Certificate issued as a Verified Emission Reduction unit (VER) but imbued with biodiversity and community co-benefits as required by the Plan Vivo Standard. These co-benefits are integral attributes of the carbon offsets produced under this standard and for this reason, project monitoring requires measurement, reporting and verification of the following project outcome attributes:

- Carbon benefits
- Community benefits
- Biodiversity benefits

Project measurement requirements set out in the PD are broken down into these three categories. Similarly, project monitoring is also broken down into the same three categories. The Project Monitoring Plan is the annual standard operating procedure for measuring project outcome delivery according to these three project benefit types.

8.1 CARBON MONITORING

Carbon offsets are issued to this project as a result of 3rd party verification of each Project Monitoring Report, which contains data sufficient to provide evidence to support a GHG assertion for the Project Monitoring Period in question.

Project Monitoring reports will be produced using the latest VCS Monitoring Report Template at a maximum of 5-yearly intervals covering each Project Monitoring Period. The Project Monitoring Report will be produced in the year following the final year of the Project Monitoring Period.

8.1.1 Monitored And Non-Monitored Parameters - Carbon

Some data parameters are derived from default values or are measured at one time only. These are non-monitored parameters. Other data parameters are monitored during each Monitoring Period.

Monitored and non-monitored data are listed in Table 8.1.1 below, and presented in the sequence in which measurement of GHG emissions and emission reductions are calculated.

Table 8.1.1 Monitored and Non-Monitored Parameters – Carbon (monitored parameters in green)

Notation	Parameter	Unit	Equa-tion	Origin	Monitored
EFA	Eligible Forest Area	ha	-	PD	Monitored
LF/ULF	Forest stratification (logged/unlogged forest)	ha	-	PD	Area calculated in PD
AGBE	Above Ground Biomass Emitted	$m^3\ yr^{-1}$	4.1.1	Calculated from inventory	Not monitored Updated each Baseline Revision
BGBE	Below Ground Biomass Emitted	$m^3\ yr^{-1}$	4.1.2	Root-shoot ratio (proportion of AGBE)	Not monitored Updated each Baseline Revision
TM3	Total Emissions in m^3	$m^3\ yr^{-1}$	4.1.3	Sum of AGBE and BGBE	Not monitored Updated each Baseline Revision
GTCO2	Gross Total Emissions in tCO^2e	$tCO_2e\ yr^{-1}$	4.1.4a 4.1.4b 4.1.4c 4.1.4d	Conversion factors from wood volume to emissions	Not monitored Updated each Baseline Revision
GBEWP	Gross Baseline Emissions	$tCO_2e\ yr^{-1}$	4.1.5	Conversion factors from wood products calculation	Not monitored Updated each Baseline Revision
ltWP	Long Term Wood Products	$tCO_2e\ yr^{-1}$	4.1.6	Calculated through conversion factors based on volume of wood harvested.	Not monitored
NBEA	Net Baseline Emissions Avoided	$tCO_2e\ yr^{-1}$	4.1.7	Default factors based on GBE	Not monitored Updated each Baseline Revision
ER	Enhanced Removals	$tCO_2e\ yr^{-1}$	5.1.1	Default values derived from mean sequestration rates for relevant forest types and subsequently derived from project-specific data	Not Monitored Updated each Monitoring Period
TAL	Total Activity Shifting Leakage	$tCO_2e\ yr^{-1}$	5.2.1	Derived from Activity Shifting Leakage Analysis	Monitored Updated each Monitoring Period

8.1.2 Monitored Parameters - Carbon

Monitored data and parameters are summarized in the tables below.

Data Unit / Parameter:	**Eligible Forest Area (Eligible Forest Area)**
Data unit:	Ha
Description:	Forest area included in baseline and project scenario, and area upon which crediting is based (EFA_{LF} &/or EFA_{ULF})
Source of data:	Aerial imagery and Project Boundary Inspection
Description of measurement methods and procedures to be applied:	Aerial imagery (sub-meter accuracy) to define Eligible Forest Area boundary; boundary survey inspections (sub-meter accuracy) using GPS. Measure any reversals occurring in the Eligible Forest Area. Monitored by means of Eligible Forest Boundary Inspections that record any reversal incident occurring within the Eligible Forest Area. The area of any reversal above and beyond the *de minimis* threshold is measured using GPS units set up for sub-meter accuracy and measuring tapes. Area subject to reversal is removed from the Eligible Forest Area until the reversal has recovered the carbon volume lost in the reversal. This is calculated by means of sequestration rates and the estimate of the forest age for the area subject to the reversal. Forest age of the area subject to the reversal is calculated by: • Dendrochronology on stumps in the case of a timber harvest reversal • Dendrochronology on adjacent living trees of equivalent size of burnt stumps
Frequency of monitoring/recording:	Aerial imagery: 5-yearly Eligible Forest Boundary inspections: annually
Value monitored:	Area
Monitoring equipment:	Aerial imagery/satellite data to sub-meter accuracy Hand held GPS unit, photography
QA/QC procedures to be applied:	Maximum periodicity of 5-yearly 3rd party verification of Project Monitoring Reports.
Calculation method:	Subtract reversal area from the Eligible Forest Area and recalculate the Net Carbon Credits by means of the Buffer Account Rules (Section 5.5.2 this document).

Data Unit / Parameter:	**Total Activity Shifting Leakage**
Data unit:	tCO_2e/yr
Description:	Leakage caused by activity shifting
Source of data:	Project Area Inspection (outside Eligible Forest Area)
Description of measurement methods and procedures to be applied:	Site visit of indigenous forest lands owned and controlled by the Project Owner to assess commercial timber harvesting activity in comparison with the Baseline Activity and Project Activity as stated in the PD.

	Where commercial indigenous timber harvesting is occurring on lands owned and controlled by the Project Owner but lying outside the Eligible Forest Area, and where such harvesting has been declared in the PD, the following assessment will be undertaken: • Records of timber harvesting activity are inspected and verified against the timber harvesting plan stated in the PD. • Timber harvesting sites are inspected to verify that they are occurring in the areas specified in the PD. Where commercial indigenous timber harvesting is occurring on lands owned and controlled by the Project Owner but lying outside the Eligible Forest Area, and where such harvesting has not been declared in the PD (i.e. and thereby constitutes Activity Shifting Leakage), the following assessment will be undertaken: • Records of timber harvesting activity are inspected and annual timber harvesting volumes and species are recorded. • Timber harvesting sites are inspected to determine area of harvesting activity. • Calculations are made using the baseline GHG emissions measurement methodology in the Technical Specifications Module 2.1 (C) (AD-DtPF), to determine the volume of Activity Shifting Leakage. • Net Carbon Credits are recalculated to account for Total Activity Shifting Leakage (TAL) • The Project Owner is notified of the consequence of any continuation of Activity Shifting Leakage in terms of the reduction in Net Carbon Credits for the Project. The Project Owner is instructed to terminate Activity Shifting timber harvesting or risk suspension or termination from the Nakau Programme.
Frequency of monitoring/recording:	Annual Leakage Inspection and results incorporated into the annual Project Management Report. 5-yearly 2nd party verification of Project Management Reporting by the Programme Operator.
Value monitored:	$m^3\ yr^{-1}$
Monitoring equipment:	GPS unit, measuring tape, photography
QA/QC procedures to be applied:	Maximum periodicity of 5-yearly 3rd party verification of Project Monitoring Reports.
Calculation method:	Activity Shifting Leakage method specified in Section 5.2.1 of the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815.

8.1.3 Monitoring Roles And Responsibilities - Carbon

Specific project monitoring roles for this project is presented in Table 8.1.3 below:

Table 8.1.3 Project Monitoring Roles/Responsibilities	
Task	Responsibility
Eligible Forest Area Boundary Inspections	Project Owner with assistance from the Project Coordinator where needed
Eligible Forest Area Inspections	Project Owner with assistance from the Project Coordinator where needed
Project Management Reporting	Project Owner with assistance from the Project Coordinator
Aerial imagery/mapping	Project Coordinator
Project Monitoring data management	Project Coordinator

8.1.4 Information Management Systems - Carbon

This project uses the information management system described in Section 7.1 of the Nakau Methodology Framework.

8.1.5 Simplified Project Monitoring Report Methodology - Carbon

This project will submit a simplified Project Monitoring Report for its first verification. The Simplified Project Monitoring Report will fulfil all components of the latest VCS Monitoring Report Template with the exception that Section 3.2 will list the data and parameters monitored but the full monitoring procedures will not be implemented until the second verification. Monitoring activities equivalent to those required in the monitoring were undertaken during project development provided and fulfilled the material requirements of the Monitoring Plan contained in this PD but did not fulfil the procedural requirements. This is because the monitoring plan was being developed towards the end of project development, which coincided with the end of the first monitoring period. At first verification this project will submit the equivalent of a Director's Certificate to assert that the Project Activity has taken place according to the requirements of the Nakau Methodology Framework and the Technical Specification Module applied between the Project Start Date and the end of the first Monitoring Period.

