Validation Report

Version 1.2

08-May-2023

Document Prepared by AENOR INTERNACIONAL S.A.U.

Forest Carbon Partnership Facility (FCPF)

Carbon Fund

Validation Report (VAR)

ER Program Name and Country:	Emission Reduction Program in Atiala Atsinanana (ERP-AA), Republic of Madagascar
Crediting Period	22-03-2020 to 31-12-2024
Name of the VVB:	AENOR INTERNACIONAL S.A.U.
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Date of the Validation Report:	08-05-2023
Version:	1.2
Report Approved by	José Luis Fuentes

1. VALIDATION STATEMENT

The review and cross-check of explanations and justifications included in the Monitoring Report Version 5.1 dated on 17-06-2022 and supporting documents, have provided AENOR with sufficient evidence to determine with a reasonable level of assurance the compliance of the Emission Reduction Program in Atiala Atsinanana (ERP-AA), Republic of Madagascar, with the applicable validation with extend scope criteria and materiality set out in the Forest Carbon Partnership Facility (FCPF) requirements.

The scope covered by the validation with extended scopes includes the ER Program´s crediting period (22-03-2020 to 31-12-2024), the selected Reference Period (01-01-2006 to 31-12-2015), the accounting area (6,980,308 ha), the REDD Country Participant's Forest Monitoring System, the national REDD+ Programs and Projects Data Management System and the following GHG sources and sinks (REDD+ activities), carbon pools and type of GHGs:

GHG sources and sinks (REDD+ activities)
Emissions from deforestation – Included Emissions from forest degradation – Included Removal as a result of improved carbon stocks – Included Emissions and removals from carbon stock conservation – Excluded Emissions and removals from sustainable forest management - Excluded
Carbon pools
Above-Ground biomass (AGB) – Included Below-Ground biomass (BGM) – Included Dead wood – Included Litter – Included Soil Organic Carbon (SOC) – Included
GHG
CO_2 – Included CH_4 – Included N_2O – Included

The validation with extended scope was performed through a combination of document review, interviews and communications with relevant staff. Findings were issued, requesting: MAJOR Corrective Action Request (MCAR); MINOR Corrective Action Request (mCAR); and Observations (OBS) according to the FCPF validation and verification guidelines (VVG) v2.4 section 11, to ensure compliance with all requirements.

A total of 15 MCAR, 7 mCAR and 2 Observations were raised as part of the validation with extended scope process. All MCAR, mCAR and OBS were successfully addressed by the ER Program and closed by the VVB and no findings remained open. The findings are reported in the appendix 1 of this report.

Regarding the reference Level, it is AENOR´s opinion that the ER program of Atiala Atsinanana within the Republic of Madagascar meets the applicable validation criteria set out in the FCPF requirements, and that it is free of material misstatements. Hence, AENOR recommends the FCPF Carbon Fund to continue with the relevant subsequent steps to proceed with the verification of the FCPF ERs.

Statement issuing date: 08-May-2023

Intended User: World Bank Group, FCPF Carbon Fund Participants

Carlos Jiménez Barrios
Team Leader

José Luis Fuentes
Climate Change Manager

2. Agreement

2.1 Level of Assurance

The validation with extended scope audit assessment was conducted to provide a reasonable level of assurance concerning material misstatements, errors, or omissions in conformance with the validation criteria and scope set out in the FCPF requirements, in conformance with paragraph 31 of the VVG v2.4. The provisions undertaken to ensure such a reasonable level of assurance included a risk assessment of the sources and the magnitude of potential errors, omissions, and misstatements, as required by section 4.4.1 of ISO 14064-3:2006, previous to the elaboration of a sampling/evidence-gathering plan.

Based on the previous provisions and considering the findings raised during the audit, a positive evaluation statement reasonably ensures that the FCPF Program Reference Level is materially correct and is a fair representation of the GHG data and information provided in the ER Monitoring Report and supporting documents.

2.2 Objectives

The objective of audit was to conduct a systematic, independent, and documented process for the evaluation of the GHG assertion made by the Emission Reduction Program in Atiala Atsinanana (ERP-AA), Republic of Madagascar, against the FCPF criteria applicable to validation with extended scope to determine if the Program is in compliance to the agreed criteria, and its implementation can be expected to result in the proposed GHG reductions and removal enhancements as described in the ER Monitoring Report and its Annex 4.

The general objectives of the validation, as required by paragraph 32 of the VVG v2.4, were:

- Review of the ER Monitoring Report and supporting information to confirm the correctness of presented information;
- Identify if the methodological steps and data are publicly available in accordance with applicable criteria;
- Assess whether the start date of the crediting period proposed by the ER Program is in compliance with the definition provided in the FCPF Glossary of terms;
- Assess the extent to which the Reference Level has been reported with a transparent and coherent step-by-step process that enables reconstruction and have meet the requirements of applicable criteria;
- Assess the extent to which the Reference Level is materially accurate;
- Identify sources of uncertainty due to both random and systematic errors related with the Reference Level setting and determine whether the ER Program has conducted the uncertainty analysis in compliance applicable criteria;
- Assess the National Forest Monitoring System (NFMS) of the ER Program and validate that there are controls for sources of potential errors, omissions, and misstatements in place;
- Identify components of the NFMS that require attention and/or adjustment in future monitoring and reporting or identify areas of risk of future non-compliance.

The specific objectives of the validation with extended scope, as required by paragraph 33 of the VVG v2.4, were:

- Determine that the ER Program's scope in terms of sources, sinks and carbon pools is in accordance with the applicable validation criteria;
- Assess whether the ER Program's methods are in accordance with applicable validation criteria as the latest IPCC Guidelines;
- Assess if the Reference level is in accordance with applicable validation criteria.

2.3 Criteria

The audit assessment was carried against the criteria set for validation with extended scope by the following documents:

- FCPF Methodological Framework, v3, April 2020.
- Validation and Verification Guidelines v2.4 August 2021.
- Buffer Guidelines v3.1 May 2022.
- Guidelines on the application of the Methodological Framework.
  1. Use of Interpolation of Data in Relation to the Reference Period of an ER Program v1 June 2016.
  2. Technical Corrections to GHG Emissions and Removals Reported in the Reference Period v2 November 2020.
  3. The Definition of Reporting Periods of Emission Reduction Programs v1 November 2018.
  4. Uncertainty Analysis of Emission Reductions v1.0 November 2020.
- Process Guidelines v5.2 August 2021.
- Glossary of Terms v2.2 May, 2022.
- Guidelines contained in the ER Monitoring Report Template (v2.4), the Validation Report Template (v1.2, September 2021) and the Verification Report Template (v1.3, August 2022);
- ISO 14064-3:2006
- ISO 14065:2013
- ISO 14066:2011

The following documents will be considered as documents that provide acceptable methods for satisfying requirements provided in the above criteria, as per VVG paragraph 38:

- 2006 IPCC Guidelines;
- 2013 IPCC Wetlands Supplement;
- 2019 refinement to the 2006 IPCC Guidelines;
- GFOI 2016 Methods and Guidance Document;
- FCPF Guidance Notes.

Specifically, the following criteria and indicators of the MF were applicable to the validation with extended scope, as per paragraph 37 of the VVG 2.4:

Criteria/indicator	Topic
3	Scope and methods
4	Carbon pools and GHG
5	IPCC guidelines
6	Data availability
7, 8, 9.1	Identification and address source(s) of uncertainty
10 to 13	Reference level
14.2, 14.3	Robust Forest Monitoring system
15	National Forest Monitoring System
16	Community participation in Monitoring and Reporting

2.4 Scope

The scope of validation included as per section 8.4 of the VVG v.2.4:

- The Crediting Period of the FCPF program applicable to the ER Program;
- The selected Reference Period
- The ER Program Accounting Area as defined in the ER Program's Final ER Program Document (ER-PD);

- The GHG sources and sinks associated with any of the REDD+ Activities accounted for as required by the Methodological Framework;
- The Carbon Pools and greenhouse gases to be accounted for as required by the Methodological Framework;
- The REDD Country Participant's Forest Monitoring System as described in the ER Monitoring Report;
- The national REDD+ Program and Projects Data Management System (DMS) as described in the Monitoring Report.

2.5 Materiality

The materiality threshold of the validation, as required section 8.5 of the VVG v2.4, was:

- Quantitative: the threshold for materiality with respect to the aggregate of errors, omissions, and misrepresentations relative to the total reported GHG emission and removals was one percent (1%). (Under-estimation of the Reference Level was not considered a material discrepancy).
- Qualitative: any issue related to management system and controls, poorly managed documentation, and non-compliance with the applicable requirements of the MF and other applicable criteria; and any errors in reporting of factual information in the ER Monitoring Report as required by the FCPF MF.

The validation process based on the desk review and remote audit found that there are not quantitative and or qualitative material discrepancies affecting the Reference Level and the Reference Level setting.

3. METHODOLOGY AND PLANNING

3.1 Validation Team

Name	Role	Activities

		Desk review	Site visit	Reporting	Supervision	Technical review
Carlos Jiménez	Team Leader	X		X	X	
Javier Cócera	Validator/verifier auditor	X		X		
Pablo Domínguez	Validator/verifier auditor	X		X		
Elena Llorente	Validator/verifier auditor	X		X		
José Luis Fuentes	Reviewer				X	X
Daniel Bermejo	Auditor in trainee	X		X		
Adrián Vidal	Auditor in trainee	X		X		
Aro Ratovonomenjanahary	Local expert		X			

3.2 Validation schedule

Tasks	Deliverable	Date	Responsible
1. Kick off meeting	Minute	06/10/2022	All parties
2. Desk review of documents	Preliminary findings (if required)	-	AENOR
3.1. Draft sampling plan	Sampling plan draft	27/10/2022	AENOR
3.2. Sampling plan	Sampling plan	03/11/2022	AENOR
4.1. Draft Audit plan	Audit plan draft	10/11/2022	AENOR
4.2. Audit plan	Audit plan	24/11/2022	AENOR
5. Country visit	-	15/12/2022	AENOR/ Country participant
6. 1st round of findings	1st round of findings	30/12/2022	AENOR
7. Answer to findings	Answer to findings	06/02/2023	Country participant
8. Review of findings and potential 2nd round of findings (if required)	2nd round of findings (if required)	22/02/2023	AENOR
9. Answer to the 2nd round of findings (if required)	Answer to findings	27/03/2023	Country participant
10. Review of answers		05/04/2023	AENOR
11. Draft reports	Validation and verification draft reports	19/04/2023	AENOR
12. Provide opportunity to REDD Country and FMT to comment draft reports	Comments to draft reports (if required)	26/04/2023	Country participant/ FMT

13. Final validation report and final verification report with statements. AENOR technical review	Final validation and verification reports	03/05/2023	AENOR

3.3 Methodology description

The validation with extended scope was performed simultaneously with the first verification, through a combination of document review, interviews, and communications with relevant personnel. The conformity was evaluated against the criteria described in section 2.3.

A sampling/evidence-gathering plan was developed for the validation with extended scope and first verification of the ER Program, as required by section 9.4 of the VVG v2.4. A risk assessment of the sources and the magnitude of potential errors, omissions, and misstatements was carried out, as required by section 4.4.1 of ISO 14064-3:2006, previous to the elaboration of the sampling/evidence-gathering plan. The sampling/evidence-gathering plan was developed considering all the criteria set by section 4.4.3 of ISO 14064-3:2006:

a) Agreed level of assurance;

b) validation and verification scope;

c) validation and verification criteria;

d) amount and type of evidence (qualitative and quantitative) necessary to achieve the agreed level of assurance;

e) methodologies for determining representative samples; and

f) risk of potential errors, omissions, or misstatements.

All evidence requested and reviewed was crosschecked in order to evaluate the consistency of information in the ER Monitoring Report. All statements, claims and procedures described within the scope of the validation included in the ER Monitoring Report were part of the assessment of the sampling/evidence-gathering plan and all the reviewed supporting evidence were evaluated against the ER Monitoring Report.

The magnitude of the sampling was based on the previous experience of AENOR as VVB and ensure the achievement of reasonable level of assurance. The sampling/evidence-gathering plan was open to be modified based on any new risks or materiality concerns that could potentially lead to errors, omissions or misstatements identified during the validation process.

The validation team carried out a deep and meticulous review of the calculation spreadsheets to verify the correct application of the used methodology (formulae, equations) and checked that data required to calculate the GHG emission was appropriately provided.

All documentation provided by the Country Participant was assessed against the applicable criteria described in section 2.3. Several MCAR, mCAR and OBS were raised and submitted to the Country Participant to ensure compliance with all requirements, which addressed them either by providing to the validation team with the requested information or by making the appropriate corrections. Updated versions of the documentation were submitted by the Country Participant and the validation team reassessed them against the guidance documentation. This process was repeated iteratively until all MCAR were fully closed.

All findings, 15 MCAR, 7 mCAR and 2 OBS, issued by AENOR's audit team during the validation process have been closed. The findings issued during the validation process and the inputs for their closure are described in Appendix 1 of this report.

3.4 Review of documentation

A detailed review of all documentation was conducted to ensure consistency with and identify any deviation from FCPF requirements. Initial review focused on the ER Monitoring Report and included an examination of the Annex 4. Specially, in relation to the carbon pools, sources and sinks included within the scope of the ER Program, the methodological approach for the determination of the Reference Level, its alignment with IPPC guidelines, the data and parameters used for calculations, the estimated uncertainty, and the design of the NFMS.

In addition to the ER Monitoring Report, all documentation cited in it was downloaded and reviewed in order to verify its public accessibility and to crosschecked with the statements made in the ER Monitoring Report. These documents include, among others, calculation spreadsheets used for the determination of emission factors (EF) and estimation of the Reference Level, GIS data (satellite images and remote sensing analysis) used for determination of activity data (AD), and additional documents related to monitoring procedures, literature sources of parameters, etc.

As result of the desk review of documents and interviews, the validation team required additional documentation to the Country Participant to verify certain statements or have further clarification regarding GHG assertions, data and parameters used or employed procedures. All the additional documents requested were added to the later versions of the ER Monitoring Report, as required by criterion 6 of the MF.

For a listing of all documents provided by the Country Participant and review for the validation, see Appendix 2.

AENOR confirms that sufficient evidence was presented for all GHG assertions and that there is a clear audit trail that contains the evidence and records that validate the stated figures in this validation report since:

- Sufficient evidence available: the Country Participant has provided the 100% of data used in the calculations to achieve the final estimated amount of GHG emissions and removals.
- Nature of evidence: the raw data were collected from reliable sources. They are detailed in the program documents and have been provided to the validation team.
- Cross-checked evidence: AENOR cross-checked the collected information through interviews with stakeholders and reproducing calculations.