8.1.6 Standard Operating Procedure: Project Monitoring - Carbon

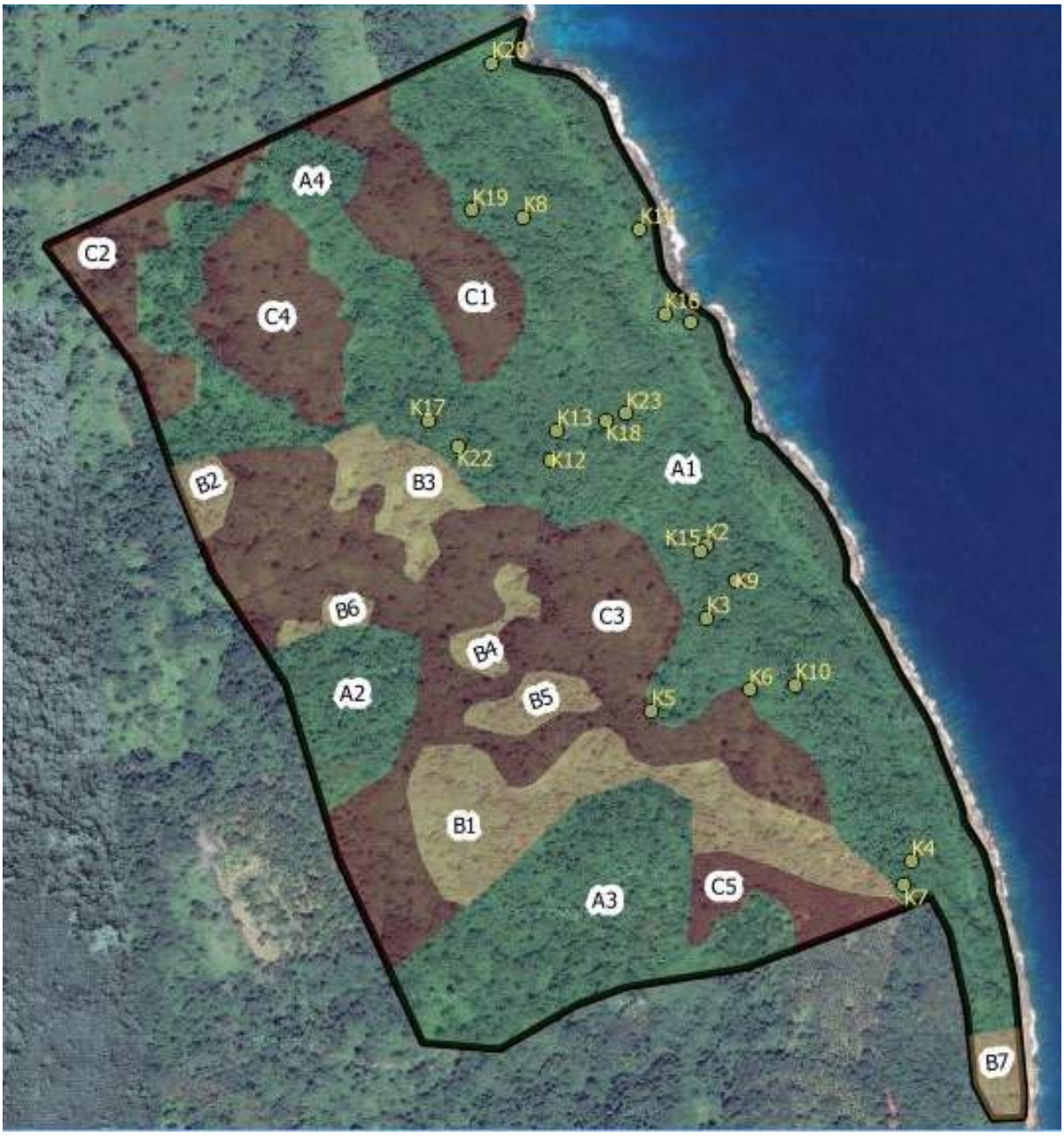
The Standard Operating Procedure (SOP) for Monitoring Carbon benefits is presented below.

Table 8.1.6 Monitoring Schedule - Carbon				
Carbon				
Activity	Frequency	Responsibility	Human Resources	Financial Resources
Eligible Forest Area	6-monthly inspection 3-yearly aerial imagery	Landowner (rangers); Project Coordinator	Rangers employed by the project from the landowner community; Project Coordinator staff	PES unit price accounts for employment of rangers and Project Coordinator staff
Eligible Forest Boundary	6-monthly inspection 3-yearly aerial imagery	Landowner (rangers); Project Coordinator	Rangers employed by the project from the landowner community; Project Coordinator staff	PES unit price accounts for employment of rangers and Project Coordinator staff
De minimis timber harvesting inspections	6-monthly inspection 3-yearly aerial imagery	Landowner (rangers); Project Coordinator	Rangers employed by the project from the landowner community; Project Coordinator staff	PES unit price accounts for employment of rangers and Project Coordinator staff
Activity Shifting Leakage	Annual inspection 3-yearly calculation	Project Coordinator and Landowner	Rangers employed by the project from the landowner community; Project Coordinator staff	PES unit price accounts for employment of rangers and Project Coordinator staff

8.1.6.1 Forest Management Areas

The Forest Management Areas for the Loru Forest Project are presented in Figure 8.1.6.1.

Figure 8.1.6.1 Loru Forest Project management zones and inventory plots



The Eligible Forest Area is restricted to Zone A1-A4. The A1-A4 boundary is delineated by describing a line from the southern most point in Zeon C1 to the nearest point in Zone B3 in Figure 8.1.6.1 above.

8.1.6.2 Eligible Forest Boundary Inspections

Description: The Eligible Forest Area boundary is inspected annually to record the status of this boundary.

Purpose: Monitor and manage any reversals occurring at the boundary.

Method:

Make observations of the Eligible Forest Area boundary during the course of the 6-monthly Eligible Forest Area Inspections. This is conducted during the walking of line transects from one side of an Eligible Forest Area boundary to another, and by viewing the Eligible Forest Area boundary in both directions along the boundary from the point on each transect line as it meets the Eligible Forest Area boundary. If reversals at the Eligible Forest Area boundary are observed at points along the boundary that do not coincide with the line transect then the reversal is recorded using the Eligible Forest Boundary Inspection Template (Appendix 6).

Recurrence: 6-monthly inspections.

Responsibility: Project Owner with supervision support from the Project Coordinator until such time as Project Coordinator supervision support not required (as determined by Project Owner and Project Coordinator by mutual agreement). Project Coordinator to supervise Eligible Forest Boundary Inspection at leas once during each 3-yearly monitoring period.

8.1.6.3 Eligible Forest Area Inspections

Description: Descriptive survey of forest condition within Eligible Forest Area boundary.

Purpose: Monitor any reversals occurring within Eligible Forest Area, and ensure that any timber harvesting lies within the *de minimis* limit imposed by the Technical Specifications Module applied.

Method:

Large Area Transect Method: For each Forest Management Area, permanently mark a Transect Base Point with a boundary peg (this can be a boundary peg used for forest inventory and/or permanent sample plots). Define a Transect Datum Line using a compass bearing and orient the transect datum line along the long axis of the Forest Management Area (see Figure 8.1.6.3). Use the last two digits from random numbers and convert to meters, to select a transect starting point along the Transect Datum Line. Use a compass bearing to mark out parallel transect lines through the Forest Management Area, with transects located between 100m and 500m intervals and orientated perpendicular to the Transect Datum Line.

Medium Area Transect Method: For forest management areas that are too small to undertake two or more transects using the Large Area Transect Method, use the same method as the Large Area Transect Method but select the last single digit from the random numbers to locate the first transect line, and locate the transects between 20m and 100m intervals along the transect datum line.

Small Area Transect Method: For forest management areas less than 100m long, start with the Transect Base Point, then locate a single transect running through the longest axis of the

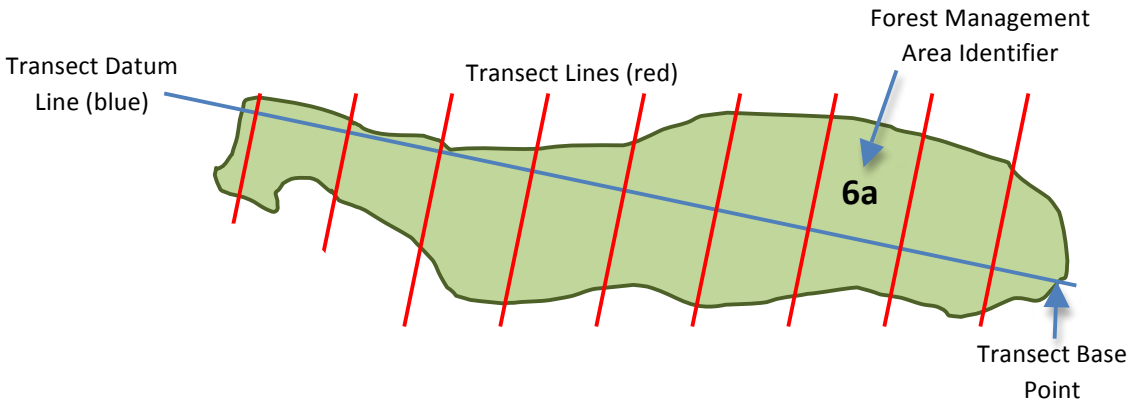
forest patch (and curving the transect where necessary in order to keep the transect within the forest boundary).

Transect Survey Procedure: Walk the full length of each transect line and on the Project Area Inspection Template (Appendix 7) record the following Reversal Events:

a. Evidence of timber harvesting
b. Evidence of fire
c. Evidence of detrimental changes in forest health (e.g. browsing, pest infestation, disease, snow-break, dieback)

For each Reversal Event record the location with a GPS unit and describe the event using the Eligible Forest Area Inspection Checklist. For each timber harvesting Reversal Event record the stump diameter, the species of harvested tree where possible, any evidence of on-site timber processing, log hauling, and collateral damage.