3.5 REDD Country Visit

In accordance with FCPF Carbon Fund Facility Management Team (FMT) and the Country Participant, and provided that a reasonable level of assurance was achievable by other means, AENOR as VVB carried out a hybrid audit that ensured the achievement of the assurance level required by the FCPF.

Thus, the Audit was performed both, onsite and remotely: some aspects were assessed remotely, since reported Emission Reductions rely on activity data estimates through Earth Observation data obtained in a centralized Forest Monitoring System with few field data. On the other hand, other aspects were assessed onsite thanks to a local technical expert, as VVG paragraphs 48 and 50 allows.

The hybrid audit procedure was developed considering the guidelines of the IAF Informative Document on the Management of Extraordinary Events or Circumstances Affecting Abs, CABs, and Certified Organizations (IAF ID 3 – Issue 1); IAF Mandatory Document for the Use of Information and Communication Technology (ICT) for Auditing/Assessment Purposes (IAF MD 4 – Issue 2); and the ANAB Accreditation Rule 9: Certified Organizations Business Continuity and Disaster Recovery. The remote audit was based on the following auditing techniques:

- Document review and cross checks between the information provided in the ER Monitoring Report and supporting information and evidence provided by the Country Participant.
- Review, based on the selected methodologies, tools and the other applied methodological regulatory documents, of the appropriateness of formulae and accuracy of calculations.

- Meetings, via teleconference, with relevant stakeholders and personal responsible for the implementation of the ER Program and the elaboration of the ER Monitoring Report.
- Cross checks between information provided by interviewees to ensure that no relevant information was omitted.
- Support from a local technical expert to facilitate the technical sessions guided by the VVB team leader.

The hybrid audit procedure was agreed with the Country Participant on the basis of available means and safety procedures. The teleconferences were carried using software agreed with the Country Participant, i.e., Microsoft Teams.

Two technical sessions (one for the validation with extended scope and one for the verification) were carried on December 20th and 21st, 2022, with Country Participant's staff involved in the management of the ER Program and the elaboration of the ER Monitoring Report. The aim of the sessions were to cross-check and verify with the responsible staff of each area the procedures described in the ER Monitoring Report and additional documents, as well as to clarify doubts from the audit team, prior to the issuance of the first round of findings. The following table includes the list of all Country Participant's staff that participated in the technical sessions, who gathered in BNCC REDD+ office Nanisana, Antananarivo, together with the local technical expert and were remotely connected with the rest of the VVB team.

Name	Organization	Role/Position
Haingomanantsoa Rija	BNCCREDD+	Chief of REDD+ service
Andriambolantsoa Rasolohery	WB	Consultant de la Banque Mondiale; Consultant.
Andriamiadana Feno Sitraka	BNCCREDD+	Technicien LOFM; Geomatics specialist.
Andriamiharivola Tantely	BNCCREDD+	Equipe Partenariat.
Andrianirina Carole	BNCCREDD+	Chef LOFM.
Andrianirina Topaniaina	BNCCREDD+	Technicien LOFM; Geomatics specialist.
Haingomampihiratra Joharitantely	BNCCREDD+	RSES.
Kila luchiana	BNCCREDD+	Responsible of REDD+ program management
Raherivelo Tahiry	BNCCREDD+	Technicien LOFM; Geomatics specialist.
Rakotondranivo Mihary	BNCCREDD+	Responsible of REDD+ strategy development.
Ranama Faramalala	BNCCREDD+	Responsable Système d'Information.
Randrianandraina Johary	BNCCREDD+	Technicien LOFM; Geomatics specialist.
Randrianantenaina Fara	BNCCREDD+	Promotion REDD.
Randrianasolo Mamy	BNCCREDD+	Responsable Planification.
Ravelomanana Lovakanto	BNCCREDD+	Coordonnateur BNCCREDD+.
Ravoninjatovo Jean Michel	BNCCREDD+	Chef de division Méthodologie; Responsible of methodology.
Razafimiasa Angelette Pascaline	BNCCREDD+	Responsable juridique.

The program covered during the technical sessions was the following:

Activity & Information
Opening meeting Introduction and scope of the Audit. Review of meeting agenda. Generalities.
Technical meeting 1 (validation with extended scope):

Activity & Information
1. 1. Carbon pools, sources and sinks Sources and sinks associated with the REDD+ Activities. Criterion 3 MF Significant Carbon Pools and greenhouse gases. Criterion 4 MF 2. Reference level Use of the most recent Intergovernmental Panel on Climate Change (IPCC) guidance and guidelines. Criterion 5 MF. Key data and methods detailed and available for reconstruction of the Reference Level. Criterion 6 MF. Clearly documented Forest Reference Emission Level or Forest Reference Level for the ER Program Measures Area. Criterion 10,11, 12 and 13 MF 3. Measurement, monitoring and reporting Robust Forest Monitoring Systems. Criterion 14 MF. National Forest Monitoring System. Criterion 15 MF. Community participation in Monitoring and Reporting. Criterion 16 MF. 4. Uncertainties of the calculation Identification and address source(s) of uncertainty (identify, minimize, quantify remaining). Criterion 7, 8, 9.1 MF.
Technical meeting 2 (verification): 1. Implementation and operation of the ER program during the reporting period Monitoring and reporting of displacement mitigation Criterion 17.3, 17.4 MF. 2. System for measurement, monitoring and reporting emissions and removals occurring within the monitoring period Consistency of monitored estimates with RL 14.1 MF. 3. Data and parameters Key data and methods detailed and available for reconstruction of the reported emissions and removals. Criterion 6 MF. 4. Quantification of emission reductions Calculation of Emission Reductions. Criterion 22 MF 5. Uncertainty of the estimate of emission reductions Identification and address source(s) of uncertainty (identify, minimize, quantify remaining). Criterion 7, 8, 9.1 MF. Estimation of residual uncertainty. Criterion 9.2, 9.3 MF. 6. Transfer of title to ERs REDD projects and programs DMS. Criterion 37. Double counting. Criterion 23 MF. 7. Reversals Addressing and account for reversals Criterion 18.2 and 19 MF
Closing Meeting: Remarks, clarifications, questions, following steps.

4. VALIDATION OF ER PROGRAM DESIGN

4.1 Completeness of Report

AENOR made a review of the ER Monitoring Report, supporting information, procedures, calculations, and supporting documentation of the Emission Reduction Program in Atiala Atsinanana (ERP-AA), Republic of Madagascar, and confirms that Annex 4 of the ER Monitoring Report contains the required information to be subject to validation with extended scope.

4.2 Start date of the crediting period

AENOR assessed information provided in the ER Monitoring Report and is able to confirm that the start date of the ER Program's crediting period, 22nd March 2020, complies with the definition of the start date provided in the FCPF Glossary of Terms, since:

- It is not earlier than the date the first ER Program Measure generating ERs has been implemented.
- It has justified with objective evidence to AENOR.
- It is not earlier than June 2018, date of program inclusion into the carbon fund portfolio.
- It does not fall within the Reference period (2006-2015).
- It has been demonstrated to AENOR that the ER Program complies with requirements on safeguards, carbon accounting, and double-counting as specified in the MF since the start date.

4.3 Sources and Sinks

The ER Program selected the following GHG sources and sinks (REDD+ activities):

GHG sources and sinks (REDD+ activities)
Emissions from deforestation – Included
Emissions from forest degradation – Included
Enhancement of forest carbon stocks – Included
Conservation of forest carbon stocks– Excluded
Sustainable management of forests– Excluded

AENOR assessed the justifications and methods provided in Annex 4 - section 7.1 of the ER Monitoring Report and found acceptable the justifications provided to include or exclude the sources and sinks. Emissions from deforestation are included in the Reference Level, in compliance with the requirements set by criterion 3 of the MF. Enhancement of carbon stocks are also included.

Additionally, AENOR confirms that the ER Program the exclusion of conservation of forest carbon stocks and sustainable management of forests, because there is no national definition for these REDD+ activities, and there is comprehensive accounting for GHG emissions and removals from forests so that GHG emissions and removals that may be included in this sources are included in previous REDD+ activities.

There are no plans for improving data since the excluded sources represent a small fraction of forest-related emissions.

4.4 Carbon pools and GHG

The following carbon pools and types of GHG have been included from the ER Program:

Carbon Pools
Above Ground Biomass (AGB) – Included
Below Ground Biomass (BGB) – Included
Dead Wood – Included

Litter − Included Soil Organic Carbon (SOC), including peat − Included
GHGs
CO_2 − Included CH_4 − Included N_2O− Included

AENOR has assessed the rationale of the ER Program for selecting or excluding carbon pools and greenhouse gases and deems that it is reasonable and in accordance with criterion 4 of the MF. The program accounts all significant carbon pools and GHG. No overestimations are occurring due to the inclusion of non-significant carbon pools and GHG.

AENOR confirms that the ER Program has no proposed plans for improving data on excluded pools, as they already included them all.

4.5 Reference Period

AENOR confirms that the start and end dates of the Reference Period (01-01-2006 to 31-12-2015) have been defined in accordance with criterion 11 of the MF and that it complies with the definition provided in the FCPF Glossary of Terms. The Reference Period has not change from the proposed period in the ER-PD.

4.6 Forest Definition

The Designated National Authority (DNA) of Madagascar submitted a definition of forest to the UNFCCC for reforestation/afforestation projects under the CDM (Clean Development Mechanism), which is consistent with the definition used in the national communication submitted in 2010. In 2018, a workshop was held for the new forest definition and a related document was released in May 2018. This same forest definition was used for the forest reference emission level (FERL) for the ERPAA program and for the national FERL update.

In the 2015 Forest Resources Assessment (FRA) submission, evergreen forest and other forest classes from the 1996 National Forest Inventory (NFI96) were used as an equivalence to the FAO forest definition. As part of the NFMS development process, new values will be reported and equivalence to the FAO definition will be established.

AENOR confirms that the definition of “forest” used in the construction of the Reference Level of the Emission Reduction Program in Atiala Atsinanana (ERP-AA), Republic of Madagascar, is consistent with the forest definition reported by Madagascar under the Clean Development Mechanism (CDM), and is also consistent with the forest definition used in the context of the national GHG inventory, as verified by the validation team.

AENOR assessed the information according to criterion 12 MF and the guidance from UNFCCC decision 12/CP.17 and deems that it was an appropriate selection of a forest definition.

4.7 Calculation of average annual historical emissions

After review of all ER Monitoring Report information, procedures, calculations, and supporting documentation, and according to the scope of the validation with extended scope carried out, AENOR confirms that:

- ERP-AA made a systematic and step-by-step assessment of the methods, assumptions, and approaches used for the calculation of historical emissions, i.e., the Reference Level;
- All equations parameters and fixed data, such as AD and EF, are appropriately linked to the equations used for the quantification of the Reference Level;
- The correctness of presented information, publicly available, reported with a transparent and coherent step-by-step process that enables reconstruction of the Reference Level to validate its compliance with the requirements of applicable criteria;

- The start date of the crediting period proposed by the ER Program is in compliance with the definition provided in the FCPF Glossary of terms;
- The GHG emissions, emission reductions of the Reference Level, and its technical corrections, are materially accurate, and free of material misstatements, errors, or omissions;
- The ER Program's equations and methods are in accordance with applicable validation criteria as the latest IPCC Guidelines, using the most recent guidance and guidelines, as adopted or encouraged by the Conference of the Parties as a basis for estimating forest related GHG emissions by sources and removals by sinks.
- The emissions from forest degradation are accounted. These emissions were estimated using the best available data.

4.8 Activity data and emission factors

4.8.1 Activity data

AENOR confirms that the reliability of the source and nature of the reported evidence justified the selection of the monitored data and parameters; and that all parameters related to activity data and described below have been reported in line with guidelines provided in the template and validation criteria.

AENOR confirms the correctness of each step of monitoring from measurement to data transfer and calculation and confirmed the information for each parameter is complete and that the stated parameters are free of error and material misstatements.

AENOR also confirms that methodological steps and data are publicly available in accordance with applicable criteria, and the open links to the multiple sources are provided in the ER Monitoring Report. AENOR confirms that the evidence provided by the ER Monitoring Reports is sufficient and appropriate to determine the GHG reductions and removals.

AENOR confirms that Activity Data were determined periodically and allowed for the Reference Level to be estimated for the Reference Period.

Assessment details are as follows per activity data grouped parameters:

Parameters	$A_{(j,i)}$ $A_{(i,j)}$
Free of Material Misstatement	Yes
Reported Appropriately	Yes
Assessment Details	These parameters represent, respectively: - Annual conversion from forest type j (primary forest, modified natural forest), to non-Forest Land uses i (Non-Forest) in period 2006-2015 (hectare/year) - Annual conversion from forest type j (primary forest), to Forest type i (modified natural forest or plantations) in period 2006-2015 (hectare/year) - Annual conversion from non-Forest Land use i to forest type j (planted forest or modified natural forest) in period 2006-2015 (hectare/year) Deforestation, degradation and enhancements were determined through sample-based visual interpretation, primarily using remote sensing data of all satellite imagery available to the country, to collect sample information. ERP-AA presented information about data sources for estimating

	Activity Data, methods for mapping land-use and land-use change (including sampling design and size, absence of stratification justification, assessment and labelling, analysis and Activity Data calculation), QA/QC procedures applied, values applied, and uncertainty associated with these parameters. The validation team conducted an independent analysis of similar remotely sensed data to confirm that the source data was reliable and appropriate. Additionally, the validation team was able to ensure that LULC classification was appropriate and followed the defined classification system. The validation team conducted independent data checks for each step necessary for the quantification of these parameters. Activity data parameters were examined using remotely sense imagery to ensure accurate classification of LULC classification. Spatial analyses conducted in ESRI GIS confirmed the geographical boundary, ensuring that all activity data fell within the Accounting Area and that the Accounting Area was computed correctly. Independent data checks were used to ensure that the quantification of the parameters was performed correctly. This included an independent review of the literature cited in reference to the applied equations. The uncertainty associated with this parameter was independently calculated after a thorough review of the calculation spreadsheets. The calculation of uncertainty applied the methodology from Olofsson, et al. (2014), and the validation team reviewed and confirmed that the estimation was correct and without any error.

Thus, AENOR confirms the sufficiency of quantity and appropriateness of quality of the evidence used to determine the Activity data factors and later used in the GHG reductions and removals calculations, and also that the Activity data is compliant with the Methodological Framework and the IPCC Guidelines and Guidance.

4.8.2 Emission Factors

AENOR confirms the reliability of the source and nature of the reported evidence justified the selection of the emission factors; and that these have been reported in line with guidelines provided in the template and validation criteria.

AENOR confirms the correctness of each step of monitoring from measurement to data transfer and calculation and confirms the information for each parameter is complete and that the stated parameters are free of error and material misstatements.