Figure 8.1.6.3 Eligible Forest Area Inspection Transect Location



Recurrence: 6-monthly inspections.

Responsibility: Project Owner with supervision support from the Project Coordinator until such time as Project Coordinator supervision support not required (as determined by Project Owner and Project Coordinator by mutual agreement). Project Coordinator to supervise Eligible Forest Boundary Inspection at leas once during each 3-yearly monitoring period.

Note: Use a different random number to generate the transect starting point along the transect datum line for each subsequent annual monitoring cycle.

8.1.6.4 *De Minimis* Timber Harvest Inspection

De minimis timber harvesting inspections will be undertaken 6-monthly in conjunction with the 6-monthly Eligible Forest Area Inspections described in Section 8.1.6.3.

The *de minimis* timber harvesting volume for the Loru Forest Project is 60m^3 per year. This amounts to <5% of the total allowable annual commercial timber harvest in the Baseline Scenario in the Eligible Forest Area as provided for in the Technical Specifications Module applied.

The project will record *de minimis* timber harvesting events using the template supplied in Appendix 8.

8.1.6.5 Activity Shifting Leakage Inspection

Activity Shifting Leakage Inspections will be undertaken annually in the Loru Forest Project following first verification. These inspections will be undertaken in conjunction with the 6-monthly Eligible Forest Area Inspections described in Section 8.1.6.3.

The project will record Activity Shifting Leakage events using the template supplied in Appendix 9.

8.1.7 Monitoring Resources and Capacity - Carbon

According to Section 5 of the Plan Vivo Standard (2013, p17):

5.9. A monitoring plan must be developed for each project intervention which specifies:
5.9.6. Resources and capacity required

According to the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815:

The Project Monitoring Plan must identify (and provide evidence for) the resources available to undertake monitoring, including:

- *Financial resources and the source of such finance (e.g. unit pricing, grants, fees)*
- *Human resources and capability required.*

The financial and human resources allocated to project monitoring are presented in Table 8.1.6 above.

8.1.8 Community Monitoring - Carbon

According to Section 5 of the Plan Vivo Standard (2013, p17):

5.9. A monitoring plan must be developed for each project intervention which specifies:
5.9.7. How communities will participate in monitoring, e.g. by training community members and gradually delegating monitoring activities over the duration of the project
5.9.8. How results of monitoring will be shared and discussed with participants

5.10. Where participants are involved in monitoring, a system for checking the robustness of monitoring results must be in place, e.g. checking a random sample of monitoring results by the project coordinator.

According to the Technical Specifications Module (C) 2.1 (AD-DtPF): D2.2.1 v1.0, 20150815:

The Project Monitoring Plan must include:

- *A description of how the Project Owner and/or other local people will participate in monitoring in compliance with the Project Participation Protocol specified in Section 3.1 of the PD (applying Section 3.1 of the Nakau Methodology Framework).*
- *A description of how the results of monitoring will be shared and discussed with participants with reference to the Project Monitoring Workshops specified in Section 3.1.7 of the PD (applying Section 3.1.7 of the Nakau Methodology Framework).*
- *A description of the quality controls used to safeguard the integrity and accuracy of data gathered from monitoring activities involving Project Owners and/or other local people.*

Community involvement in monitoring is set out in Table 8.1.6 above.

8.1.8.1 Community Participation In Monitoring

The Project Owner will recruit rangers with responsibilities to undertake project monitoring tasks described in Table 8.1.6. Ser-Thiac Ltd (the landowner community business entity responsible for this project) will be responsible for recruitment and management of rangers for this project. The Project Coordinator will provide supervision and support for ranger activities with this role scaling downwards through time at a rate determined by mutual agreement between the Project Coordinator and Ser-Thiac.

8.1.8.2 Sharing Results of Community Monitoring

Community monitoring outputs are recorded in annual Project Management Reports prepared and approved by Ser-Thiac with the assistance of the Project Coordinator. Project Management Reports are submitted for approval to the Project Coordinator and the Programme Operator on an annual basis. The Project Coordinator collates the content of annual Project Management Reports into three-yearly Project Monitoring Reports. Ser-Thiac and the Project Coordinator approves each Project Monitoring Report before being submitted to the Programme Operator for approval. Once approved by the Programme Operator the Project Monitoring Report is submitted for a verification audit.

8.1.8.3 Quality Controls for Community Monitoring

Quality controls for community monitoring are described in Section 8.1.8.2.

8.2 COMMUNITY IMPACT MONITORING

Carbon offsets are issued to this project as a result of 3rd party verification of each Project Monitoring Report, which contains data sufficient to provide evidence to support a

community impact assertion for the Project Monitoring Period in question. This is a requirement for the carbon offsets to be issued as Plan Vivo Certificates under the Plan Vivo Standard.

8.2.1 Monitored And Non-Monitored Parameters – Community

Monitored and non-monitored community impact data are listed in Table 8.2.1 below.

Table 8.2.1 Monitored and Non-Monitored Parameters – Community Impacts

Notation	Parameter	Unit	Origin	Monitored
FA	Food & Agriculture	Various	Community Impact Survey	Monitored
W	Water accessibility	%	Community Impact Survey	Monitored
H	Household Income	Vatu	Community Impact Survey	Monitored
P	Participation	Number & %	Community Impact Survey	Monitored

8.2.2 Monitored Parameters – Community

Monitored data and parameters are summarized in the tables below.

Data Unit / Parameter:	**Food & Agriculture**
Data unit:	Various
Description:	We want to know: • If the forest products continue to be used indicating the continuation of traditional practices • If access to land for gardens diminishes to a point that it affects access to food • If project owners begin to purchase food more often indicating increased income but also creating possible negative unintended impacts (i.e. health) • If income is still sought through the sale of food and how this income changes over time.
Source of data:	Community Impact Survey
Description of measurement methods and procedures to be applied:	Structured interviews pursuing the following questions: 1.1 How often do you buy food? 1.2 How big is your family garden? 1.3 How often do you eat free food from your garden? 1.4 How often do you run out of food? 1.5 How often do you eat food from the forest? 1.6 How much do you make selling food?
Frequency of monitoring/recording:	3-yearly
Value monitored:	Various
Monitoring equipment:	Social survey equipment
QA/QC procedures to be applied:	3-yearly 3rd party verification of Project Monitoring Reports.
Calculation method:	Compare responses with previous survey

Data Unit / Parameter:	**Water Accessibility**
Data unit:	Various
Description:	Access to water has been a key issue for project owners in Loru. We want to know if improved access to water results from the project. Further, access to water being such a basic need, is another indicator of overall wellbeing. The impact of this on women deserves special attention by interviewers.
Source of data:	Community Impact Survey
Description of measurement methods and procedures to be applied:	Structured interviews pursuing the following questions: 2.1 Do you run out of water? 2.2 Are there days when you can use as much as you like?
Frequency of monitoring/recording:	3-yearly
Value monitored:	Various
Monitoring equipment:	Social survey equipment
QA/QC procedures to be applied:	3-yearly 3rd party verification of Project Monitoring Reports.
Calculation method:	Compare responses with previous survey

Data Unit / Parameter:	**Household Income**
Data unit:	Various
Description:	Increased income can demonstrate increased wellbeing although it can also be damaging. While we measure income over time, we also measure changes in livelihoods or time spent on activities every day such as housework, gardening etc. This will help us to see if project owners have more time to give to non-core activities and therefore, perhaps their lives are made easier by the project. We will also monitor if the money is causing social decay via its use for negative pursuits (i.e. alcohol). Education is also used to determine whether increased income is creating greater wellbeing.
Source of data:	Community Impact Survey
Description of measurement methods and procedures to be applied:	Structured interviews pursuing the following questions: 3.1 Access to Education 3.2 Personal Monthly Income (VUV) 3.3 Travel to town (times per week) 3.4 Hours spent cooking (per day) 3.5 Hours spent Gardening (Per day) 3.6 Hours spent resting
Frequency of monitoring/recording:	3-yearly
Value monitored:	Various
Monitoring equipment:	Social survey equipment
QA/QC procedures to be applied:	3-yearly 3rd party verification of Project Monitoring Reports.
Calculation method:	Compare responses with previous survey

Data Unit / Parameter:	**Project Participation**

Data unit:	Various
Description:	We want to use this monitoring as a chance to assess how well the 'REDD+ Enterprise' (i.e. the cooperative or family business) is doing at engaging the project owners and earning local trust. This indicates resilience and overall wellbeing if the faith in this institution is high.
Source of data:	Community Impact Survey
Description of measurement methods and procedures to be applied:	Structured interviews pursuing the following questions: 4.1 How many youth do you know that are engaged with the REDD+ Enterprise? 4.2 Are you given the opportunity to access information about the REDD+ Enterprise's finances and activities? 4.3 Do you trust the REDD+ Enterprise?
Frequency of monitoring/recording:	3-yearly
Value monitored:	Various
Monitoring equipment:	Social survey equipment
QA/QC procedures to be applied:	3-yearly 3rd party verification of Project Monitoring Reports.
Calculation method:	Compare responses with previous survey

8.2.3 Monitoring Roles And Responsibilities - Community

Community Impact Monitoring surveys are the responsibility of the Project Coordinator. Surveys are to be conducted with the consent of Ser-Thiac.

8.2.4 Information Management Systems - Community

This project uses the information management system described in Section 7.1 of the Nakau Methodology Framework.

8.2.5 Simplified Project Monitoring Report Methodology - Community

This project will submit a simplified Project Monitoring Report for its first verification.

8.2.6 Standard Operating Procedure: Project Monitoring – Community

The Standard Operating Procedure (SOP) for Monitoring Community Impacts is presented below.

Table 8.2.6 Monitoring Schedule – Community Impacts				
Community				
Activity	Frequency	Responsibility	Human Resources	Financial Resources
Food, consumption, agriculture	3-yearly	Project Coordinator	Project Coordinator staff	PES unit price accounts for employment of Project Coordinator staff
Water	3-yearly	Project	Project Coordinator staff	PES unit price accounts for

accessibility		Coordinator		employment of Project Coordinator staff
Household income	3-yearly	Project Coordinator	Project Coordinator staff	PES unit price accounts for employment of Project Coordinator staff
Participation	3-yearly	Project Coordinator	Project Coordinator staff	PES unit price accounts for employment of Project Coordinator staff

8.2.6.1 Baseline Community Impacts

Baseline community impacts were measured during project development and have been measured and presented in Section 5.2.2.3 of the Loru Forest Project PD Part A D3.2a v1.0 20151009.

8.2.6.2 Project Community Impacts

Project community impacts will be measured by means of a 3-yearly community impact survey to quantify change in the community impact indicators described in Section 8.2.2 above.

8.2.6.3 Net Community Impact Enhancements

Tabulation of baseline and project community impacts, and net community impact enhancements will be presented in summary using the following format.

	Baseline community impacts	Project community impacts	Net community impact enhancements
Impact 1			
Impact 2…			

8.3 BIODIVERSITY MONITORING

Carbon offsets are issued to this project as a result of 3rd party verification of each Project Monitoring Report, which contains data sufficient to provide evidence to support a biodiversity impact assertion for the Project Monitoring Period in question. This is a requirement for the carbon offsets to be issued as Plan Vivo Certificates under the Plan Vivo Standard.

8.3.1 Monitored And Non-Monitored Parameters – Biodiversity

Monitored and non-monitored community impact data are listed in Table 8.2.1 below.

Table 8.3.1 Monitored and Non-Monitored Parameters – Biodiversity Impacts				
Notation	Parameter	Unit	Origin	Monitored
SSA	Significant species - Animals	Presence/absence	Biodiversity Survey	Monitored

SSP	Significant species - Plants	Presence/absence	Biodiversity Survey	Monitored

8.3.2 Monitored Parameters – Biodiversity

Monitored data and parameters are summarized in the tables below.

Data Unit / Parameter:	**Significant Species - Animals**
Data unit:	Presence/absence
Description:	
Source of data:	Biodiversity Survey
Description of measurement methods and procedures to be applied:	Record significant species during Eligible Forest Area Inspections.
Frequency of monitoring/recording:	3-yearly
Value monitored:	Presence/absence
Monitoring equipment:	Animal identification table, binoculars, mobile phone, itracker software (or equivalent)
QA/QC procedures to be applied:	3-yearly 3rd party verification of Project Monitoring Reports.
Calculation method:	Compare responses with previous survey

Monitored data and parameters are summarized in the tables below.

Data Unit / Parameter:	**Significant Species - Plants**
Data unit:	Presence/absence
Description:	
Source of data:	Biodiversity Survey
Description of measurement methods and procedures to be applied:	Record significant species during Eligible Forest Area Inspections.
Frequency of monitoring/recording:	3-yearly
Value monitored:	Presence/absence
Monitoring equipment:	Plant identification table, binoculars, mobile phone, itracker software (or equivalent)
QA/QC procedures to be applied:	3-yearly 3rd party verification of Project Monitoring Reports.
Calculation method:	Compare responses with previous survey

8.3.3 Monitoring Roles And Responsibilities - Biodiversity

Biodiversity Monitoring surveys are the responsibility of the Project Owner with support and supervision of the Project Coordinator. Surveys are to be conducted with the consent of Ser-Thiac.

8.3.4 Information Management Systems - Biodiversity

This project uses the information management system described in Section 7.1 of the Nakau Methodology Framework.

8.3.5 Simplified Project Monitoring Report Methodology - Biodiversity

This project will submit a simplified Project Monitoring Report for its first verification.

8.3.6 Standard Operating Procedure: Project Monitoring – Biodiversity

The Standard Operating Procedure (SOP) for Monitoring Biodiversity is presented below.

Table 8.3.6 Monitoring Schedule – Community Impacts				
Community				
Activity	Frequency	Responsibility	Human Resources	Financial Resources
Biodiversity Survey - Animals	3-yearly	Project Owner	Project Rangers	PES unit price accounts for employment of Project Coordinator staff
Biodiversity Survey - Plants	3-yearly	Project Owner	Project Rangers	PES unit price accounts for employment of Project Coordinator staff

8.3.6.1 Baseline Biodiversity Impacts

Baseline biodiversity impacts (i.e. survey of a reference area supporting habitat types in the baseline) have not been measured. A baseline biodiversity survey is optional under the Plan Vivo standard minimum requirements for biodiversity, but it is the aspiration of the Loru Forest Project to undertake a baseline biodiversity survey to enable comparison between baseline and project biodiversity indicators and generate a net biodiversity impact assertion.

8.3.6.2 Project Biodiversity Impacts

Project biodiversity impacts will be measured by means of a 3-yearly biodiversity impact survey to quantify change and/or trends in site biodiversity. The first project biodiversity impact survey was undertaken during project development and have been measured and presented in Section 5.3.1 of the Loru Forest Project PD Part A D3.2a v1.0 20151009.

8.3.6.3 Net Biodiversity Impact Enhancements

Tabulation of baseline and project biodiversity impacts, and net biodiversity impact enhancements will be presented in summary using the following format.

	Baseline community impacts	Project community impacts	Net community impact enhancements
Impact 1			
Impact 2…			

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Appendices

APPENDIX 1: DEFINITIONS

A/R	Afforestation/Reforestation
Activity Type	Specifically defined carbon project activity combining a reference activity and a project activity to generate carbon benefits
Afforestation	Establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest (FAO 2010). See Explanatory Note below.
AFOLU	Agriculture, Forestry and Other Land Uses
Baseline Scenario	Carbon balance arising from baseline (BAU) activities
BAU	Business-as-Usual
Carbon balance	Sum of carbon in a system into account carbon stored in reservoirs, emissions of carbon from sources, and sequestration of carbon into sinks
Carbon benefits	Net CO_2e benefits arising from total net avoided emissions and net enhanced removals
Carbon flux	Movement of carbon through different carbon pools
Carbon pool	Component of the earth system that stores carbon
Carbon reservoir	Carbon pool that stores carbon for long time scales
Carbon sink	Carbon pool that absorbs/sequesters carbon dioxide by transforming gaseous CO_2e into a carbon-based liquid or solid
Carbon source	Carbon pool that emits carbon from a liquid or solid form into a gas
CCB	Climate Community and Biodiversity Standard
CDM	Clean Development Mechanism
CO_2e	Carbon dioxide equivalent: translation of non-CO_2 GHG tonnes into equivalent CO_2tonnes through conversion using global warming potential of non-CO_2 GHG
Compliance Space	What is contained within the GHG accounting boundary of a compliance GHG accounting regime (e.g. Kyoto Protocol, NZ ETS)
COP	Conference of Parties (to the UNFCCC)
CSR	Corporate Social Responsibility
Deforestation	The conversion of forest to other land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold (FAO 2010). See Explanatory Note below.
DOE	Designated Operational Entity
Eligible Area	Subset of Forest Area comprising area of forest eligible for crediting

Enhanced removals	Carbon sequestration assisted by management intervention to a level above what would occur naturally
Ex ante	Before the event (referring to future activities)
Ex post	After the fact (referring to past activities)
Forest Area	Subset of Project Area comprising forest land within Project Area
Forest Degradation	The reduction of the capacity of a forest to provide goods and services.
Forest Land	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use (FAO 2010). See Explanatory Note below.
GHG	Greenhouse Gas
GIS	Geographical Information System
GPG	Good Practice Guidance
HWP	Harvested Wood Products
IFM	Improved Forest Management
IFM-LtPF	Improved forest management – logged to protected forest activity type
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organisation
LULUCF	Land Use, Land Use Change and Forestry
MRV	Measurement/Monitoring Reporting and Verification
Non-Forest Land	All land that is not classified as Forest or Other wooded land (FAO 2010). See Explanatory Notes for 'Other Land' below). Same definition as 'Other Land'.
Operational Forest Area	Term used in sustainable forest management plans delimiting area eligible for timber harvesting
Other Land	All land that is not classified as Forest or Other wooded land (FAO 2010). See Explanatory Notes below). Same definition as 'Non-Forest Land'.
Other Wooded Land	Land not classified as Forest, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use (FAO 2010). See Explanatory Note below.
Participants	The adult land/resource rights holders involved in the project – including, but not limited to the project owner group board/committee members.
PD	Project Description
PDD	Project Design Document (synonymous with PD in this document)
PES	Payment for Ecosystem Services