AENOR confirms the source of emission factors is from data collected during different national inventories, and models or average values of direct measurements reported in literature and following IPCC Guidance and Guidelines.

AENOR confirms that emission factors of the ERP-AA and the methods to determine them are the same for Reference Level setting and for Monitoring. IPCC Tier 2 or higher methods are used to establish emission factors, and the uncertainty for each emission factor is documented.

Assessment details on emission factors are as follows:

Parameters	$AGB_{(Before,j)}$, $AGB_{(After,j)}$, $AGB_{(Before,i)}$, $AGB_{(After,i)}$
Free of Material Misstatement	Yes

Reported Appropriately	Yes
Assessment Details	These parameters represent, respectively (all in ton of dry matter per ha): - Aboveground biomass of forest type j before conversion - Aboveground biomass of forest type j after conversion - Aboveground biomass of forest type i before conversion - Aboveground biomass of forest type i after conversion ERP-AA Monitoring Report presented the following information about emission factors: source of data; values applied in reference period; QA/QC procedures applied; and uncertainty associated with each emission factor. The source is primarily three different inventories or sources (PERR-FH inventory, 2014; DVRF inventory, 2016; DRGPF inventory, 2020). The validation team conducted independent analysis of the information provided to confirm that the source data was reliable and appropriate. Additionally, the validation team judged that the methods to estimate these parameters were reasonable and appropriate. The validation team performed an independent check of the IPCC Guidance and Guidelines to ensure the parameters ensuring correctness. The validation team conducted independent data checks for each step necessary in the quantification of these parameters. Additionally, the validation team conducted an independent review of the literature cited in reference to each equation in the calculation procedure. The uncertainty associated with these parameters was independently calculated after a thorough review of the calculation spreadsheets; and the validation team reviewed and confirmed that the estimation of uncertainty was correct and without any error. The validation team reviewed the ER Monitoring Report and associated links to ensure that all data related to this parameter are made public.

Parameter	$AGB_{(After,i)}$, $AGB_{(Before,i)}$ (non-forest)
Free of Material Misstatement	Yes
Reported Appropriately	Yes
Assessment Details	These parameters represent, respectively (all in ton of dry matter per ha): - Aboveground biomass of non-forest type i before conversion, in tonne of dry matter per ha - Aboveground biomass of non-forest type i after conversion, in tonnes dry matter per ha; ERP-AA Monitoring Report presented the following information about emission factors: source of data; values applied in reference period; QA/QC procedures applied; and uncertainty associated with each

	emission factor. The source is a destructive sampling. The validation team conducted independent analysis of the information provided to confirm that the source data was reliable and appropriate. Additionally, the validation team judged that the methods to estimate these parameters were reasonable and appropriate. The validation team performed an independent check of the IPCC Guidance and Guidelines to ensure the parameters ensuring correctness. The validation team conducted independent data checks for each step necessary in the quantification of these parameters. Additionally, the validation team conducted an independent review of the literature cited in reference to each equation in the calculation procedure. The uncertainty associated with these parameters was independently calculated after a thorough review of the calculation spreadsheets; and the validation team reviewed and confirmed that the estimation of uncertainty was correct and without any error. The validation team reviewed the ER Monitoring Report and associated links to ensure that all data related to this parameter are made public.

Parameter	C_O
Free of Material Misstatement	Yes
Reported Appropriately	Yes
Assessment Details	This parameter represents dead wood/litter stock under the old land-use category (ton/ha). ERP-AA Monitoring Report presented the following information about emission factors: source of data; values applied in reference period; QA/QC procedures applied; and uncertainty associated with each emission factor. The source is primarily three different inventories or sources (PERR-FH inventory, 2014; DVRF inventory, 2016; DRGPF inventory, 2020), applied only to the trees that were labelled in the field as dead trees. The validation team conducted independent analysis of the information provided to confirm that the source data was reliable and appropriate. Additionally, the validation team judged that the methods to estimate these parameters were reasonable and appropriate. The validation team performed an independent check of the IPCC Guidance and Guidelines to ensure the parameters ensuring correctness. The validation team conducted independent data checks for each step necessary in the quantification of these parameters. Additionally, the validation team conducted an independent review of the literature cited in reference to each equation in the calculation procedure. The uncertainty associated with these parameters was independently calculated after a thorough review of the calculation spreadsheets; and the validation team reviewed and confirmed that the estimation of

	uncertainty was correct and without any error. The validation team reviewed the ER Monitoring Report and associated links to ensure that all data related to this parameter are made public.

Parameter	$SOC_{(Before,j)}$, $SOC_{(After,i)}$
Free of Material Misstatement	Yes
Reported Appropriately	Yes
Assessment Details	This parameter represents the Soil Organic Carbon at 30 cm depth of forest type j before conversion and Soil Organic Carbon at 30 cm depth of non-forest type j after conversion (tC/ha). ERP-AA Monitoring Report presented the following information about emission factors: source of data; values applied in reference period; QA/QC procedures applied; and uncertainty associated with each emission factor. The source is an specific inventory conducted in the Eastern Humid Ecoregion as part of the PERR-FH inventory, 2014. The validation team conducted independent analysis of the information provided to confirm that the source data was reliable and appropriate. Additionally, the validation team judged that the methods to estimate these parameters were reasonable and appropriate. The validation team performed an independent check of the IPCC Guidance and Guidelines to ensure the parameters ensuring correctness. The validation team conducted independent data checks for each step necessary in the quantification of these parameters. Additionally, the validation team conducted an independent review of the literature cited in reference to each equation in the calculation procedure. The uncertainty associated with these parameters was independently calculated after a thorough review of the calculation spreadsheets; and the validation team reviewed and confirmed that the estimation of uncertainty was correct and without any error. The validation team reviewed the ER Monitoring Report and associated links to ensure that all data related to this parameter are made public.

Thus, AENOR confirms the sufficiency of quantity and appropriateness of quality of the evidence used to determine the Emission factors and later used in the GHG reductions and removals calculations, and also that the Emission Factors are compliant with the Methodological Framework and the IPCC Guidelines and Guidance.

4.9 Adjustments to the average annual historical emissions over the reference period

Not applicable: the Reference Level has not been adjusted regarding the average annual historical emissions.

4.10 Estimated Reference Level

AENOR assessed the Reference Level for the ER Program for the Crediting Period and confirms that the Reference Level is materially accurate. AENOR confirms the relation, and its consistency, between the Reference Level, the development of the FREL/FRL submitted to the UNFCCC and the country's existing greenhouse gas inventory.

The results of the estimated Reference Level are as follows, according to ER Monitoring Report:

Crediting Period year *t*	Average annual historical emissions from deforestation over the Reference Period (tCO_{2-e}/yr)	If applicable, average annual historical emissions from forest degradation over the Reference Period (tCO_{2-e}/yr)	If applicable, average annual historical removals by sinks over the Reference Period (tCO_{2-e}/yr)	Adjustment, if applicable (tCO_{2-e}/yr)	Reference level (tCO_{2-e}/yr)
2020	11,442,849	420,060	-13,254		11 849 654
2021	11,442,849	420,060	-26,508		11 836 401
2022	11,442,849	420,060	-39,762		11 823 147
2023	11,442,849	420,060	-53,016		11 809 893
2024	11,442,849	420,060	-66,270		11 796 639

4.11 Consistency of the Program's Reference Level with national FREL/FRL and GHG Inventory

AENOR confirms that ERP-AA' proposed Reference Level is consistent with the national FREL/FRL submitted to the UNFCCC and with the country´s existing and future GHG inventory. Although some differences can be noted, all of them are measures that improve the accuracy of the Program's Reference Level. The differences were assessed and considered consistent and reasonable by AENOR and in conformance with indicators 10.2 and 10.3 of the MF.

4.12 Uncertainty of the Reference Level

4.12.1 Identification and assessment of sources of uncertainty

The Country Participant identified and assessed though a stepwise approach, the sources of uncertainty of the Reference Level in Activity Data (measurement, representativeness, sampling), Emission Factors (DBH measurement, H measurement, plot delineation, wood density estimation, biomass allometric model, sampling, and in other parameters such as Carbon Fraction, root-to-shoot ratios, etc.), as well as in Integration.

The validation team recalculated the uncertainty statistics independently to confirm the accuracy of the reported precision, reviewed assumptions and sources associated with parameters used in the quantification, and reviewed uncertainty of the Reference Level due to random and systematic errors. AENOR confirms that the sources of uncertainty are systematically identified and correctly assessed in the Reference Level, and addressed according to validation criteria, including the Guideline on the application of the Methodological Framework Number 4.

Additionally, AENOR confirms that there is an appropriate process for reducing uncertainty in the activity data and emission factors, where possible: systematic errors are minimized through the implementation of a consistent and comprehensive set of standard operating procedures, including a set of quality assessment and quality control processes; and random errors and other uncertainties are minimized to the extent practical based on the assessment of their relative contribution to the overall uncertainty of the emissions and removals.

4.12.2 Uncertainty of the estimate of the Reference Level

The Country Participant estimated the uncertainty of the Reference Level based on Monte Carlo analysis. A total of 10,000 iterations were calculated for the cumulative emissions of the reference period. The uncertainty estimate for the Reference Level strictly follows the guidelines of Approach 2: Monte Carlo simulation from 2006 IPCC Volume 1 General Guidance and Reporting Chapter 3 as well as the Guideline on the application of the Methodological Framework Number 4.

The validation team reviewed and confirmed that elements mentioned in section 4.12.1 related to the estimation of uncertainty for the Reference Level were all addressed in the provided Uncertainty spreadsheet. AENOR also confirmed that the estimations were correct and that the results matched the Reference Level included in the ER Monitoring Report. Therefore, AENOR concludes that the application of Monte Carlo simulation for the quantification of Uncertainty of the Reference Level was performed correctly and free of errors and misstatements.

4.12.3 Sensitivity analysis and identification of areas for improvement of the MRV system

In order to identify the relative contribution of each parameter to overall uncertainty, a sensitivity analysis was conducted by the Country Participant in which the uncertainty of each parameter was selectively removed prior to running Monte Carlo simulations and combining uncertainties.

AENOR confirms that uncertainty of AD and EF used in Reference Level setting and the monitoring period are quantified in a consistent way.

AENOR reviewed and confirmed that above-mentioned (section 4.12.1) elements related to the sensitivity analysis were all addressed in the provided calculation spreadsheets. The validation team also confirmed that the estimations were free of errors and the results matched the sensitivity analysis included in the ER Monitoring Report. Therefore, AENOR concludes that the sensitivity analysis was performed correctly.

4.13 Data quality and availability

The validation team reviewed the quality and descriptions of the data and reproduced calculations of the Reference Level as presented in the ER Monitoring Report and related documents and is able to confirm that the steps are described with enough detail to enable the reconstruction of the Reference Level.

Additionally, AENOR confirms that the main methodological steps, relevant spatial information, maps, or synthesized data, related to the Reference Level, and the reported emissions are documented and included in the monitoring report and made publicly available online. There is not a specific webpage to find together all the references, but along the ER Monitoring Report there are links and references that lead to the data, methods, and assumptions.

5. NON-COMPLIANCES AND OBSERVATIONS

To ensure conformance of the ER Program with all requirements set by the FCFC and the audit criteria (section 2.3), the validation team issued findings in accordance with section 11 of the VVG v2.4 in the following cases:

- **Major Corrective Action Request (MCAR)**: i) the evidence provided to demonstrate conformity is insufficient, unclear, or not transparent and may lead to a material error, omission, or misstatement, and/or a breakdown in the systems delivery; ii) underlying assumptions used to develop the reported estimates are not supported by data; iii) material errors, omissions or misstatements have been made in applying assumptions, in data or calculations; or i) non-compliance with validation criteria.
- **Minor Corrective Action Requests (mCAR)**: i) the evidence provided to demonstrate conformity is insufficient, unclear, or not transparent, but does not lead to a material error, omission, or misstatement, and/or a breakdown in the systems delivery; or ii) non-material errors, omissions or misstatements have been made in applying assumptions, in data or calculations;
- **Observations (OBS)**: i) there is no objective evidence to prove that there is a non-conformity, but the VVB observes practices and/or methods that could result in future MCAR and mCAR; or ii) the VVB wishes to identify an area of the Forest Monitoring System that requires attention and/or adjustment in future monitoring and reporting.

The findings were submitted by the validation team in a single document, in which the Country Participant was able to offer answers to each of them and list supporting documents provided.

The Country Participant made the requested corrections and provided the validation team with updated versions of the ER Monitoring Report, which the validation team reassessed against the guidance documentation. The validation team either closed the opened findings when corrections, evidence and answers were satisfactory to comply with the audit criteria or asked for further corrections or clarifications. This process was repeated iteratively until all MCAR were suitably closed, as required by paragraph 62 of the VVG v2.4.

All findings, 15 MCAR, 7 mCAR and 2 OBS, issued by AENOR's audit team during the joint validation and first verification process have been closed. There are no non-compliances pending for the subsequent crediting period. Appendix 1 includes the description of all findings issued and the inputs for their closure.

APPENDIX 1: OVERVIEW OF NON-COMPLIANCES & OBSERVATIONS ISSUED DURING THE VALIDATION BY THE VALIDATION TEAM

Non Conformities (NCs)

<table>
<tr><td>NC ID: Major</td><td>01</td><td>Date: 30/12/2022</td></tr>
<tr><td colspan="3">Description of NC</td></tr>
<tr><td colspan="3">In accordance with the MR template, this information it is not included in MR section 1.1:
- For the progress on the actions and interventions under the ER Program, the key dates and milestones have not been included.
- A detailed update on the strategy to mitigate and minimize potential Displacement.</td></tr>
<tr><td colspan="2">Project Participant response</td><td>Date: 06/02/2023</td></tr>
<tr><td colspan="3">Progress on the actions and interventions under the ER Program
<table>
<tr><th>Key dates</th><th>Activities</th></tr>
<tr><td>2018</td><td>● Submission of the Emission Reductions Program Document (ER-PD)
● Adoption of the national REDD+ strategy by the decree N°2018-500 on may, 30th 2018
● Elaboration of the AlaotraMangoro, Atsinanana, Analanjirofo, Sofia, SAVA, Boeny, Menabe et AtsimoAndrefana regional REDD+ strategy
● Establishment of the governance and institutional framework of REDD+ mechanism (national REDD+ Plateform, Regional REDD+ Plateforms)</td></tr>
<tr><td>2019</td><td>● Implementation of the Information System on Program Initiatives (SIIP)
● Development of the REDD+ implementation frameworks on environmental and social safeguards</td></tr>
<tr><td>2020</td><td>● Development and implementation of the REDD+ transactional register
● Establishment of the Complaints Management Mechanism
● Inventories of the Eastern Humid Forests
● Mapping of the "Atiala Atsinanana" Emissions Reduction Program area, according to the Land Use and Occupation classification system (UOT) and definition of forests over the course of the year, by the Madagascar Forest Observation Laboratory (LOFM), BN-CCCREDD+ geomatics laboratory
● Analysis of national deforestation: mapping of changes for the periods 2000-2005-2010-2015-2019 over the course of the year.</td></tr>
</table>
Detailed update on the strategy to mitigate and minimize potential Displacement.</td></tr>
<tr><td colspan="3">Documentation provided by the Project Participant</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="2">VVB Assessment</td><td>Date: 22/02/2023</td></tr>
</table>

The Monitoring report has been updated according to the requirements. Therefore, this NC is deemed closed.

NC ID: minor	**02**	**Date: 30/12/2022**
Description of NC		
In section 1.1 it is stated that the Project has been submitted to the NAMA Fund for funding (Expected response by 2022), and in table 1 that NAMA has started in 2022 for a duration of 05 years. Please, provide further explanations about the current state or update the dates (if not yet response).		
Project Participant response		**Date:** 06/02/2023
The NAMA project is indeed one of the initiatives developed to strengthen actions in the Program area; it has been submitted for funding from the NAMA Facility. Being a competitive process, unfortunately it was not selected at the end of the process. The actions carried out by the WWF within the framework of the Protected Area persist however.		
Documentation provided by the Project Participant		
VVB Assessment		**Date:** 22/02/2023
According to the project participant response, please update the Monitoring Report, detailing this information in the references to NAMA in section 1.1. Therefore, this NC is not closed		
Project Participant response		**Date:** 27/03/2023
The text mentioning NAMA has been deleted as there were no response so far form the NAMA facility and the project does not expect any new development soon		
Documentation provided by the Project Participant		
VVB Assessment		**Date:** 05/04/2023
Section 1.1 has been updated and deemed correct. Therefore, this NC is closed.		

NC ID: Major	**03**	**Date: 30/12/2022**
Description of NC		
Please, provide documented evidence of the field surveys –GIS, templates, etc.- (one per each region: Analanjirofo, Alaotra, Mangoro, Atsinanana and Sofia) targeted deforestation hotspots, that supports information in MR section 1.2.		
Project Participant response		**Date:** 06/02/2023
The documents about the field surveys are provided, these are: - *The terms of reference of the field survey/* - *The field survey reports (with maps)* *The LOFM conducted two parallel field surveys during July 2021 in order to assess the causes of deforestation and to verify the map of stratification 2020 (first year of monitoring). The regions that were conscerned are: Analanjirofo, Atsinanana, AlaotraMangoro and SAVA*		

regions. Sofia was not targeted in the itinerary of the survey. - *The filled form templates used during the interviews* *For all interviews, a standard template was filled. At the end of the interventions, the information collected were synthetized.*
Documentation provided by the Project Participant
- *Document: terms of reference of the field survey* https://drive.google.com/file/d/12WvDhjgPYHxmjUtLh4pxz3KENbNaKvz4 - *The field survey reports:* https://drive.google.com/file/d/1lb_iQZHUVD3KLxXbSdBWCqdoUQkn6vwu and https://drive.google.com/file/d/1OvCC6K5p746TQ3KHhMDjM5KLISOWVQ44 - *The filled templates during interviews* Makira:https://drive.google.com/file/d/1SFO7mHt3I1JgiO4WLnpttjFcUC_7QTKv (linked to field reconnaissance report) Masoala: https://drive.google.com/file/d/14cF1h6GhLENs5N32KvuDrdrzQT5V-w3G (linked to field reconnaissance report) Analamazaotra:https://drive.google.com/file/d/1Ixvf1op4B6MzrgLQqKzAvBnauEUQtsNx (linked to field report) Mantadia: https://drive.google.com/file/d/1OEahhxbf_A8GJJ6v-YHHlXMwhBVkz3cX (linked to field report) Zahamena:https://drive.google.com/file/d/1RPE3Tb_BFRKBCV1EzWnRGJ1ugby01Lv5 (linked to field report)

VVB Assessment	**Date:** 22/02/2023
The evidence has been provided and deemed correct. - However, MR section 1.2 is not updated with the zones targeted by the field surveys (Analanjirofo, Atsinanana, Alaotra Mangoro and SAVA regions). Please update the section accordingly with these zones, as supported by evidence, as the Sofia zone was not targeted. - On the other hand, the following link cannot be open: https://docs.google.com/spreadsheets/d/1II8nbiBRsWjyDHA1wtxV0XZOltrfx_8N Therefore, this NC is not closed	
Project Participant response	**Date:** 27/03/2023
The MR section 1.2 have been updated with the zones targeted by the field surveys (Regions: Analanjirofo, Atsinanana, Alaotra Mangoro and SAVA). Remark: The link: "https://docs.google.com/spreadsheets/d/1II8nbiBRsWjyDHA1wtxV0XZOltrfx_8N" that could not be opened is not part of the documentation needed for this NC. However, it has been also updated.	
Documentation provided by the Project Participant	
The MR updated after the second round of findings	
VVB Assessment	**Date:** 05/04/2023
Section 1.2 has been updated with the zones targeted by the field surveys. The link indeed does not correspond to this NC. Therefore, this NC is closed.	

NC ID: Major	**04**	**Date: 30/12/2022**

Description of NC	
Section 2.2 makes no references on how ERP-AA complies with criterion MF 6 regarding the online publicly available information that enables the reconstruction of the Reference Level and the reported emissions and removals, as requested by the MR template.	
Project Participant response	**Date:** 06/02/2023
A new subsection were added with the link to the datasets, documentations and R scripts as well as an Excel template necessary for the recreation of all steps and calculation of the reported emissions and removals.	
Documentation provided by the Project Participant	
Title of the file : MADA_CalculRE_v00_20211109_update_for_ER_Report_version_6 Link https://drive.google.com/file/d/1QQtpS_4RpcF9rKIARd-eBE0YMeRa5H4C Title of the file : MADA_Biomasse_aerienne_et_Morte_20220410_v01 Link : https://drive.google.com/file/d/1Bgm0DqFAFN7zIeeOrGHhYgDaUIycvMa1 Title of the file : SOP 4, Data Analysis Link :https://www.environnement.mg/?wpdmpro=standard-doperation-pour-la-collecte-des-donnees#	
VVB Assessment	**Date:** 22/02/2023
- The section has been updated with the provided links. However, multiple cells in the calculation spreadsheets are not properly linked, showing #REF! and #DIV/0 errors. - On the other hand, regarding the link: https://www.environnement.mg/?wpdmpro=standard-doperation-pour-la-collecte-des-donnees# Please, indicate or provide directly 'SOP 4, Data Analysis' since it cannot be found in the website. Therefore, this NC is not closed.	
Project Participant response	**Date:** 27/03/2023
Errors resulting from division by zero #REFs and #DIV/0 in the excel spreadsheet has been dealt with by fixing the formula with IFERROR, so no more #REFs and #DIV/0 remains in the documents. Also, Missing parcel 213/141 making #VALUE, because the parcel did not have aboveground biomass, it created the #VALUE, it has been corrected. In the formula =VLOOKUP(X1780,'D:\bncc_tutor\ERPAA 2021\Biomasse_version_Fin_Setra_160621\final Sept 21\[Base de données inventaire Forêt Humide et Seche_2020_211021_avec lien et Formule_sans traitement.xlsx]WD PERR-FH improved'!$D:$E,2,FALSE), #N/A are errors, they show that the search for terms (wood specific gravity) does not exist yet for the species concerned in the database, so the formula would use the default ones. #N/As in the inventaire_2020 sheet is left as is on purpose because it flags the lack of species specific data in the database. MADA_CalculRE_v00_20211109_update_for_ER_Report_version_6_errorremoved.xlsx also update in the following sheet: • DA (Sheet) corrected. • KCA (sheet) corrected.	
Documentation provided by the Project Participant	
Link to the corrected excel files. Biomass: https://drive.google.com/file/d/1Bgm0DqFAFN7zIeeOrGHhYgDaUIycvMa1 RE calculation: https://drive.google.com/file/d/1QQtpS_4RpcF9rKIARd-eBE0YMeRa5H4C	
VVB Assessment	**Date:** 05/04/2023

The spreadsheets have been updated and deemed correct. Therefore, this NC is closed.

NC ID: Major	**05**	**Date: 30/12/2022**
Description of NC		
Please, provide in sections 2.2.2 and Annex 4: 8.3, - Complete reference to the emission factors from IPCC after equation 7 - Complete reference to the Global Warming Potential of CH4 and N2O of equation 8		
Project Participant response		**Date:** 06/02/2023
- *Emission factors value of equation 7 can be found on the MADA_calculRE_v00_20211109_update_for_ER_report_version6.xlsand values originated from national inventory in 2014 in and 2020 (report attached as documentation)* - *Global Warming Potential (GWP) of CH4 and N2O value can be found on the link* .https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf . - *Values from the last AR5 are used as recommended, all the numbers updated accordingly*		
Documentation provided by the Project Participant		
- Link to PERR-FH Rapport livrable 5 final 3 https://drive.google.com/file/d/1r5a7zylbp0XJala0dY4MJT0Lhxv0URT_ - Bibilographyreference : In the end of the MR - Link to Rapport Final Forêthumide et Forêt Sèche_2020- Evaluation biomasse_vfhttps://drive.google.com/file/d/1dXb0HPXrXub4WhNXMMB7q5try0FZl3ql - Bibilographyreference : In the end of the MR - AR5 value, table 8.A.1 at page 731 available here https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdfand AR4 available here https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg1-chapter2-1.pdf - https://drive.google.com/file/d/1QQtpS_4RpcF9rKIARd-eBE0YMeRa5H4C/view?usp=share_link		
VVB Assessment		**Date:** 22/02/2023
Please update in the MR the complete reference (AR5 and link) to the Global Warming Potential of CH4 and N2O used in Equation 8 of section 2.2.2 and Annex 4: section 8.3. Also, an inconsistency remains between the GWP values of CH4 and N2O reported in Table 11 of section 5.2 and those reported in Equation 8 of section 2.2.2 and Annex 4: section 8.3. Last, the following link cannot be open: https://docs.google.com/spreadsheets/d/1UDjLV50F7qhOjIHbtPx1LrmBG6YzLTs4 Therefore, this NC is not closed.		
Project Participant response		**Date:** 27/03/2023
The linkage and use of the AR5 values were put in the MR, section 2.2 and 8.3, equation 8. The values in Table 11 have also been updated The link on the excel file has been updated		
Documentation provided by the Project Participant		
Link on the excel file : https://drive.google.com/file/d/1QQtpS_4RpcF9rKIARd-eBE0YMeRa5H4C		
VVB Assessment		**Date:** 05/04/2023

Sections 2.2.2 and Annex 4: 8.3 have been updated and deemed correct. The values in Table 11 have been updated and deemed correct. The link on the excel file has been updated and deemed correct. Therefore, this NC is closed.

NC ID: Major	**06**	**Date: 30/12/2022**
Description of NC		
Regarding the following bibliography references: RAZAKAMANARIVO et al. (2013), Chave et al. (2014), Vielledent et al. (2012), Zane et al. (2009), Perr-FH and LRA (2021), Ramananantoandro et al. (2015), Ramananantoandro et al. (2017), Delaney et al. (1999); Brown et al. (2001), Olofsson et al. (2004). A complete reference is not provided (as an Annex at the end of the MR), and the source (document) was not provided to AENOR.		
Project Participant response		**Date:** 06/02/2023
References added to the documents as follow : Razakamanarivo et al.2012-Production de biomasse souterraine et relations allométriques d'une plantation de taillis d'eucalyptus dans les hautes terres centrales de Madagascar Vieilledent, G., Vaudry, R., Andriamanohisoa, S. F. D., Rakotonarivo, O. S., Randrianasolo, H. Z., Razafindrabe, H. N., Rakotoarivony, C. B., Ebeling, J., &Rasamoelina, M. (2012). A universal approach to estimate biomass and carbon stock in tropical forests using generic allometric models. Ecological Applications, 22(2), 572–583. http://www.ncbi.nlm.nih.gov/pubmed/22611855 Zanne, Amy E. et al. (2009), Data from: Towards a worldwide wood economics spectrum, Dryad, Dataset LRA.2021-Livrable 6A : Rapport final-Equation allométrique pour estimer la biomasse aérienne-Forêts sèches de l'Ouest de Madagascar Ramananantoandro et al (2015)- Estimations de la biomasse aérienne de la forêt dans une forêt tropicale humide à Madagascar : nouvelles perspectives à partir de l'utilisation des données de gravité spécifique du bois Ramananantoandro et al (2019)- Quels modèles allométriques sont les plus appropriés pour estimer la biomasse aérienne dans les forêts secondaires de Madagascar avecRavenala madagascariensis? Olofsson, P., Foody, G. M., Herold, M., Stehman, S. V., Woodcock, C. E., Wulder, M. A. (2014): Good practices for estimating area and assessing accuracy of land change. Remote Sensing of Environment, 148, 42-57. Brown, S. L., Schroeder, P., & Kern, J. S. (1999). Spatial distribution of biomass in forests of the eastern USA. Forest Ecology and Management, 123(1), 81–90. doi:10.1016/s0378-1127(99)00017-1 Delaney, M., Brown, S., Lugo, A., Torres-Lezama, A. & Quintero, N.B. (1998) The quantity and turnover of dead wood in permanent forest plots in six life zones of Venezuela. Biotropica, 30, 2– 11.		

Documentation provided by the Project Participant
Link to documents : Razakamanarivo et al.2012 : DOI ://10.1016/j.biombioe.2011.01.020 Vieilledent et al 2012 : http://www.ncbi.nlm.nih.gov/pubmed/22611855 Zanne et al, 2009 : https://doi.org/10.5061/dryad.234 LRA. 2021 : Cf Google drive NC 6 Ramananantoandro et al.2015 : DOI : /10.1007/s11676-015-0029-9 Ramananantoandro et al.2019 https://www.sciencedirect.com/science/article/pii/S2468227619307082 Delaney et al 1998 : DOI://10.1111/j.1744-7429.1998.tb00364.x Brown et al. 1999 : doi:10.1016/s0378-1127(99)00017-1 Olofsson et al., 2014 : https://reddcr.go.cr/sites/default/files/centro-de-documentacion/olofsson_et_al._2014_-_good_practices_for_estimating_area_and_assessing_accuracy_of_land_change.pdf

VVB Assessment	Date: 22/02/2023
The references have been updated and deemed correct. Therefore, this NC is closed.	