Project Area	Land ownership boundary within which carbon project will take place
Project Coordinator	The entity assisting the Project Owner to develop and implement the forest carbon project.
Project Governing Board	Subset of the Project Owner community appointed by the Project Owner community to govern the project in the interests of the Project Owner community.
Project Scenario	Carbon balance arising from project activities
Programme Operator	The entity that owns and administers the Nakau Programme. This entity is responsible for safeguarding the integrity of the Nakau Programme and its role is to a) govern the Nakau Programme; b) own the IP associated with Nakau Programme methodologies and protocols; c) be the beneficiary of any covenant on the land title of the Project Owner that protects the forest; d) own the buffer credits of the Nakau Programme; e) administer the buffer account with the registry; and f) act as the guardian of the Nakau Programme.
Project Owner	The owner of the forest and forest carbon rights subject to the project
Project Proponent	The Project Owner and Project Coordinator combined.
Project Scenario	Carbon balance arising from Project activities (carbon project change from BAU)
Protected Forest	Halting or avoiding activities that would reduce carbon stocks and managing a forest to maintain high and/or increasing carbon stocks
RED	Reducing Emissions from Deforestation
REDD	Reducing Emissions from Deforestation and Degradation
Reforestation	Re-establishment of forest through planting and/or deliberate seeding on land classified as forest (FAO 2010). See Explanatory Note below.
REL	Reference Emission Level: rate of GHG emissions under BAU
Removals	Carbon sequestered from the atmosphere into a carbon sink
SFM	Sustainable Forest Management
UNFCCC	United Nations Framework Convention on Climate Change
Validation	Independent audit of Project Description (PD) and/or Methodology
VCS	Verified Carbon Standard
Verification	Independent audit of Project Monitoring Reports

Explanatory Notes

All definitions and explanatory notes relating to forest and non-forest land, afforestation, reforestation, deforestation, forest degradation is taken from the FAO Global Forest Resources Assessment 2010.

Forest Land:

1. Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters in situ.

2. Includes areas with young trees that have not yet reached but which are expected to reach a canopy cover of 10 percent and tree height of 5 meters. It also includes areas that are temporarily unstocked due to clear-cutting as part of a forest management practice or natural disasters, and which are expected to be regenerated within 5 years. Local conditions may, in exceptional cases, justify that a longer time frame is used.

3. Includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific environmental, scientific, historical, cultural or spiritual interest.

4. Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 hectares and width of more than 20 meters.

5. Includes abandoned shifting cultivation land with a regeneration of trees that have, or is expected to reach, a canopy cover of 10 percent and tree height of 5 meters.

6. Includes areas with mangroves in tidal zones, regardless whether this area is classified as land area or not.

7. Includes rubber-wood, cork oak and Christmas tree plantations.

8. Includes areas with bamboo and palms provided that land use, height and canopy cover criteria are met.

9. Excludes tree stands in agricultural production systems, such as fruit tree plantations, oil palm plantations and agroforestry systems when crops are grown under tree cover. Note: Some agroforestry systems such as the "Taungya" system where crops are grown only during the first years of the forest rotation should be classified as forest.

Other Wooded Land

1. The definition above has two options:

- The canopy cover of trees is between 5 and 10 percent; trees should be higher than 5 meters or able to reach 5 meters in situ.
- The canopy cover of trees is less than 5 percent but the combined cover of shrubs, bushes and trees is more than 10 percent. Includes areas of shrubs and bushes where no trees are present.

2. Includes areas with trees that will not reach a height of 5 meters in situ and with a canopy cover of 10 percent or more, e.g. some alpine tree vegetation types, arid zone mangroves, etc.

3. Includes areas with bamboo and palms provided that land use, height and canopy cover criteria are met.

Other Land

1. Includes agricultural land, meadows and pastures, built-up areas, barren land, land under permanent ice, etc.

2. Includes all areas classified under the sub-category “Other land with tree cover”.

Afforestation

1. Implies a transformation of land use from non-forest to forest.

Reforestation

1. Implies no change of land use.

2. Includes planting/seeding of temporarily unstocked forest areas as well as planting/seeding of areas with forest cover.

3. Includes coppice from trees that were originally planted or seeded.

4. Excludes natural regeneration of forest.

Deforestation

1. Deforestation implies the long-term or permanent loss of forest cover and implies transformation into another land use. Such a loss can only be caused and maintained by a continued human-induced or natural perturbation.

2. Deforestation includes areas of forest converted to agriculture, pasture, water reservoirs and urban areas.

3. The term specifically excludes areas where the trees have been removed as a result of harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silvicultural measures. Unless logging is followed by the clearing of the remaining logged-over forest for the introduction of alternative land uses, or the maintenance of the clearings through continued disturbance, forests commonly regenerate, although often to a different, secondary condition.

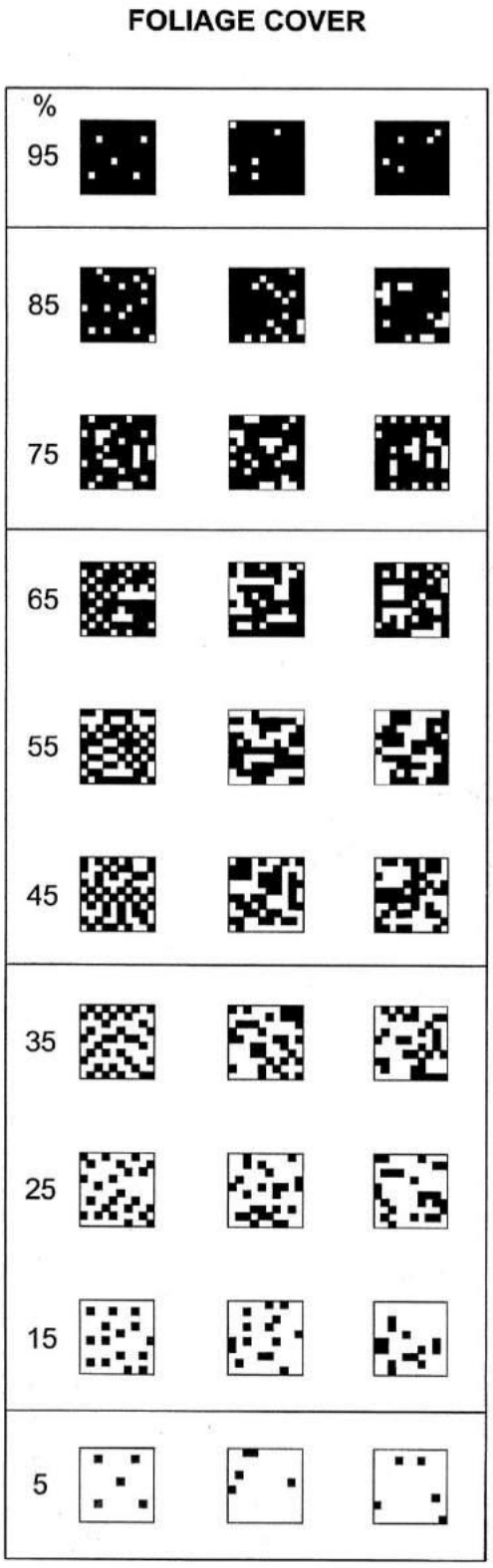
4. In areas of shifting agriculture, forest, forest fallow and agricultural lands appear in a dynamic pattern where deforestation and the return of forest occur frequently in small patches. To simplify reporting of such areas, the net change over a larger area is typically used.

5. Deforestation also includes areas where, for example, the impact of disturbance, over utilization or changing environmental conditions affects the forest to an extent that it cannot sustain a tree cover above the 10 percent threshold.

APPENDIX 2. SITE DESCRIPTION PLOT SHEET

SITE DESCRIPTION PLOT SHEET				
Survey name:				**Date measured:**
Plot identifier:				**Measured by:**
Location:				
Plot layout:				**GPS make & model**
	Bearing	**Slope distance**	**Slope angle**	**Easting:**
A–B				**Southing:**
B–C				**Single/averaged 2D/3D ± m**
C–D				**Datum:**
D–A				
				Location diagram:
Altitude (m)				
Physiography: ridge gully face terrace				
Aspect (0 - 359°)				
Slope (°) concave convex linear				
Average top height (m)				
Canopy Cover (%)				
Cultural: none burnt logged cleared mined grazed tracked				
Subplots outside survey area:				
				Approach notes:
Dominant tree species:				
Other plant species:				
Fauna:				**Notes:**

APPENDIX 3. FOLIAR COVER SCALE



APPENDIX 4. STEM DIAMETER RECORD SHEET

Plot Identifier:	Measured by:
Date:	Recorded by:

Subplot	Tag No.	Local name	Botanical name	Diameter	Notes

APPENDIX 5. LORU CARBON BUDGET & PRICING SPREADSHEET

Supplied separately

APPENDIX 6. ELIGIBLE FOREST BOUNDARY INSPECTION TEMPLATE

Project Boundary Inspection Data Entry Template		
Project Boundary Inspection Key Data		
A	Project Name	
B	Inspection Date	
C	Project Management Report Number	
D	GPS Settings	

Forest Management Area (FMA) Data (repeat for each FMA)					
1	Forest Management Area (FMA)				
2	Transect Base Point (TBP)				
3	Key Identifiers	Select up to 4 landmarks identifiable by aerial imagery as anchor points linking ground based data with aerial imagery data			
		Name/Description		GPS Location	
	Key Identifier 1	E.g. Road Intersection with fence line 20m SW of TBP			
	Key Identifier 2				
	Key Identifier 3				
	Key Identifier 4				
4	Eligible Forest Area Boundary (GPS Readings @ 50m intervals)				
	GPS File number				
	Boundary Survey (record all events and enter additional lines as necessary)				
5	Evidence of Reversal		Description	GPS Location	Photo
	Timber Harvesting	1	Description: Cause: Avoidable/unavoidable: Remedy:		Y/N
		2			Y/N
	Fire	1			Y/N
		2			Y/N
	Forest Health	1			Y/N
		2			Y/N
6	Evidence of Addition		Description	GPS Location	Photo
		1			Y/N
		2			Y/N
7	Notes				