NC ID: Major	07	Date: 30/12/2022
Description of NC		
The links along the document are broken, as the ones in sections 1.1, 2, 3, 5.1, 6.1, 6.2, Annex 4, etc. Please, review all of them along the document.		
Project Participant response		**Date:** 06/02/2023
Links are updated		
Documentation provided by the Project Participant		
VVB Assessment		**Date:** 22/02/2023
The links have been updated but they redirect to the front page of the Ministry. Please update so they can correctly reference each document. Therefore, this NC is not closed.		
Project Participant response		**Date:** 27/03/2023
The links for each document have been updated		
Documentation provided by the Project Participant		
VVB Assessment		**Date:** 05/04/2023
The links have been correctly updated. Therefore, this NC is closed.		

NC ID: Major	09	Date: 30/12/2022
Description of NC		

In MR section 2.1, the role of communities in the forest monitoring system in accordance with the indicator 16.1 is not demonstrated. Please provide evidence of: - 10 participatory patrol missions in Makira. - At the level of the Masoala initiative: 5 offenses prosecuted and evidence of 5 ground patrols.	
Project Participant response	**Date:** 06/02/2023
Please find the documents below	
Documentation provided by the Project Participant	
Results of patrol missions in Makira :https://drive.google.com/file/d/10VbhebJwqbyMxJP3oSGdkUnn2MPxTjoY Patrols for Masoala: https://drive.google.com/file/d/1hSi9sfSgbZ7RbyY5KXWmmIUSacRP200T	
VVB Assessment	**Date:** 22/02/2023
The evidence provided is deemed correct. Therefore NC 09 is closed	

NC ID: Major	**10**	**Date: 30/12/2022**
Description of NC		
In MR sections 2.2.2 and 8.3, chapter 2.2.1 mentioned doesn't exist in the GFOI MGD 3.1. From the link it is apparent it is used the MGD 2.0 version. In MR section 2.2, chapter 3.1.2 mentioned doesn't exist in the GFOI MGD 3.1 (it corresponds to section 2.5.1.2). Please update mentions to GFOI to the proper version used.		
Project Participant response		**Date:** 06/02/2023
Changed the chapter number to align with the new GFOI MGD 3.1, text now reads *"following the recommendations set in chapter 2.5.1.1 of the GFOI …"* *"following the recommendation set in chapter 2.5.1.2 of the GFOI …"*		
Documentation provided by the Project Participant		
Link at the bottom of page changed to version 3.1 *https://www.reddcompass.org/mgd/resources/GFOI-MGD-3.1-en.pdf*		
VVB Assessment		**Date:** 22/02/2023
The link with the correct version ofGFOI MGD has been updated. Therefore, this NC is closed.		

NC ID: Major	**11**	**Date: 30/12/2022**
Description of NC		
Please, specify in which IPCC AR are based the values for GWP (it appears it is the 100-yr of AR4) reported in MR section 2.2.2. Please, justify the election of these values over the most recent available.		
Project Participant response		**Date:** 06/02/2023
GWP value for the previous version of MR are based of IPCC AR4, 100-years. Values were updated based on the last available and recommended for use by the IPCC which is the IPCC AR5, it uses the		

100 years period.
Documentation provided by the Project Participant
AR5 value, table 8.A.1 at page 731 available here https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf and AR4 available here https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg1-chapter2-1.pdf

VVB Assessment	**Date:** 22/02/2023
Please update in the MR the complete reference (AR5 and link) to the Global Warming Potential of CH4 and N2O usedinEquation 8 of section 2.2.2 and Annex 4: section 8.3. Also, an inconsistency remains between the GWP values of CH4 and N2O reported in Table 11 of section 5.2 and those reported in Equation 8 of section 2.2.2 and Annex 4: section 8.3. Therefore, this NC is not closed.	

Project Participant response	**Date:** 27/03/2023
The link and use of the AR5 values were put in the MR, section 2.2 and 8.3, equation 8. The values in Table 11 have also been updated	
Documentation provided by the Project Participant	

VVB Assessment	**Date:** 05/04/2023
Sections 2.2.2 and Annex 4: 8.3 have been updated and deemed correct. The values in Table 11 have been updated and deemed correct. Therefore, this NC is closed.	

NC ID: Major	**12**	**Date: 30/12/2022**
Description of NC		
In MR sections 3.1, 3.2, 8.3, 9.1 the name of the file "MADA_Calcul_RE_V00 " is not updated with the latest version provided.		
Project Participant response		**Date:** 06/02/2023
Sections updated with the correct version of the excel file		
Documentation provided by the Project Participant		
Title of the file : MADA_CalculRE_v00_20211109_update_for_ER_Report_version_6 Link : https://drive.google.com/file/d/1QQtpS_4RpcF9rKIARd-eBE0YMeRa5H4C		
VVB Assessment		**Date:** 22/02/2023
The sections have been updated and deemed correct. Therefore, this NC is closed.		

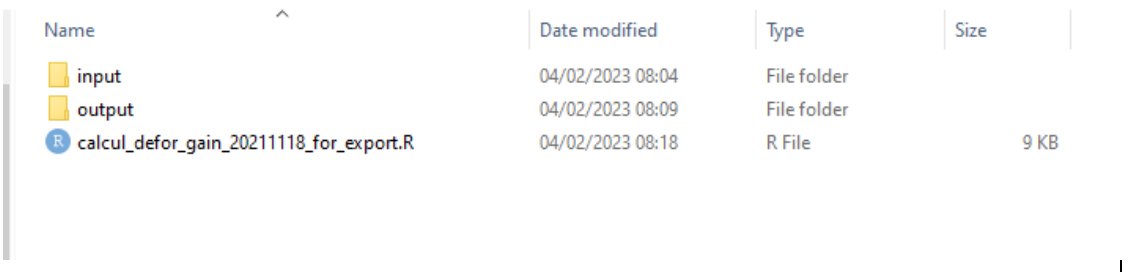
NC ID: Major	**13**	**Date: 30/12/2022**
Description of NC		
Table of relations used for calculating heights is missing the relative error, as stated in the section 3.1.		

Project Participant response	**Date:** 06/02/2023
For this monitoring period, Calculation of of biomass and emissions are based on real on the ground measurement of all the parameters (diameter at breast height DBH, Heights) and no extrapolation was used. The formula for calculation of heights presented was provided to be used in the future where there is no possibility to make the height measurement in the field. The reported emissions and removals are not affected by the error margins in this table.. *The table was from earlier analysis, and it is now impossible to evaluate the error/bias without the original data, so we just left the table and added N/A to the error margin columns. Newer allometric equation and analysis with bias is added to the table. These will be the one recommended for use.*	
Documentation provided by the Project Participant	
Chave et al., 2014 DOI: 10.1111/gcb.12629 Vieilledent et al., 2012http://www.ncbi.nlm.nih.gov/pubmed/22611855	
VVB Assessment	**Date:** 22/02/2023
The explanation provided clarified the issue and it is deemed correct. However, please include this justification in the section 3.1 of the MR, so it can be self-explanatory. Therefore, this NC is not closed.	
Project Participant response	**Date:** 27/03/2023
The explanation is put in the Monitoring report as requested; it should be self-explanatory now	
Documentation provided by the Project Participant	
VVB Assessment	**Date:** 05/04/2023
Section 3.1 has been updated and deemed correct. Therefore, this NC is closed.	

NC ID: Major	**14**	**Date: 30/12/2022**
Description of NC		
In section 3.1, after Table 8, it is stated that 548 were the total records. However, it does not match Table 7.		
Project Participant response		**Date:** 06/02/2023
The number of total records were indeed 543 (not 548 as in the text), there was a transcription error, however, it does not affect the following calculation as the number of records used to evaluate the proportion comes from the table.		
Documentation provided by the Project Participant		
We are attaching the confusion matrix table (corresponding to table 7) "matrice_confusion_qaqc_20220422_all.xlsx", with the formula for the computation of table 8. The total records is 543 (in cell J10 of the sheet matrice_confusion_qaqc. The second sheet (errors) contain the formatted table imported to table 8. *https://drive.google.com/file/d/1CfQFtmUIsSfHh-4sV0yhOtEP6gF-PMmj/view?usp=share_link*		
VVB Assessment		**Date:** 22/02/2023
The section has been updated and deemed correct with supporting evidence. Therefore, this NC is closed.		

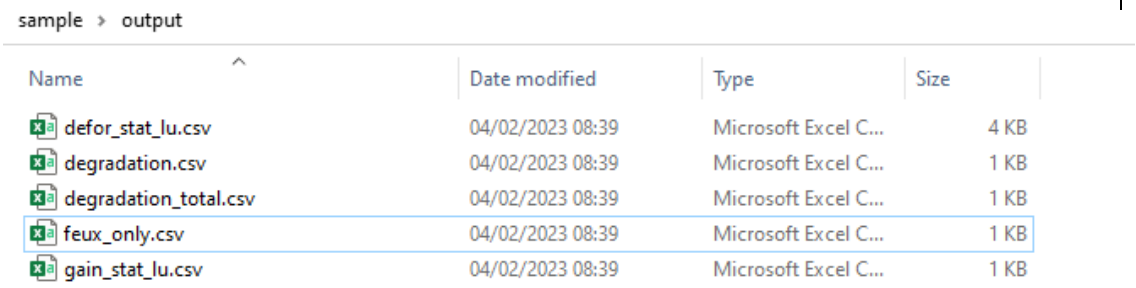
NC ID: Major	15	Date: 30/12/2022
Description of NC		
In section 3.1, parameter 'AGB_(Before,j) AGB_(After,j) AGB_(Before,j) AGB_(After,j)' row 'QA/QC procedures applied' it is stated that 'a team of supervisor spot checked 5% of the plots'. Please provide evidence of this.		
Project Participant response		**Date:** 06/02/2023
28 amongst the 478 plots were spot-checked by the supervision team, which is equivalent to 5.78% of the total plots. It is explained in the mid-term report of humid and dry inventory forest		
Documentation provided by the Project Participant		
The mid-term report is attached with the document to provided to AENOR Link to Rapport_mi_parcours_Humide et sèche_2021: https://drive.google.com/file/d/1aivBYotPOVbIwgga-Dw-g4hGOSspnThp		
VVB Assessment		**Date:** 22/02/2023
The explanation is deemed correct with supporting evidence. Therefore, this NC is closed.		

NC ID: Major	16	Date: 30/12/2022
Description of NC		
In MR section 3.1 (parameter $SOC_{Before,j}SOC_{After,i}$; row 'Source of data') and in section 8.3 (parameter $SOC_{Before,j}SOC_{After,i}$; row 'Source of data') it is mentioned Equation 3; however that is not the reference of the equation used.		
Project Participant response		**Date:** 06/02/2023
The equation used is from the PERR-FH report, p.31		
Documentation provided by the Project Participant		
Link to PERR-FH Rapport livrable 5 final 3 https://drive.google.com/file/d/1r5a7zylbp0XJala0dY4MJT0Lhxv0URT_		
VVB Assessment		**Date:** 22/02/2023
The audit team has reviewed the PERR-FH Rapport livrable 5 final 3, p.31, and found the Equation used in Sections 3.1 and 8.3 of the MR for $SOC_{Before,j}SOC_{After,i}$. The MR shall be updated, to include the reference of this equation based on the report shared with the audit team. Therefore, this NC is not closed.		
Project Participant response		**Date:** 27/03/2023
The link is inserted in section 3.1 and 8.3 of the MR		
Documentation provided by the Project Participant		
The link is inserted in section 3.1 and 8.3 of the MR and a short text added to explain what is SOC before and what is SOC after		
VVB Assessment		**Date:** 05/04/2023
Sections 3.1 and 8.3 have been updated and deemed correct. Therefore, this NC is closed.		

NC ID: Major	17	Date: 30/12/2022
Description of NC		
Section 4.2 from the MR has missing information from the MR template: - Provide sample calculations using the actual values from section 3 with sufficient information to allow others to reproduce the calculation. - Regarding the reporting period, (step-by-step description of the calculation) clearly describe the steps through which the pro-rata allocation has occurred and how the ERs for the Reporting Period have been calculated.		
Project Participant response		**Date:** 06/02/2023
Sample calculation with step by step instruction was added, and all data input, scripts, used for the calculation provided in a link. *Total emissions for the monitoring period are calculated as the sum of emissions from deforestation, emissions from forest degradation minus removals.* Emission for monitoring period = 7,731,616 + 706,511 - 0 = 8,438,127 tCO2e/year *Reference level (FREL) : 11,849,654 tCO2/year* *Monitored emission: 8,438,127 tCO2/year* *Annual ER for the monitoring period : FREL – Monitored emission = 3,411,528 tCO2/year* *ER for the report period = (Annual ER/365)*Nomber of days during the monitoring period = (3,411,528/365)*285 = 2,663,796 tCO2/year* *Number of ER to FCPF= ER for the report period – Quantity of ERs to be allocated to the Uncertainty Buffer - Quantity of ERs to allocated to the Reversal Buffer – Quantity of ERs to be allocated to the Pooled Reversal Buffer = 2,663,796–213,104–563,659– 122,535 = 1,764,498 tCO2*		
Documentation provided by the Project Participant		
Sample calculation of Emission Reduction In this sample, step by step calculation is shown in processing of the activity data to the generation of the Emissions and Removals. The steps here are already provided in SOP4 Data analysis. **Inputs :** - Activity data table (results from collect earth) as **data_with_stratum_20210928.csv** - Area and weight of each stratum used in the sampling **area_stratum.csv** - Area of ERPAA (calculated from the table above) - R script used to process that data ***calcul_defor_gain_20211118_for_export.R*** - Excel spreadsheet **MADA_CalculRE_v00_20211109_update_for_ER_Report_version_6.xlsx** **Steps** The scripts is designed to read input data from a folder input, and write results in folder output. The folder structure is then arranged so that the R script can find the input and output folder, and should then be arranged as in the picture below:  Now, open the script in R-Studio and change the working directory according to where the file is in		

the computer. Normally, this is the only change to be made on the script and it, but if the activity data have a different name, also change the change the filename.

After the script runs, there will be a few .csv table in the output folder, each of the file corresponds to activity and parameters used to compute the Emissions and removals and values from these files are input into the excel spreadsheet for that purpose.