APPENDIX 7. ELIGIBLE FOREST AREA INSPECTION TEMPLATE

Project Area Inspection Data Entry Template		
Project Area Inspection Key Data		
A	Project Name	
B	Inspection Date	
C	Project Management Report Number	
D	GPS Settings	

Forest Management Area (FMA) Data (repeat for each FMA)						
1	Forest Management Area (FMA)					
2	Transect Base Point (TBP)					
3	Transect Method	Large Area		Medium Area		Small Area
4	Transect Datum Line Compass Bearing					
5	Transect Starting Point	Enter last two or last random number digit		Description of how Transect Starting Point was positioned		
6	Sketch of transect location in FMA					
7	Transect Survey (record all events and enter additional lines as necessary)					
	Evidence of Reversal		Description		GPS Location	Photo
	Timber Harvesting	1	Description: Cause: Avoidable/unavoidable: Remedy:			Y/N
		2				Y/N
	Fire	1				Y/N
		2				Y/N
	Cyclone	1				Y/N
		2				Y/N
	Forest Health	1				Y/N
		2				Y/N
	Other	1				Y/N
		2				Y/N
8	Notes					

APPENDIX 8. DE MINIMIS HARVESTING INSPECTION TEMPLATE

Project Area Inspection Data Entry Template		
Project Area Inspection Key Data		
A	Project Name	
B	Inspection Date	
C	Project Management Report Number	
D	GPS Settings	

Forest Management Area (FMA) Data (repeat for each FMA)					
1	Forest Management Area (FMA)				
2	Transect Base Point (TBP)				
3	Transect Method	Large Area	Medium Area	Small Area	
4	Transect Datum Line Compass Bearing				
5	Transect Starting Point	Enter last two or last random number digit	Description of how Transect Starting Point was positioned		
6	Sketch of transect location in FMA				
7	Transect Survey (record all events and enter additional lines as necessary)				
	Evidence of *de minimis* timber harvesting		Description	GPS Location	Photo
	Harvest event	1	Stem Diameter: Species:		Y/N
		2	Stem Diameter: Species:		Y/N
8	Notes				

APPENDIX 9. ACTIVITY SHIFTING INSPECTION TEMPLATE

Project Area Inspection Data Entry Template		
Project Area Inspection Key Data		
A	Project Name	
B	Inspection Date	
C	Project Management Report Number	
D	GPS Settings	

Forest Management Area (FMA) Data (repeat for each FMA)					
1	Forest Management Area (FMA)				
2	Transect Base Point (TBP)				
3	Transect Method	Large Area	Medium Area	Small Area	
4	Transect Datum Line Compass Bearing				
5	Transect Starting Point	Enter last two or last random number digit	Description of how Transect Starting Point was positioned		
6	Sketch of transect location in FMA				
7	Transect Survey (record all events and enter additional lines as necessary)				
	Evidence of Activity Shifting	Description		GPS Location	Photo
	Harvest event	1	Area affected (ha):		Y/N
		2	Area affected (ha):		Y/N
8	Notes				

APPENDIX 10. ADDITIONALITY ASSESSMENT

This project applies the most recent VCS tool for the demonstration of additionality:

> *"Tool for the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities, VT 0001, v3.0"*

PROCEDURE

Project proponent(s) shall apply the following four steps:

(a) STEP 1. Identification of alternative land use scenarios to the AFOLU project activity;

(b) STEP 2. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or

(c) STEP 3. Barriers analysis; and

(d) STEP 4. Common practice analysis.

STEP 1: IDENTIFICATION OF ALTERNATIVE LAND USE SCENARIOS

Sub-step 1a. Identify credible alternative land use scenarios

The VCS AFOLU Additionality Tool requires projects to undertake the following:

(a) Identify realistic and credible land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS. The scenarios should be feasible for the project area taking into account relevant national and/or sectoral policies and circumstances, such as historical land uses, practices and economic trends. The identified land use scenarios shall at least include:

i. Continuation of the pre-project land use;

ii. Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project;

iii. If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- *Legal requirements; or*
- *Extrapolation of observed similar activities in the geographical area with similar socio- economic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.*

Realistic and credible land use scenarios that would have occurred on the land within the Eligible Forest Area in the absence of this project include:

- Copra production
- Cattle grazing
- Cash crop gardening
- Land clearance and increase non-forest land
- Protection of forest but without any monetary benefits (but gain other benefits such as honeybees, tourism)
- Harvesting short-rotation energy crop
- Sustainable harvesting resources for industrial goods and packaging (pulp and paper, particle board)
- Continue logging as a source of income.

These land uses are consistent with local development and land use trends, evidenced by land use activities on neighbouring lands and throughout lowland eastern Santo.

The VCS AFOLU Additionality Tool requires projects to undertake the following:

(b) All identified land use scenarios must be credible. All land-uses within the boundary of the proposed VCS AFOLU project that are currently existing or that existed at some time in the period beginning ten years prior to the project start date but no longer exist, may be deemed realistic and credible. For all other land use scenarios, credibility shall be justified. The justification shall include elements of spatial planning information (if applicable) or legal requirements and may include assessment of economical feasibility of the proposed land use scenario.

Credibility assessment of alternative land use scenarios:

Credibility Assessment of Alternative Land Use Scenarios		
Land use scenario	Credible Y/N	Explanation
Copra production	Y	This is a predominant land use type for this part of Vanuatu, and such land use exists on neighbouring lands, along with supporting markets and infrastructure
Cattle grazing	Y	This is a predominant land use type for this part of Vanuatu, and such land use exists on neighbouring lands, along with supporting markets and infrastructure
Cash crop gardening on cleared land	Y	This is a predominant land use type for this part of Vanuatu, and such land use exists on neighbouring lands, along with supporting markets and infrastructure
Protection of forest but without any monetary benefit (but gain other benefits such as honey, tourism)	N	Tourism was attempted at Loru but did not generate income sufficient to address conservation opportunity costs. Successful tourism also requires a skill set that is beyond the capacity of the Loru landowners. Furthermore, the value of the tourist attraction at Loru cannot compete with other tourism attractions in the vicinity such

		as diving on WWII shipwreck, and bathing at Champaign beach. At best tourism could function as a complementary measure to other land uses capable of meeting the core economic development needs of the landowner community. Honey production is potentially credible land use but would be insufficient in financial scale to address conservation opportunity costs, and cannot compete with economic benefits from deforestation (timber revenue), copra production and cattle grazing for which there is ample supporting infrastructure and markets. As with tourism, honey production could (at best) function as a complementary measure to other land uses capable of meeting the core economic development needs of the landowner community.
Harvesting short rotation energy crop	N	No market or infrastructure exists to support growing and harvesting of short rotation energy crops.
Sustainably harvesting resources for industrial goods (e.g. pulp paper, particle board)	N	No infrastructure exists to support sustainable harvesting of industrial forest products. Also the Loru land area is insufficient to generate an economy of scale sufficient to provide for viability of sustainable harvests of industrial goods.

The VCS AFOLU Additionality Tool requires projects to undertake the following:

(c) Outcome of Sub-step 1a: List of credible alternative land use scenarios that could have occurred on the land within the project boundary of the VCS AFOLU project.

- Copra production
- Cattle grazing
- Cash crop gardening

Sub-step 1b. Consistency of credible land use scenarios with laws and regulations

The VCS AFOLU Additionality Tool requires projects to undertake the following:

(a) Apply the following procedure:

- *i. Demonstrate that all land use scenarios identified in the sub-step 1a: are in compliance with all mandatory applicable legal and regulatory requirements;*
- *ii. If an alternative does not comply with all mandatory applicable legislation and regulations then show that, based on an examination of current practice in the region in which the mandatory law or regulation applies, those applicable mandatory legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread, i.e., prevalent on at least 30% of the area of the smallest administrative unit that encompasses the project area;*
- *iii. Remove from the land use scenarios identified in the sub-step 1a, any land use scenarios which are not in compliance with applicable mandatory laws and regulations unless it can be shown these land use scenarios result from systematic lack of enforcement of applicable laws and regulations.*

NB: This sub-step does not consider laws, statutes, regulatory frameworks or policies implemented since 11 November 2001 that give comparative advantage to less emissions-intensive technologies or activities relative to more emissions-intensive technologies or activities.

This project asserts that the baseline activity is that the Serakar Clan change the land use from forest to non-forest land use. This involves harvesting timber from deforestation activity and using revenue from timber to finance the forest removal and to provide seed capital for agricultural development on the cleared lands. Agricultural development involves conversion of the land to copra, cash cropping and cattle grazing. The Serakar Clan would do this themselves following the way they have converted land historically. No third party develops the land.

The Constitution of Vanuatu assigns the ownership of land and resources to custom landowners (discussed in PIN). Landowners therefore, do not need to seek permission to harvest their own timber or to convert land to agricultural production. No licenses are required if it is the landowner themselves making the changes in land use on their own land.

There is no official planning framework in force on the island of Santo, and as such, there are no legal or planning constraints on landowners to undertake land development activities on their own lands.

The baseline activity does not involve the application of any lease arrangement for timber extraction or agriculture because under the baseline the Serakar Clan would undertake these activities themselves – with no lease requirement. As such, there is no activation of conditions under the Land Leases Act. Any timber harvesting leases and licenses in the baseline would go through the Forestry Act. Part 4 of the Forestry Act (CAP 276) describes the process required for custom landowners should they want a commercial lease on their land for timber harvesting. But this would only be relevant where a third party were

undertaking the logging under a lease arrangement. Nothing in this section of the Forestry Act inhibits the Serakar Clan from pursuing timber harvesting themselves.

Part 5 of the Forestry Act (CAP 276) outlines procedures for licenses to harvest or mill sandalwood (5 years up to 500cubic metres). Again this legislation does not impede the Serakar Clan from pursuing sandalwood harvesting.

Section 6 of the Forestry Act (CAP 276) states that if the Minister's opinion the forest area has particular scientific, cultural or social significance s/he can declare it a 'Conservation Area.' However, Clause 52 of the same Act states that the custom owners can cancel this at any time in writing to the Minister.

There is, as yet, no legislation for Agricultural activity. In 2015 an Agriculture Bill was drafted placing copra as one of the key products for Vanuatu to promote but this bill is yet to be enacted.

The Government of Vanuatu Agriculture Policy promotes copra as a major agricultural product for the country and the government strongly supports copra production.

The VCS AFOLU Additionality Tool requires projects to undertake the following:

(b) Outcome of Sub-step 1b: List of plausible alternative land use scenarios to the VCS AFOLU project activity that are in compliance with mandatory legislation and regulations taking into account their enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

If the list resulting from the Sub-step 1b is empty or contains only one land use scenario, than the proposed VCS AFOLU project activity is not additional.

List of plausible alternative land use scenarios that are in compliance with mandatory legislation and regulations taking into account their enforcement in Vanuatu:

- Copra production
- Cattle grazing
- Cash crop gardening

Sub-step 1c. Selection of the baseline scenario:

According to the VCS AFOLU Additionality Tool:

The baseline methodology that would use this tool shall provide for a stepwise approach justifying the selection and determination of the most plausible baseline scenario.

→ Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis), as it is necessary to undertake at least one of them.

This project elects to undertake a Barrier Analysis and thereby moves directly to Step 3 below.

STEP 2. INVESTMENT ANALYSIS

The VCS AFOLU Additionality Tool requires projects to:

Determine whether the proposed project activity, without the revenue from the sale of GHG credits is economically or financially less attractive than at least one of the other land use scenarios. Investment analysis may be performed as a stand-alone additionality analysis or in connection to the Barrier analysis (Step 3). To conduct the investment analysis, use the following sub-steps.

Sub-step 2a. Determine appropriate analysis method

The VCS AFOLU Additionality Tool requires projects to:

Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b). If the VCS AFOLU project generates no financial or economic benefits other than VCS related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III). Note, that Options I, II and III are mutually exclusive hence, only one of them can be applied.

Sub-step 2b. – Option I. Apply simple cost analysis

The VCS AFOLU Additionality Tool requires projects to:

Document the costs associated with the VCS AFOLU project and demonstrate that the activity produces no financial benefits other than VCS related income.

→ If it is concluded that the proposed VCS AFOLU project produces no financial benefits other than VCS related income then proceed to Step 4 (Common practice analysis).

Sub-step 2b. – Option II. Apply investment comparison analysis

The VCS AFOLU Additionality Tool requires projects to:

Identify the financial indicator, such as IRR (investment rate of return), NPV (net present value), payback period, cost benefit ratio most suitable for the project type and decision-making context.

Sub-step 2b – Option III. Apply benchmark analysis

The VCS AFOLU Additionality Tool requires projects to:

Identify the financial indicator, such as IRR, NPV, payback period, cost benefit ratio, or other (e.g. required rate of return (RRR) related to investments in agriculture or forestry, bank deposit interest rate corrected for risk inherent to the project or the opportunity costs of land, such as any expected income from land speculation) most suitable for the project type and decision context. Identify the relevant benchmark value, such as the required rate of return (RRR) on equity. The benchmark is to represent standard returns in the market, considering the specific risk of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer. Benchmarks can be derived from:

(a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert;

(b) Estimates of the cost of financing and required return on capital (e.g., commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds¨ required return on comparable projects;

(c) A company internal benchmark (weighted average capital cost of the company) if there is only one potential project developer (e.g., when the proposed project land is owned or otherwise controlled by a single entity, physical person or a company, who is also the project developer). The project developers shall demonstrate that this benchmark has been consistently used in the past, i.e., that project activities under similar conditions developed by the same company used the same benchmark.

Sub-step 2c. Calculation and comparison of financial indicators

According to the VCS AFOLU Additionality Tool those projects electing Options II and III are required to calculate and compare financial indicators as follows:

(a) Calculate the suitable financial indicator for the proposed VCS AFOLU project without the financial benefits from the VCS and, in the case of Option II above, for the other land use scenarios. Include all relevant costs (including, for example, the investment cost, the operations and maintenance costs), and revenues (excluding GHG credit revenues, but including subsidies/fiscal incentives where applicable), and, as appropriate, non-market cost and benefits in the case of public investors.

(b) Present the investment analysis in a transparent manner and provide all the relevant assumptions in the VCS AFOLU project description, so that a reader can reproduce the analysis and obtain the same results. Clearly present critical economic parameters and assumptions (such as capital costs, lifetimes, and discount rate or cost of capital). Justify and/or cite assumptions in a manner that can be validated. In calculating the financial indicator, the project's risks can be included through the cash flow pattern, subject to project-specific expectations and assumptions (e.g. insurance premiums can be used in the calculation to reflect specific risk equivalents).

(c) Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated.

(d) Present in the VCS AFOLU project description submitted for validation a clear comparison of the financial indicator for the proposed VCS AFOLU project without the financial benefits from the VCS and:

- *i. Option II (investment comparison analysis): If one of the other land use scenarios has the better indicator (e.g. higher IRR), then the VCS AFOLU project cannot be considered as the financially attractive; or*
- *ii. Option III (benchmark analysis): If the VCS AFOLU project has a less favorable indicator (e.g., lower IRR) than the benchmark, then the VCS AFOLU project cannot be considered as financially attractive.*

→ If it is concluded that the proposed VCS AFOLU project without the financial benefits from the VCS is not financially most attractive then proceed to Step 2d (Sensitivity Analysis).

Sub-step 2d. Sensitivity analysis

According to the VCS AFOLU Additionality Tool those projects electing Options II and III are required to undertake a sensitivity analysis as follows:

Include a sensitivity analysis that shows whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the proposed VCS AFOLU project without the financial benefits from the VCS is unlikely to be financially attractive.

(a) If after the sensitivity analysis it is concluded that the proposed VCS AFOLU project without the financial benefits from the VCS is unlikely to be financially most attractive (Option II and Option III), then proceed directly to Step 4 (Common practice analysis).

(b) If after the sensitivity analysis it is concluded that the proposed VCS AFOLU project is likely to be financially most attractive (Option II and Option III), then the project activity cannot be considered additional by means of financial analysis. Optionally proceed to Step 3 (Barrier analysis) to prove that the proposed project activity faces barriers that do not prevent the baseline land use scenario(s) from occurring. If the Step 3 (Barrier analysis) is not employed then the project activity cannot be considered additional.

STEP 3. BARRIER ANALYSIS

According to the VCS AFOLU Additionality Tool projects can elect to undertake a barrier analysis instead of or as an extension of investment analysis:

If this step is used, determine whether the proposed project activity faces barriers that:

(a) Prevent the implementation of this type of proposed project activity without the revenue from the sale of GHG credits; and

(b) Do not prevent the implantation of at least one of the alternative land use scenarios.

The most plausible baseline scenario for this project is a combination of copra production cattle grazing and cash crop gardening following the deforestation of the forest in question. This would be combined with the retention of a small percentage of indigenous forest in areas not suitable to these agricultural activities due to steepness of land and the likelihood of small patches of remnant forest in areas not used directly for agriculture. An example of this pattern of forest/non-forest land use can be seen in the area immediately surrounding the Project Area (see Figure 2.4.3 of the Loru PD Part A D3.2a v1.0 20151009).