Defor_stat_lu.csv is the file with the information on deforestation activity. In that file, we are interested in any rows with lu_level2 with the value "FG", these corresponds to change from Forest to Grassland, or any other non-forest land use. In this example, deforestation occurred in two (02) land use types : FHI (Humid intact forest) and FHD (Degraded Humid Forest). Statistics from each are going to be created manually.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		lu_level2	lu_level3	fq_abs	fq_rel	variance	std_error	uncertain	area	CI	stratum	wh			
2	1	FF		297	0.99	1.03E-06	0.001017	0.001691	1223553	2068.672	11	0.177057			
3	2	FF	FHI	1	0.003333	3.47E-07	0.000589	0.290886	4119.707	1198.363	11	0.177057			
4	3	GG		2	0.006667	6.92E-07	0.000832	0.205343	8239.414	1691.905	11	0.177057			
5	4	FF		33	0.22	1.52E-08	0.000123	0.000922	5593.564	5.154712	12	0.003642			
6	5	FF	FHI	3	0.02	1.73E-09	4.16E-05	0.003426	508.5058	1.742103	12	0.003642			
7	6	FG	FHD	72	0.48	2.21E-08	0.000149	0.000509	12204.14	6.216817	12	0.003642			
8	7	FG	FHI	4	0.026667	2.30E-09	4.79E-05	0.002957	678.0077	2.004753	12	0.003642			
9	8	GG		29	0.193333	1.38E-08	0.000117	0.001	4915.556	4.914125	12	0.003642			
10	9	GG	SSar	1	0.006667	5.86E-10	2.42E-05	0.005974	169.5019	1.012623	12	0.003642			
11	10	GG	SSararb	5	0.033333	2.85E-09	5.34E-05	0.002636	847.5097	2.233693	12	0.003642			
12	11	GG	SZararb	3	0.02	1.73E-09	4.16E-05	0.003426	508.5058	1.742103	12	0.003642			
13	12	FF		5	0.033333	0.000102	0.010093	0.498288	160231	79841.2	22	0.688641			
14	13	GG		144	0.96	0.000121	0.011018	0.018888	4614652	87159.54	22	0.688641			
15	14	WW		1	0.006667	2.09E-05	0.004576	1.12947	32046.19	36195.22	22	0.688641			
16	15	FF		258	0.948529	7.29E-07	0.000854	0.001481	421998.5	625.1732	55	0.063736			
17	16	FF	FHI	8	0.029412	4.26E-07	0.000653	0.036534	13085.23	478.0501	55	0.063736			
18	17	GG		6	0.022059	3.22E-07	0.000568	0.042345	9813.919	415.5688	55	0.063736			
19	18	FF		825	0.768156	7.43E-07	0.000862	0.001846	358839.8	662.4935	56	0.066923			
20	19	FF	FHI	5	0.004655	1.93E-08	0.000139	0.049137	2174.787	106.8634	56	0.066923			
21	20	FG	FHD	10	0.009311	3.85E-08	0.000196	0.034664	4349.573	150.7738	56	0.066923			
22	21	GG		232	0.216015	7.06E-07	0.00084	0.006402	100910.1	646.0335	56	0.066923			
23	22	GG	SZararb	1	0.000931	3.88E-09	6.23E-05	0.11008	434.9573	47.88008	56	0.066923			
24	23	WW		1	0.000931	3.88E-09	6.23E-05	0.11008	434.9573	47.88008	56	0.066923			
25															
26															
27															
28															
29															

We know that for estimates from stratified random sampling is as follow :

$$Pi\ (Estimate) = \sum_{i}^{n} (\text{(Relative frequency of stratum)x (Weight of the stratum)})$$

$$Variance = \sum Variance\ per\ stratum$$

$$Standard\ error = \sqrt{Variance}$$

Estimate FHD = 0.48*0.003642 + 0.009311*066923 = *0.002371487*

Variance FHD = 0.00000002208 + 0.00000003847 = 0.00000006054

Standard error FHD = SQRT(0.00000006054) = *0.000246055*

The same calculation is used to calculate the Estimate for FHI,

Estimate FHI = 0.000097131490

Standard error = 0.00004791383

Degradation.csv contains the same information as above but related to the degradation. The same exact calculation apply, in our case, there is only one land use type affected by degradation so the number can be read directly from the table without any more computation

Estimate FHI = 0.002849

Standard error FHI = 0.000891

Feux_only.csv contains the information about activity data that was due to burning. It contains the same information and calculation of the parameters are the same as the other.

Estimate FHD = 0.000128

Standard error FHD = 0.000086143

Gain_stat_lu.csv contains the gain (regeneration, reforestation), with all the statistics like the above, and calculation of the estimate is the same. Only for this case, there are no records of gain, so all parameters are just zero (0).

Emissions and removals

These are the information necessary information needed for the estimation of Activity data, the next step is to plug each number into the appropriate cells in the excel spreadsheet **MADA_CalculRE_v00_20211109_update_for_ER_Report_version_6.xlsx** (this is a guide, so version number would not be relevant). In the tab "DA" (short for donnéesd'activité, French for Activity Data), the monitoring section start at **row 32.** After each parameter are input (Stratified estimate and standard error), activity data for each category is automatically computed, and the emission reduction updated in the tab "Reduction d'émissions".

Title of the file : MADA_CalculRE_v00_20211109_update_for_ER_Report_version_6

Link https://drive.google.com/file/d/1QQtpS_4RpcF9rKIARd-eBE0YMeRa5H4C/view?usp=share_link

VVB Assessment	**Date:** 22/02/2023

Section 4.2 has been completed however, it does not address the request yet: the additional information is focused in the informatics process (software used, files, folders, etc.), but does not explain the process conceptually according the methodology (including hypothesis, equations, etc.) used and how the parameters (all of them) reported in section MR 3.1 and 3.2 were used.

Therefore, this NC is not closed.

Project Participant response	**Date:** 27/03/2023

Addition in section 4.2 of the MR

USE OF PARAMETERS (ACTIVITY DATA AND EMISSION FACTORS) FOR THE CALCULATION OF FREL AND EMISSION MONITORING:

-Calculation of the FREL (cf MADA Calcul RE file, Niveau de Référence sheet)

*Identification of reference periods

The reference period must be identified first. This period lasts 10 years and is the period before the start of the project or before the monitoring period. The case of the ERPAA here is therefore 2006 to 2015.

*Definition of REDD+ activities considered (deforestation, degradation, enhancement, etc)

The REDD+ activities considered need to be well defined : are the calculating emissions from deforestation or degradation or both ? Is enhancement or reforestation also considered for the

calculation of removals ?

If so, the calculations described by REDD+ activities are performed in the MADA Calcul RE excel file, Niveau de Reference sheet.

*Preparation of ADs (data collection, processing of results by script, production of results)

Here, we begin by collecting the data needed to calculate the FREL. In this case, the national grid is used to sample the points to be collected according to the zones to be considered or zones already delimited. The objective is to know the change of land use of these samples during two different periods. Here, we use different images to collect in this case high resolution images such as Google Earth, landsat, sentinel, planet, etc…

These samples have specific sizes according to the definition of forests at the country level. The case here, square 70m*70m because the minimum area according to the new definition of forests in Madagascar is 0,50ha. Once the sample sizes are defined, we proceed to the actual data collection using the software collect earth.

At the end of the collection, we obtain information of the csv points identified by sample. This csv file can be changed to excel.

This consolidated csv file of all zones will be used in the script software to output statistics by REDD+ activity and by stratum or land use type (area, absolute frequency, relative frequency, variance, standard error, uncertainty, confidence interval, etc…) (see matrix example, statistical results from script processing, deforestation activity, below)

N°	alu_2006_sub	freq_abs	freq_rel	variance	std_error	uncertainty	Area	ci
1	AF	1	0.0002321	5.38701e-08	0.000232099	1.64501653	1605.10329	2640.421
2	FHD	139	0.0322655	7.24802e-06	0.002692215	0.13727497	223109.3581	30627.331
3	FHI	17	0.00394614	9.12389e-07	0.000955190	0.39823335	27286.7560	10866.496
4	FSS	1	0.000232126	5.38701e-08	0.000232099	1.64501653	1605.1032	2640.421

* Update of data by REDD+ activities on stratified estimates or estimates, standard errors through statistical results of the ADs (in the file MADA CalculRE, DA sheet, entitled Niveau de Référence)

Once the matrices from the scripts or statistical results are output, they can be used in the DA sheet by filling the estimate and standard error lines with freq_rel and std_error

*Update of biomass data according to the latest inventories (Excel table, Biomasse sheet)

The values of biomass, Stdev, Sample number, SE, Relative error, etc have been updated according to the results of the last forest inventory (here, it is the 2020 inventory).

Note that the formula of Veilledent et al (2012) was used for the calculation of aboveground biomass. Indeed, the development of this formula involved data from the forests of eastern Madagascar. Also, the local values obtained from local measurements are the most recommended and approximate the realities. The formula is :

$$AGB = EXP(-1.103 + 1.994 * Ln(DBH) + 0.317 * Ln(H) + 1.303 * Ln(\rho)$$

with :

AGB : Above ground biomass, expressed in tons of dry matter (tdm)

ρ : infra density of wood (t/m³)

DBH : Diameter at Breast Height (DBH) (cm)

H : Total height of the tree (m)

*Calculation of the FREL itself (Excel table, Niveau de référence sheet)

The calculations of emissions or removals by REDD+ activities are done automatically according to the formulas, and the value of the FREL appears automatically at the bottom (see table whose title is highlighted in green) by following the formula :

FREL= Deforestation Emission + Degradation Emission -Absorption

Thus, we obtain the average emissions during the reference period, and the FREL value appears in the first row of the column « Total annual historical GHG emissions », here it is the value 11,849,654 tCO2/year.

It should be noted that the calculation of emissions per REDD+ activity follows the formula :

Emission (tCO2/year) = Activity Data (AD) x Emission Factors (EF)

AD: Land use change area: Example: deforestation area, obtained through data collection with the collect earth software, expressed in ha/year

EF: It is the amount of CO2 emitted when clearing 1 ha of forest, expressed in tCO2/ha and follows the following formula:

$\boldsymbol{EFj}$ = (Biomass Before,$\boldsymbol{j}$ – Biomass After,$\boldsymbol{j}$) $\boldsymbol{xCFX}$ 44/12

With

: Emission factor for transition j in tons CO2 ha-1.

Biomass Before,$\boldsymbol{j}$: Biomass stock before conversion from forest to non-forest stage, for transition j, in tons of dry matter ha-1

Biomass After, : Biomass stock after conversion from forest to non-forest stage, for transition j, in tons of dry matter ha-1. In the case of dead biomass, the in accordance with the IPCC recommendations for Level 1, the value was considered to be zero.

: Fraction of carbon in dry biomass.

44/12 : Carbon expansion factor at CO2.

-Calculation of emissions for the monitoring period

*Identification of monitoring periods

First, identify the years of emissions tracking. Here, it is the year 2020

*Definition of REDD+ activities considered (deforestation, degradation, enhancement, etc)

The REDD+ activities considered need to be well defined : are the calculating emissions from deforestation or degradation or both ? Is enhancement or reforestation also considered for the calculation of removals ?

If so, the calculations described by REDD+ activities are performed in the MADA Calcul RE excel file, Suivi sheet.

*Preparation of the AD (data collection, development of the stratification map, confusion matrix, production of results)

We start with the delimitation of the considered areas. We then proceed to the downloading of images (date 1 and date 2) for the stratification map. We work on the classification of images with ROI. Then, we proceed to the sampling of the points to collect. Define the sample sizes according to the definition of forests and finally the collection of data itself using the software collect earth and using different images (Google earth, landsat, sentinel, etc).

At the end of the collection, we obtain information of the csv points identified by sample. The csv file can be changed to excel.

This consolidated csv file of all zones will be used in the script software to output statistics by REDD+ activity and by stratum or land use type (area, absolute frequency, relative frequency, variance, standard error, uncertainty, confidence interval, etc…) (see matrix from example, statistical results from script processing, deforestation activity (FG, Forest to Grassland), below)

N°	lu_lev2	lu_lev3	fq_abs	fq_rel	variance	std_error	uncertainty	area	CI	stratum	wh

1	FF		297	0,99	1,03E-06	0,001017	0,001691	1223553	2068,672	11	0,177057
2	FF	FHI	1	0,003333	3,47E-07	0,000589	0,290886	4119,707	1198,363	11	0,177057
3	GG		2	0,006667	6,92E-07	0,000832	0,205343	8239,414	1691,905	11	0,177057
4	FF		33	0,22	1,52E-08	0,000123	0,000922	5593,564	5,154712	12	0,003642
5	FF	FHI	3	0,02	1,73E-09	4,16E-05	0,003426	508,5058	1,742103	12	0,003642
6	FG	FHD	72	0,48	2,21E-08	0,000149	0,000509	12204,14	6,216817	12	0,003642
7	FG	FHI	4	0,026667	2,30E-09	4,79E-05	0,002957	678,0077	2,004753	12	0,003642
8	GG		29	0,193333	1,38E-08	0,000117	0,001	4915,556	4,914125	12	0,003642
9	GG	SSar	1	0,006667	5,86E-10	2,42E-05	0,005974	169,5019	1,012623	12	0,003642
10	GG	SSararb	5	0,033333	2,85E-09	5,34E-05	0,002636	847,5097	2,233693	12	0,003642
11	GG	SZararb	3	0,02	1,73E-09	4,16E-05	0,003426	508,5058	1,742103	12	0,003642
12	FF		5	0,033333	0,000102	0,010093	0,498288	160231	79841,2	22	0,688641
13	GG		144	0,96	0,000121	0,011018	0,018888	4614652	87159,54	22	0,688641
14	WW		1	0,006667	2,09E-05	0,004576	1,12947	32046,19	36195,22	22	0,688641
15	FF		258	0,948529	7,29E-07	0,000854	0,001481	421998,5	625,1732	55	0,063736
16	FF	FHI	8	0,029412	4,26E-07	0,000653	0,036534	13085,23	478,0501	55	0,063736
17	GG		6	0,022059	3,22E-07	0,000568	0,042345	9813,919	415,5688	55	0,063736
18	FF		825	0,768156	7,43E-07	0,000862	0,001846	358839,8	662,4935	56	0,066923
19	FF	FHI	5	0,004655	1,93E-08	0,000139	0,049137	2174,787	106,8634	56	0,066923
20	FG	FHD	10	0,009311	3,85E-08	0,000196	0,034664	4349,573	150,7738	56	0,066923
21	GG		232	0,216015	7,06E-07	0,00084	0,006402	1009101	646,0335	56	0,066923
22	GG	SZararb	1	0,000931	3,88E-09	6,23E-05	0,11008	434,9573	47,88008	56	0,066923
23	WW		1	0,00	3,88E-09	6,23E-05	0,1100	434,95	47,88008	56	0,066

				0931			8	73			923

Result after manual processing of this result using the formula, FG deforestation case, : (stratified estimate = fq_rel*wh) ; (Variance = Variance described in the table above) ; (Standard error = Square root of Variance) :

Total area	6980308,19
T student	1,645637431

lu category	FHI	FHD
Stratified estimate	0,000097	0,002371487
Variance	0,000000	6,05E-08
Standard error	0,000048	0,000246055
Margin of error (90% CI)	0,000079	0,000404918
Relative Margin of error (90% CI)	0,811774	17%
Area (ha)	678,007733	16553,71248
standard error (ha)		

* Update of data by REDD+ activities on stratified estimates or estimates, standard errors through statistical results of the ADs (in the file MADA CalculRE, DA sheet, entitled Suivi)

Once the matrices from the scripts or statistical results are output, they can be used in the DA sheet by filling the estimate and standard error lines with freq_rel and std_error

*Update of biomass data according to the latest inventories (Excel table, Biomasse sheet)

The values of biomass, Stdev, Sample number, SE, Relative error, etc have been updated according to the results of the last forest inventory (here, it is the 2020 inventory).

Note that the formula of Veilledent et al (2012) was used for the calculation of aboveground biomass. Indeed, the development of this formula involved data from the forests of eastern Madagascar. Also, the local values obtained from local measurements are the most recommended and approximate the realities. The formula is :

$$AGB = EXP(-1.103 + 1.994 * Ln(DBH) + 0.317 * Ln(H) + 1.303 * Ln(\rho)$$

with :

AGB : Above ground biomass, expressed in tons of dry matter (tdm)

ρ : infra density of wood (t/m³)

DBH : Diameter at Breast Height (DBH) (cm)

H : Total height of the tree (m)

*Calculation of the monitoring emissions itself (Excel table, Suivi sheet)

The calculations of emissions or removals by REDD+ activities are done automatically according to the formulas, and the value of the monitoring emission appears automatically at the bottom (see table whose title is highlighted in green) by following the formula :

Monitoring Emission= Deforestation Emission + Degradation Emission -Absorption

Thus, the average emissions during the monitoring period are obtained, and the value of the monitoring emission appears in the first row of the column « Total annual historical GHG emissions », here it is the value 8,438,127 tCO2/year.

It should be noted that the calculation of emissions per REDD+ activity follows the formula :

Emission (tCO2/year) = Activity Data (AD) x Emission Factors (EF) AD: Land use change area: Example: deforestation area, obtained through data collection with the collect earth software, expressed in ha/year EF: It is the amount of CO2 emitted when clearing 1 ha of forest, expressed in tCO2/ha and follows the following formula: $\boldsymbol{EFj}$ = (Biomass Before,$\boldsymbol{j}$ – Biomass After,$\boldsymbol{j}$) $\boldsymbol{xCFX}$ 44/12 With : Emission factor for transition j in tons CO2 ha-1. Biomass Before,$\boldsymbol{j}$: Biomass stock before conversion from forest to non-forest stage, for transition j, in tons of dry matter ha-1 Biomass After, : Biomass stock after conversion from forest to non-forest stage, for transition j, in tons of dry matter ha-1. In the case of dead biomass, the in accordance with the IPCC recommendations for Level 1, the value was considered to be zero. : Fraction of carbon in dry biomass. 44/12 : Carbon expansion factor at CO2. -Calculation of the Emission Reduction *Update the monitoring period (expressed in days) in the Excel table, Reduction d'émission sheet This update or calculation of the number of monitoring days will be necessary if the monitoring period does not cover a full year, i.e. different from 360 days, and if the monitoring period starts for example in the middle of the year (here, beginning of the period = March 22, 2020). The calculation of the number of monitoring days is as follows : (December 31, 2020-March 22, 2020)+1 = 285 days (see line entitled Length of the Reporting period/Length of the Monitoring Period (# days/# days) *Update the different parameters of the table to have the number of emission reductions to sell These parameters are designated by the letters A, B, C, D, E, F, G, H, I, J, K, L The value of these parameters are obtained either in the MR (example : 28%, Total reversal risk) or in the Monte Carlo excel file (example : 8% conservativeness factor designated uncertainty discount)
Documentation provided by the Project Participant

VVB Assessment	**Date:** 05/04/2023
Section 4.2 has been completed to explain the process conceptually according the methodology (including hypothesis, equations, etc.) used and how the parameters reported in section MR 3.1 and 3.2 were used. Therefore, this NC is closed.	

NC ID: minor	**18**	**Date: 30/12/2022**
Description of NC		
According to MR template, please provide more regarding 'the design and provide evidence of the implementation and operation of an ER transaction registry in accordance with the requirements of the Methodological Framework' in section 6.3.		
Project Participant response		**Date:** 06/02/2023
In order to avoid any incompatibility in the registry and accounting systems, Madagascar has chosen to use the FCPF registry to issue and manage all the Program's RE units. CATS is the only registry that will be used. Another system called "Information System on REDD+ Initiatives and Programs" (temporarily unavailable due to end of hosting contract) has been set up to manage the existence of projects and		

ensure that initiatives developed do not overlap. This system assists in the implementation and monitoring of field activities but does not generate or manage any RE Unit or title. It should also be noted that only the Government through the Ministry of the Environment has the capacity to sign payment agreements and to market Emission Reductions. It is this same entity that carries out the validation of carbon projects (including on voluntary markets), and which also makes the corresponding adjustment related to the NDC to avoid double counting.
Documentation provided by the Project Participant
Legal note on titles transfer: https://www.environnement.mg/?wpdmpro=note-juridique-sur-le-transfert-des-titres#

VVB Assessment	**Date:** 22/02/2023
Project Participant Response shall be included in an updated MR, as per the requirements of the MR Template of Section 6.3. Moreover, more information regarding evidence of the implementation and operation of an ER transaction shall be included, as per compliance with the MR Template. Therefore, this NC is not closed.	
Project Participant response	**Date:** 27/03/2023
The first point is already in the report. And the country has already submitted a document approving the use of the FCPF registry for Program REs To give you an overview of the national transactional ledger, please find below the final design deliverable. While reiterating that only the FCPF registry will be used to issue titles of REs for the ERPAA.	
Documentation provided by the Project Participant	
https://drive.google.com/file/d/1MFQ6g4Xja6nRyGdQUnfPkdzFQhlfrweo	
VVB Assessment	**Date:** 05/04/2023
Section 6.3 has been updated and deemed correct. Therefore, this NC is closed.	

NC ID: minor	**19**	**Date: 30/12/2022**
Description of NC		
Provide an explanation in the MR about why sections 7.1 and 7.2 are not applicable.		
Project Participant response		**Date:** 06/02/2023
As this is the first monitoring period, there is no “previous” monitoring period and there is no reversals. Hence, section 7.1 and 7.2 is not applicable		
Documentation provided by the Project Participant		
VVB Assessment		**Date:** 22/02/2023
The explanation provided is deemed correct. However, please include this justification in the sections 7.1 and 7.2 of the MR, so it can be self-explanatory. Therefore, this NC is not closed.		
Project Participant response		**Date:** 27/03/2023
The justification has been inserted in section 7.1 and 7.2		

Documentation provided by the Project Participant	
VVB Assessment	**Date:** 05/04/2023
Sections 7.1 and 7.2 have been updated and deemed correct. Therefore, this NC is closed.	

NC ID: minor	**20**	**Date: 30/12/2022**
Description of NC		
In section 7.3: - In addition to the Risk Factors listed in the Buffer Guidelines, indicate if other Reversal Risk factors with an impact on large-scale deforestation/degradation, such as economic or political factors, would be applicable. - It is not indicated how the ER Program' design and implementation will mitigate significant risks of Reversals beyond the Crediting Period, according to MF Indicator 18.2.		
Project Participant response		**Date:** 06/02/2023

The reversal risk assessment using the Buffer Guidelines has not changed since the preparation of the ERP-AA final ERPD. Therefore, no risk other than the 4 listed in the Buffer Guidelines has been identified.

The program lasts for 5 years and actually, the largest payment of ERs from the program comes at the end of the third period, i.e. beyond the duration of the ERPA. These funds are intended to sustain the activities carried out under the program, including those that strengthen community livelihoods and reduce the risks of reversal.

Indeed, the Program's benefit-sharing plan provides for the use of carbon revenues to sustain and increase the Program's activities both during the Program and beyond.

It is also important to note that the governance of the REDD+ mechanism and the Program was developed with a view to enhancing existing structures (public and administrative structures), mobilizing local actors (based communities and delegated managers) and ensuring that at the end of the Program, all structures and capacities remain and continue to operate.

Among these reversal management activities, mitigation measures have been mentioned on the following table as a result of the reversal risk assessment.

Risk factor	Mitigation measures
Lack of long term effectiveness in addressing underlying drivers	**Is the program able to link REDD+ to economic activities and development?** 1/ In the context of Madagascar, the main risks of ineffectiveness within the area of the project are associated with the practice of slash and burn agriculture ("Tavy") and uncontrolled extraction of wood energy. Both practices are largely associated with poverty of rural households in Madagascar, a situation exacerbated during periods where households are facing food emergencies. These risks are of anthropogenic origin. Mitigation measures: The activities of the program are designed particularly to address these practices. To do so, Act AD1: (i) Development of infrastructures (construction of hydro-agricultural dam), Act AD2: (ii) Development and extension of food crops and income-generating Activities and (iii)Propagation, intensification and promotion of cash crops and agroforestry are dedicated to the improvement of agricultural practices and access to market in order to increase

	productivity and at the same time increase revenues of local populations, allowing them to progressively reduce their dependence on subsistence agriculture. 2/ The commodities driving deforestation are products from permanent crops: vanilla, cloves, and coffee, high value products that are generating higher incomes to households and have a positive impact on the local economy. During the reference period, these commodities had a two-faceted impact on deforestation: on one hand, it can incentivize local populations to cut forest parcels in order to implement production; on the other hand, such production is also implemented on fallow land or secondary forest, allowing their maturation and increasing carbon stocks on land with relatively low carbon content. Mitigation measure: The program will implement measures to reduce the risk that such commodities trigger deforestation and are systematically produced under agroforestry systems, thus participating in carbon stock enhancement when settled on fallow land or secondary forest. Most of the protected areas are already fostering such practices within their surrounding agriculture belt, with positive experiences and feedback, and the PADAP will also implement agroforestry in 3 watersheds of the program. Activity AD2 of the ER-P is dedicated to agroforestry, and more globally, the program will try to increase sustainable production of commodities within the jurisdiction 3/ An additional risk, identified through experience, is that success in the project/program areas, if associated with important positive economic impact, can lead to an influx of people that are not part of the target population thus leading to unsustainable practices in the end. This context is particularly witnessed in projects/programs of relatively short lifespan. Mitigation measures: The ER Program design focuses on the development of activities that can be inclusive of incoming populations through identification and promotion of "no-land" activities, income-generating activities that are not dependent on land ownership, and will limit anarchic land grabs that may be associated with these practices. "No-land" activities are designed to strengthen the value chains that will reduce pressures on forest degradation directly and also indirectly through decreasing the demand for extensive land practices. **Is the relevant legal and regulatory environment conducive to REDD+ objectives?** The government of Madagascar has taken several legal and regulatory steps to integrate REDD+ into the legal framework for environment and climate change mitigation in the country. Several legal steps have recently clarified key legal and institutional elements of REDD+ and have created a sufficient basis on which to plan implementation. In addition, as a Strategic direction 1 in the national REDD+ strategy, the ERPAA aims to improve the political, legal, institutional and financial framework along with governance.

Documentation provided by the Project Participant	
VVB Assessment	**Date:** 22/02/2023
No changes have been done in section 7.3 to address the request. Therefore, this NC is not closed.	
Project Participant response	**Date:** 27/03/2023
The ER Report has been updated with the explanation above, and more information on how the	

nationally designed framework would ensure sustainability of the program beyond the crediting period
Documentation provided by the Project Participant

VVB Assessment	**Date:** 05/04/2023
Section 7.3 has been updated and deemed correct. Therefore, this NC is closed.	

NC ID: minor	**22**	**Date: 30/12/2022**
Description of NC		
As mentioned in Annex 3, please provide evidence of the following documents: - 03 new contracts for the transfer of management to communities were signed, 15 COBAs were evaluated and 08 contracts were renewed in Makira. - 02 new contracts of management transfer to communities at the CAZ level.		
Project Participant response		**Date:** 06/02/2023
please find the documents below		
Documentation provided by the Project Participant		
MAKIRA 08 contracts renewed management transfer 2020: https://drive.google.com/file/d/1wNjpi0og6NEPE4G8bTJiLDAc479Fb2oT MAKIRA COBA evaluation: https://drive.google.com/file/d/1nnotVXNrLvBCMLe6s-3-xtvsWM8QnY43 MAKIRA 03 new contracts for the transfer of management: https://drive.google.com/file/d/1_MpHgDUrYgce2-wQXVQv3tCgrOWmVqCl CAZ: https://drive.google.com/file/d/1kpyeQ_X6vClS7QIrgusUmqBBwy8D_3LA and https://drive.google.com/file/d/1DO3Sy_rsrVABvE1USP4ABZxpzxrq71VC		
VVB Assessment		**Date:** 22/02/2023
The evidence has been provided and deemed correct. Therefore, this NC is closed.		

NC ID: minor	**23**	**Date: 30/12/2022**
Description of NC		
Section 8.3. In the ¨MADA_Biomasseaerienne et Morte¨ Spreadsheet, the value of Stdev for Degraded humid forest appears as 111,90 instead of 11.90, as stated on the table. Please clarify, and update both the file and the MR with the correct value.		
Project Participant response		**Date:** 06/02/2023
It was a typo error, the correct stdev is 111.90 ; text and table changed accordingly		
Documentation provided by the Project Participant		
Title of the file : MADA_Biomasse_aerienne_et_Morte_20220410_v01 Link : https://drive.google.com/file/d/1Bgm0DqFAFN7zIeeOrGHhYgDaUIycvMa1		
VVB Assessment		**Date:** 22/02/2023
The value has been updated and deemed correct with supporting evidence.		

Therefore, this NC is closed.