Sub-step 3a. Barriers that would prevent the proposed project activity

When undertaking a Barrier Analysis the VCS AFOLU Additionality Tool requires projects to:

(a) Establish that there are barriers that would prevent the implementation of the type of proposed project activity from being carried out if the project activity was not registered as a VCS AFOLU project. The barriers should not be specific to the project or the project proponent(s). Such barriers may include, among others:

(b) Investment barriers, other than the economic/financial barriers in Step 2 above, inter alia:
- *i. For AFOLU project activities undertaken and operated by private entities: Similar activities have only been implemented with grants or other non-commercial finance terms. In this context similar activities are defined as activities of a similar scale that take place in a comparable environment with respect to regulatory framework and are undertaken in the relevant geographical area;*
- *ii. Debt funding is not available for this type of project activity;*
- *iii. No access to international capital markets due to real or perceived risks associated with domestic or foreign direct investment in the country where the project activity is to be implemented, as demonstrated by the credit rating of the country or other country investment reports of reputed origin;*
- *iv. Lack of access to credit.*

(c) Institutional barriers, inter alia:
- *i. Risk related to changes in government policies or laws;*
- *ii. Lack of enforcement of forest or land-use-related legislation.*

(d) Technological barriers, inter alia:
- *i. Lack of access to planting materials;*
- *ii. Lack of equipment and/or infrastructure for implementation of the technology.*

(e) Barriers related to local tradition, inter alia:
- *i. Traditional knowledge or lack thereof, laws and customs, market conditions, practices;*
- *ii. Traditional equipment and technology.*

(f) Barriers due to prevailing practice, inter alia:
- *i. The project activity is the "first of its kind": No project activity of this type is currently operational in the host country or region.*

(g) Barriers due to local ecological conditions, inter alia:
- *i. Degraded soil (e.g. water/wind erosion, salination, etc.);*
- *ii. Catastrophic natural and / or human-induced events (e.g. landslides, fire, etc);*
- *iii. Unfavorable meteorological conditions (e.g. early/late frost, drought);*
- *iv. Pervasive opportunistic species preventing regeneration of trees (e.g. grasses, weeds);*
- *v. Unfavorable course of ecological succession;*
- *vi. Biotic pressure in terms of grazing, fodder collection, etc.*

(h) Barriers due to social conditions and land-use practices, inter alia:
- *i. Demographic pressure on the land (e.g. increased demand on land due to population*
- *ii. growth);*
- *iii. Social conflict among interest groups in the region where the project takes place;*
- *iv. Widespread illegal practices (e.g. illegal grazing, non-timber product extraction and tree felling);*

v. Shortage of available labor to undertake the AFOLU activity;
vi. Lack of skilled and/or properly trained labor force;

(i) Lack of organization of local communities;

(j) Barriers relating to land tenure, ownership, inheritance, and property rights, inter alia:
i. Communal land ownership with a hierarchy of rights for different stakeholders limits the incentives to undertake the AFOLU activity;
ii. Lack of suitable land tenure legislation and regulation to support the security of tenure;
iii. Absence of clearly defined and regulated property rights in relation to natural resource products and services;
iv. Formal and informal tenure systems that increase the risks of fragmentation of land holdings;
v. Barriers relating to markets, transport and storage;
vi. Unregulated and informal markets for products and services related to the project activity prevent the transmission of effective information to project proponent(s);
vii. Remoteness of AFOLU activities and undeveloped road and infrastructure incur large transportation expenditures, thus eroding the competitiveness and profitability of timber and non-timber products from the VCS AFOLU project activity;
viii. Possibilities of large price risk due to the fluctuations in the prices of products related to the project activity over the project period in the absence of efficient markets and insurance mechanisms;
ix. Absence of facilities to convert, store and add value to production from VCS activities limits the possibilities to capture rents from the land use under the VCS AFOLU project activity.

(k) The identified barriers are only sufficient grounds for demonstration of additionality if they would prevent potential project proponent(s) from carrying out the proposed project activity if it was not expected to be registered as a VCS AFOLU project.

(l) Provide transparent and documented evidence, and offer conservative interpretations of this documented evidence, as to how it demonstrates the existence and significance of the identified barriers. Anecdotal evidence can be included, but alone is not sufficient proof of barriers. The type of evidence to be provided may include:
i. Relevant legislation, regulatory information or environmental/natural resource management norms, acts or rules;
ii. Relevant (sectoral) studies or surveys (e.g. market surveys, technology studies, etc) undertaken by universities, research institutions, NGOs, associations, companies, bilateral/ multilateral institutions, etc;
iii. Relevant statistical data from national or international statistics;
iv. Documentation of relevant market data (e.g. market prices, tariffs, rules);
v. Written documentation from the company or institution developing or implementing the VCS AFOLU project activity or the VCS AFOLU project developer, such as minutes from Board meetings, correspondence, feasibility studies, financial or budgetary information, etc;
vi. Documents prepared by the project developer, contractors or project partners in the context of the proposed project activity or similar previous project implementations;
vii. Written documentation of independent expert judgments from AFOLU related Government/ Non-Government bodies or individual experts, educational institutions (e.g. universities, technical schools, training centers), professional associations and others.

The Serakar Clan have basic socio-economic needs and aspirations relating to local community infrastructure establishment and/or enhancement. Infrastructure in need of establishment and/or enhancement in the Serakar Clan village at Loru include access to sanitation, piped water, electricity, housing, transportation, and health care for current and future generations of Clan members. The Serakar Clan also aspires to gaining access to employment for household cashflows to raise the standard of living for individual families in this community. Local demand for land available for agriculture was also caused by degradation of existing arable land and population growth. According to the 2009 National Census the population growth rate for Sanma Province (Santo) is 2.4 (above the national average of 2.3). This growth rate trend will continue to put pressure on arable lands in the absence of counter-measures capable of delivering economic development capable of supporting this growing population without having to clear indigenous forest for agricultural production.

As people move into higher age classes at Loru (and elsewhere in Vanuatu) they will normally be awarded new gardening lands to support their growing families. In the absence of measures to address conservation opportunity costs, the continued informal protection of the indigenous forest at Loru is under threat.

In contrast, neighbouring communities that have cleared their indigenous forest and implemented agricultural production systems on their lands have increased their access to such economic development in the form of community infrastructure, employment and income. The on-going economic development opportunities associated with copra production, cattle grazing and cash cropping has benefited communities that have elected to undertake agricultural production on their lands.

The Serakar Clan wanted to protect their indigenous forest for the non-economic benefit of the local community and also to provide benefits (e.g. biodiversity) to the wider national and international community. But the protection of their indigenous forest became a direct barrier to gaining access to tangible community economic development as described above. This community made an attempt to gain income from tourism but this produced negligible results.

As a result, the informal protection of their indigenous forest (which they had attempted to sustain for several years prior to this project) became less and less attractive to landowners who recognized the barrier this forest posed to their access to basic economic development enjoyed by neighbouring communities. This is also set against a backdrop of national level promotion of agricultural production by the Government of Vanuatu through the government's Agriculture Policy.

There is one other Community Conservation Area on Santo, located at Vathe (Big Bay) in northern Santo. This CCA is running into difficulties because landowners are not seeing tangible socio-economic benefits arising from forest conservation and the project there has not delivered on the conservation opportunity costs. The easiest way for Vathe landowners to gain access to economic development is through copra production and cash cropping.

Sub-step 3b. Barriers not preventing alternative land use scenarios

According to the VCS AFOLU Additionality Tool projects undertaking a Barrier Analysis are required to undertake the following:

If the identified barriers also affect other land use scenarios, explain how they are affected less strongly than they affect the proposed VCS AFOLU project activity. In other words, explain how the identified barriers are not preventing the implementation of at least one of the alternative land use scenarios. Any land use scenario that would be prevented by the barriers identified in Sub-step 3a is not a viable alternative, and shall be eliminated from consideration. At least one viable land use scenario shall be identified.

(a) If both Sub-steps 3a – 3b are satisfied, then proceed directly to Step 4 (Common practice analysis).

(b) If one of the Sub-steps 3a – 3b is not satisfied then the project activity cannot be considered additional by means of barrier analysis. Optionally proceed to Step 2 (Investment analysis) to prove that the proposed VCS AFOLU project activity without the financial benefits from the VCS is unlikely to produce economic benefit (Option I) or to be financially attractive (Option II and Option III). If the Step 2 (Investment analysis) is not employed then the project activity cannot be considered additional.

The barrier to a project to permanently protect the indigenous forest at Loru is the inability of a protected forest to cater to the reasonable (and very basic) socio-economic development needs and aspirations of the local community, now and into the future. This barrier to rainforest protection is not a barrier to the implementation of the alternative land use scenarios identified in the baseline: copra production, cattle grazing and cash cropping. The alternative land use scenarios mentioned here directly overcome the barrier to economic development posed by the long-term protection of the indigenous forest.

STEP 4. COMMON PRACTICE ANALYSIS

According to the VCS AFOLU Additionality Tool:

The previous steps shall be complemented with an analysis of the extent to which similar activities have already diffused in the geographical area of the proposed VCS AFOLU project activity. This test is a credibility check to demonstrate additionality that complements the barrier analysis (Step 3) and the investment analysis (Step 2).

Provide an analysis to which extent similar activities to the one proposed as the VCS AFOLU project activity have been implemented previously or are currently underway. Similar activities are defined as that which are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the relevant geographical area, subject to further guidance by the underlying methodology. Other registered VCS AFOLU project activities shall not be included in this analysis. Provide documented evidence and, where relevant, quantitative information. Considerations shall be limited to the period beginning 10 years prior to the project start date.

If activities similar to the proposed VCS AFOLU project activity are identified, then compare the proposed project activity to the other similar activities and assess whether there are essential distinctions between them. Essential distinctions may include a fundamental and verifiable change in circumstances under which the proposed VCS AFOLU project activity will be implemented when

compared to circumstances under which similar activities were carried out. For example, barriers may exist, or promotional policies may have ended. If certain benefits rendered the similar activities financially attractive (e.g., subsidies or other financial flows), explain why the proposed VCS AFOLU project activity cannot use the benefits. If applicable, explain why the similar activities did not face barriers to which the proposed VCS AFOLU project activity is subject.

→ If Step 4 is satisfied, i.e. similar activities can be observed and essential distinctions between the proposed VCS AFOLU project activity and similar activities cannot be made, then the proposed VCS AFOLU project activity cannot be considered additional. Otherwise, the proposed VCS AFOLU project activity is not the baseline scenario and, hence, it is additional.

The baseline activity of a combination of copra production, cattle grazing, and cash cropping is the predominant land use activity in all neighbouring lands, in the region of eastern Santo and also the predominant land use for village based economic development throughout Vanuatu.

The project activity is the first of its kind in Vanuatu and so there is no opportunity to compare it with similar activities that have already diffused in the geographical area of the proposed project.