NC ID: minor	**24**	**Date: 30/12/2022**
Description of NC		
An exhaustive revision is required, as the document present: 1- Typos and misspellings, 2- Punctuation errors, 3- Font colors or highlighted sentences, 4- Font type mismatches (regarding MR template), like in headers of sections 1, 1.1, 2, etc. 5- Text over figures, 6- Sentences in French (instead of English) 7- Dates in the front page are not reported in the format required (DD-MM-YYYY). Please, also use it in the rest of the document. 8- Figures are not reported in the required international standard format (000,000,000.00, e.g. 1,000 representing one thousand and 1.0 representing one) 9- The footnote "official use" does not appear in the ER template 10- Numbering within section 2.2.2 (after 2.2.2.1) is not correct. 11- Mention to Equation 1 in section 2.2.2 is repeated 12- Throughout the document there is double spacing (e.g. page 49) 13- There are references to tables, figures and equations in the texts whose numbering is not correct.		
Project Participant response		**Date:** 06/02/2023
Revision and proof read of the document undertaken, and changes should be seen on the new version		
Documentation provided by the Project Participant		
VVB Assessment		**Date:** 22/02/2023
The whole document has been reviewed and the NC is closed		

Observations (OBSs)

OBS ID	**01**	**Date: 12/01/2023**
Description of OBS		
Please, provide further explanations about the following statement in section 1.2: "For various reasons, slash-and-burn is the most competitive agricultural system in the country".		
Country participant response		**Date:** 06/02/2023

More explanation to the statement: "For various reasons, slash-and-burn is the most competitive agricultural system in the country" is mentioned here and added in the ER monitoring report: "For various reasons, slash-and-burn is the most competitive agricultural system in the ERP AA region, and is the most commonly practiced. Farmers across Madagascar are reluctant to say they practice tavy, though evidence indicates that slash-and-burn agriculture is widespread. The main indicator of tavy is the stagnation of crop yields, which can only be explained by this practice (a non-tavy, more modern or intensified system would produce measurably higher yields). Increasing household needs often leads to expansion of tavy plots and new deforestation, rather than to agricultural innovation, due to limited access to extension services and technology to support innovative approaches. Agricultural innovation is very low in this area, which relies on traditional seeds, manual plowing, basic equipment, almost nonexistent agricultural supervision, rare use of fertilizers. Lack of available land in plains and lowlands encourages rain-fed cultivation and clearing."
Documentation provided by the Country Participant
The ERPD document: File name: "Final ER PD MDG6_20180606_Posted"

VVB assessment	**Date:** 22/02/2023
The explanation is deemed correct. Therefore, this OBS is closed.	

OBS ID	**02**	**Date: 30/12/2022**
Description of OBS		
The current version of the ER MR is not reported in the table 32 (Document history).		
Country participant response		**Date:** 06/02/2023
Table updated with correct version number		
Documentation provided by the Country Participant		
VVB assessment		**Date:** 22/02/2023
The table has been updated and deemed correct. Therefore, this OBS is closed.		

APPENDIX 2: EVIDENCE PROVIDED BY COUNTRY PARTICIPANT AND REVIEWED BY AENOR

Title	File	Date received/ retrieved
Forest Carbon Partnership Facility (FCPF) Carbon Fund ER Monitoring Report (ER-MR)	ER_monitoring_report_ERPAA_06052023	08/05/2023
Forest Carbon Partnership Facility (FCPF) Carbon Fund ER Program Document (ER-PD)	Final ER PD MDG6_20180606_Posted_0.pdf	15/10/2022
Signed Contract ERPA	Signed Contract ERPA TF0B4710 & TF0B4711.pdf	15/10/2022
Activity Data Reference Data	ad_reference_data_20220411.R	15/10/2022
Emission Reductions Calculation Spreadsheet	MADA_Calcul_RE_20220426_v01.xlsx	15/10/2022
Uncertainty Analysis Spreadsheet	MADA_Uncertainty_Analysis_20220426_v02.xlsx	15/10/2022
rel_defor_matrix_20220429.csv	rel_defor_matrix_20220429.csv	15/10/2022
rel_degrad_matrix_20220429.csv	rel_degrad_matrix_20220429.csv	15/10/2022
rel_fire_matrix_20220429.csv	rel_fire_matrix_20220429.csv	15/10/2022
rel_gain_matrix_20220429.csv	rel_gain_matrix_20220429.csv	15/10/2022
National grid_baovola	Grille_nationale_4km_ERPAA_1_baovola.csv	15/10/2022
National grid_sitraka	Grille_nationale_4km_ERPAA_2_sitraka.csv	15/10/2022
National grid_johary	Grille_nationale_4km_ERPAA_3_johary.csv	15/10/2022
National grid_topa	Grille_nationale_4km_ERPAA_4_topa.csv	15/10/2022
Madagascar National grid	madagascar_grillenational_uot_copy_1_20220404T001458.cep	15/10/2022
ORGANISATION DU CONTROLE QUALITE	ORGANISATION DU CONTROLE QUALITE.docx	15/10/2022
Final Sample	final_sample.csv	15/10/2022

Generate random points	generate_random_points.R	15/10/2022
Madagascar National grid	madagascar_grillenational_uot_copy_1_fr_2020_04_22t10_22_15_fr_2021-06-29T16_04_01.cep	15/10/2022
Distribution of 400 random sample	stratif.jpg	15/10/2022
Topaniaina collected data	Topaniaina_collectedData_earthmadagascar_grillenational_uot_copy_1_on_310821_174330_CSV.csv	15/10/2022
Topaniaina collected data XML	Topaniaina_collectedData_earthmadagascar_grillenational_uot_copy_1_on_310821_174357_ZIP_WITH_XML.zip	15/10/2022
Johary collected data	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_300821_170625_CSV.csv	15/10/2022
Johary collected data XML	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_300821_170701_ZIP_WITH_XML.zip	15/10/2022
Sitraka collected data	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_310821_165551_CSV.csv	15/10/2022
Sitraka collected data XML	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_310821_165632_ZIP_WITH_XML.zip	15/10/2022
Topaniaina collected data	Topaniaina_collectedData_earthmadagascar_grillenational_uot_copy_1_on_310821_165244_CSV.csv	15/10/2022
Topaniaina collected data XML	Topaniaina_collectedData_earthmadagascar_grillenational_uot_copy_1_on_310821_165312_ZIP_WITH_XML.zip	15/10/2022
Baovola collected data	Baovola_collectedData_earthmadagascar_grillenational_uot_copy_1_on_240621_153855_CSV.csv	15/10/2022
Baovola collected data XML	Baovola_collectedData_earthmadagascar_grillenational_uot_copy_1_on_240621_153932_ZIP_WITH_XML.zip	15/10/2022
Johary collected data	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_240621_153524_CSV_Control.csv	15/10/2022
Johary collected data XML	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_240621_153604_ZIP_WITH_XML_Control.zip	15/10/2022
Sitraka collected data	Sitraka_collectedData_earthmadagascar_grillenational_uot_copy_1_on_240621_133610_CSV.csv	15/10/2022
Sitraka collected data XML	Sitraka_collectedData_earthmadagascar_grillenational_uot_copy_1_on_240621_133638_ZIP_WITH_XML.zip	15/10/2022
Topaniaina collected data	Topaniaina_collectedData_earthmadagascar_grillenational_uot_copy_1_on_240621_165952_CSV.csv	15/10/2022
Topaniaina collected data XML	Topaniaina_collectedData_earthmadagascar_grillenational_uot_copy_1_on_240621_170008_ZIP_WITH_XML.zip	15/10/2022

QA/QC	QAQCorganisationcollectePREAA21062021.xlsx	15/10/2022
Baovola collected data	Baovola_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_130712_CSV.csv	15/10/2022
Baovola collected data XML	Baovola_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_130824_ZIP_WITH_XML.zip	15/10/2022
Johary collected data	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_170121_CSV.csv	15/10/2022
Johary collected data XML	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_170214_ZIP_WITH_XML.zip	15/10/2022
Madagascar National grid	madagascar_grillenational_uot_copy_1_fr_2021-07-15T16_28_49.cep	15/10/2022
Johary final sample	sample1_final_enforme_johary.csv	15/10/2022
Baovola final sample	sample2_final_enforme_14092021_1_baovola.csv	15/10/2022
Sitraka final sample	sample2_final_enforme_14092021_2_sitraka.csv	15/10/2022
Topaniaina final sample	sample2_final_enforme_14092021_3_topa.csv	15/10/2022
Sitraka collected data	Sitraka_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_182602_CSV.csv	15/10/2022
Sitraka collected data XML	Sitraka_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_182621_ZIP_WITH_XML.zip	15/10/2022
Topaniaina collected data	Topaniaina_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_173144_CSV.csv	15/10/2022
Topaniaina collected data XML	Topaniaina_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_173226_ZIP_WITH_XML.zip	15/10/2022
Evaluation of uncertainty in a stratified estimate	calcul_uncertainty_v6_20211001.xlsx	15/10/2022
Emission Reductions Calculation Spreadsheet	MADA_Calcul_RE_v05_20211109.xlsx	15/10/2022
Uncertainty Analysis Spreadsheet	MADA_Uncertainty_Analysis_20180523_V03.xlsx	15/10/2022
Above Ground Biomass and Deadwood Spreadsheet	MADA_Biomasse_aerienne_et_Morte_20220410_v01.xlsx	15/10/2022
Activity Data Sampling Design	MADA_AD_Sampling design_20210902_erpaa_20221221.xlsx	22/12/2022

Presentation of the activities of Madagascar Forest Observation Laboratory (LOFM) – National REDD Coordination Office	ppt audit-ENGLISH-v2.pptx	22/12/2022
ad_all_stat_lu.xlsx	ad_all_stat_lu.xlsx	22/12/2022
Emission Reductions Presentation	ER_methodo_2022_Eng.pptx	22/12/2022
Forest Reference Emission Level and Emission Factor Presentation	FREL_and EF_methodo_2022_Eng.pptx	22/12/2022
Emission Reductions Calculation Spreadsheet	MADA_CalculRE_v00_20211109_update_for_ER_Report_version_5.xlsx	22/12/2022
Uncertainty Analysis Spreadsheet	MADA_Uncertainty_Analysis_20180523_V03_for_ER_Report_version_3.xlsx	22/12/2022
rel_defor_matrix.csv	rel_defor_matrix.csv	22/12/2022
rel_degrad_matrix.csv	rel_degrad_matrix.csv	22/12/2022
rel_fire_matrix.csv	rel_fire_matrix.csv	22/12/2022
rel_gain_matrix.csv	rel_gain_matrix.csv	22/12/2022
Steps for ER Calculation	Steps ER Calculation_Eng.docx	22/12/2022
Johary collected data	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_130422_130523_CSV.csv	22/12/2022
Johary collected data XML	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_130422_130600_ZIP_WITH_XML.zip	22/12/2022
Activity Data Reference Data	ad_reference_data_20211210.R	22/12/2022
Stratified estimator	stratified_estimator_ver6_20210930.R	22/12/2022
Johary collected data	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_170121_CSV.csv	22/12/2022
Johary collected data XML	Johary_collectedData_earthmadagascar_grillenational_uot_copy_1_on_270921_170214_ZIP_WITH_XML.zip	22/12/2022
Generate random points demo	generate_random_points_demo.R	22/12/2022
erpaa_stratif_ver_3_0_clip_32739_vf.tif	erpaa_stratif_ver_3_0_clip_32739_vf.tif	22/12/2022

erpaa_stratif_ver_3_0_clip_32739_vf.tif.ovr	erpaa_stratif_ver_3_0_clip_32739_vf.tif.ovr	22/12/2022
erpaa_stratif_ver_3_0_clip_32739_vf.tif.vat.cpg	erpaa_stratif_ver_3_0_clip_32739_vf.tif.vat.cpg	22/12/2022
erpaa_stratif_ver_3_0_clip_32739_vf.tif.vat.dbf	erpaa_stratif_ver_3_0_clip_32739_vf.tif.vat.dbf	22/12/2022
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Final Sample	final_sample.csv	22/12/2022
Final Sample	final_sample.dbf	22/12/2022
Final Sample	final_sample.prj	22/12/2022
Final Sample	final_sample.shp	22/12/2022
Final Sample	final_sample.shx	22/12/2022
Final Sample	final_sample_utm39.csv	22/12/2022
Random Sample	randomSample.csv	22/12/2022
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Standard Operation Procedure. CONCEPTION_REPONSE	SOP_2_CONCEPTION_REPONSE.pdf	22/12/2022
Standard Operation Procedure. COLLECTE_DONNEES	SOP_3_COLLECTE_DONNEES.pdf	22/12/2022
Standard Operation Procedure. ANALYSE_DONNEES	SOP_4_ANALYSE_DONNEES.pdf	22/12/2022
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Engine	engine.txt	22/12/2022
Post_KUB	Post_KUB.R	22/12/2022
FF (Forest to Forest)	FF.cpg	22/12/2022
FF (Forest to Forest)	FF.dbf	22/12/2022
FF (Forest to Forest)	FF.prj	22/12/2022
FF (Forest to Forest)	FF.qpj	22/12/2022
FF (Forest to Forest)	FF.shp	22/12/2022
FF (Forest to Forest)	FF.shx	22/12/2022
FN (Forest to Non-Forest)	FN.cpg	22/12/2022
FN (Forest to Non-Forest)	FN.dbf	22/12/2022
FN (Forest to Non-Forest)	FN.prj	22/12/2022
FN (Forest to Non-Forest)	FN.qpj	22/12/2022
FN (Forest to Non-Forest)	FN.shp	22/12/2022
FN (Forest to Non-Forest)	FN.shx	22/12/2022
NN (Non-Forest to Non-Forest)	NN.cpg	22/12/2022
NN (Non-Forest to Non-Forest)	NN.dbf	22/12/2022
NN (Non-Forest to Non-Forest)	NN.prj	22/12/2022
NN (Non-Forest to Non-Forest)	NN.qpj	22/12/2022
NN (Non-Forest to Non-Forest)	NN.shp	22/12/2022
NN (Non-Forest to Non-Forest)	NN.shx	22/12/2022
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Training Points	training_point.shx	22/12/2022
WW (Water to Water)	WW.cpg	22/12/2022
WW (Water to Water)	WW.dbf	22/12/2022
WW (Water to Water)	WW.prj	22/12/2022
WW (Water to Water)	WW.qpj	22/12/2022
WW (Water to Water)	WW.shp	22/12/2022
WW (Water to Water)	WW.shx	22/12/2022
Confusion Matrix	confusion_matrix.csv	22/12/2022
Error	erreur.csv	22/12/2022
fcc_date1date2.img	fcc_date1date2.img	22/12/2022
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Classification validation 2021 script	classification_validation_2021.R	22/12/2022
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MAKIRA 03 new contracts for the transfer of management	MAKIRA 03 new contracts for the transfer of management.rar	06/02/2023

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Forest Carbon Partnership Facility (FCPF) Carbon Fund ER Monitoring Report (ER-MR)	ER_monitoring_report_ERPAA_03272023_Clean.docx	27/03/2023
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Above Ground Biomass and Deadwood Spreadsheet	MADA_Biomasse_aerienne_et_Morte_20220410_v02_errorremoved.xlsx	27/03/2023
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Document information

Version	Date	Description
1.2	08-May-2023	Report version after FMT and Country Participant' comments.
1.1	27-April-2023	Report version after FMT comments.
1.0	19-April-2023	Final report version after Internal Technical Review.