



Validation Report

Version [3.0]

[May 28, 2021]

[Document Prepared by]



Forest Carbon Partnership Facility (FCPF) Carbon Fund Validation Report (VAR)	
ER Program Name and Country:	Zambézia Integrated Landscape Management Program (ZILMP) Republic of Mozambique
Crediting Period:	01-01-2018 to 31-12-2024
Name of the VVB:	Aster Global Environmental Solutions, Inc.
Contact information of the VVB:	Name: Aster Global Environmental Solutions Contact: Janice McMahon Phone: +1 330.294.1242 ext. 102 Email: jmcmahon@asterglobal.com Address: 3800 Clermont St. NW North Lawrence, OH 44666
Date of the Validation Report:	28 May 2021
Version:	V3.0
Report Approved by:	Shawn McMahon

1. VALIDATION STATEMENT

The review and cross-check of explanations and justifications included in the Monitoring Report dated 18-05-2021 and supporting documents have provided Aster Global with sufficient evidence to determine with a reasonable level of assurance the compliance of the Zambézia Integrated Landscape Management Program (ZILMP) with the applicable partial validation criteria.

The scope covered by the partial validation includes the ER Program’s crediting period (01-01-2018 to 31-12-2024), the reference period (2005-2015), the accounting area (5,310,265 hectares), the REDD Country Participant’s Forest Monitoring System, the national REDD+ Programs and Projects Data Management System and the following GHG sources, sinks, REDD+ activities and carbon pools:

Sources/Sinks/Reservoirs	<p>REDD+ Activities (sources and sinks) Emissions from deforestation – included Emissions from forest degradation – excluded Enhancement of carbon stocks – excluded Sustainable management of forests – excluded Conservation of carbon Stocks – excluded</p> <p>Carbon Pools Aboveground biomass in tress – included Belowground biomass in trees – included Biomass in non-woody vegetation – excluded Dead organic matter – excluded Soil organic carbon – excluded</p> <p>GHGs CO₂ – included CH₄ – excluded N₂O – excluded</p>
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During the partial validation process, the audit team issued findings as specified in the FCPF Validation and Verification Guidelines v2.3 Section 11. The VVB issued Major Corrective Actions (MCARs), Minor Corrective Actions (mCARs), and Observations (OBS).

A total of 50 MCARs, 0 mCARs and 1 Observation were raised as part of the partial validation process. A total of 50 MCARs and 0 mCARs were successfully addressed by the ER Program and closed by the VVB, while 1 Observation remains open. These findings are described in Appendix 1 of this report.

Regarding the Reference Level, it is Aster Global Environmental Solutions, Inc.’s (herein referred to as Aster Global) opinion that the Zambézia Integrated Landscape Management Program (ZILMP) meets the applicable partial validation criteria set out in the FCPF Validation and Verification Guidelines and that it is free of material misstatements. Hence, Aster Global recommends the FCPF Carbon Fund to continue with the relevant subsequent steps to proceed with the verification of the FCPF Emission Reductions units.

Statement Issuing Date: 28 May 2021

Intended User: [World Bank Group, FCPF Carbon Fund Participants]




TEAM LEADER: Shawn McMahon

LEGAL REPRESENTATIVE: Janice McMahon

2. Agreement

2.1 Level of Assurance

The level of assurance determined the depth of detail that the validation team used to determine if there were any errors, omissions, or misrepresentations. Aster Global assessed the ZILMP's implementation of general principles, data collection and processing, sampling/monitoring descriptions, documentation, calculations, etc., to provide *reasonable assurance* to meet the requirements of the FCPF Carbon Fund and to satisfy the professional judgement of the audit team.

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

2.2 Objectives

As outlined in the Validation and Verification Guidelines (VVG) - (Section 8.2), the general objectives of the partial validation/verification of ZILMP included the following:

- “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 reported ERs /Reference Level have 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 reported GHG emissions / Emission Reductions / Reference Level (or the revised Reference Level if technical corrections are applied) is materially accurate, i.e. free of material misstatements, errors or omissions;
- Identify source(s) of Uncertainty due to both random and systematic errors related with the Reference Level setting and any sources of bias that can impact the estimate of the Total ERs, and determine whether the ER Program has conducted the Uncertainty analysis in compliance applicable criteria;
- Assess the Forest Monitoring System of the ER Program and validate that there are controls for sources of potential errors, omissions, and misstatements in place;
- Identify components of the Forest Monitoring System that require attention and/or adjustment in future monitoring and reporting or identify areas of risk of future noncompliance.”¹

The Partial Validation process ensured all required objectives have been met during the course of the audit.

2.3 Criteria

The criteria included the following normative documents provided by the FCPF:

- FCPF Methodology Framework, Version 3, April 2020
- Buffer Guidelines, Version 2, April 2020
- Guidelines on the application of the Methodological Framework Numbers 1 - 4
- FCPF Guidelines on Uncertainty Analysis_2020
- Process Guidelines, Version 5, April 2020

¹ Forest Carbon Partnership Facility, Validation and Verification Guidelines, Version 2.3, March 2021 (Section 8.2)

- FCPF Validation and Verification Guidelines, Version 2.3, March 2021
- FCPF – Glossary of Terms Version 2, January 2021
- ISO 14064-3:2006
- ISO 14065:2013
- ISO 14066:2011
- IAF MD 6:2014
- Forms and templates as published and available by FCPF
- Training Presentations presented by FCPF

Criteria Indicators	Topic	Partial Validation	Verification
6	Data availability	X	X
7, 8, 9.1	Identification and address sources of uncertainty	X	X
9.2, 9.3	Estimation of residual uncertainty		X
14.1	Consistency of monitoring estimates with Reference Level		X
17.3, 17.4	Monitoring and reporting of displacement mitigation		X
18.2	Addressing reversals		X
19	Account for reversals		X
22	Calculation of Emission Reductions		X
23	Double counting		X
37	REDD project and program DMS		X

2.4 Scope

The general scope of the partial validation² included:

- Crediting period of the ER Program
- The selected Reference Period (validation)
- 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 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 Project’s Data Management System.

2.5 Materiality

Materiality is a concept that errors, omissions, and misrepresentations could affect the GHG reduction assertion and influence the intended users. Materiality was also used as part of the Partial Validation and Verification Sampling Plan design to determine the type of audit processes used by Aster Global to minimize the risk of not detecting a material misstatement. As specified in the Validation and Verification Guidelines (VVG) - (Section 8.5), the threshold for quantitative materiality is 1%.

The partial validation process based on the desk review found that there are not quantitative or qualitative material discrepancies affecting the reference level.

² Criteria 1 – 5 of the Methodological Framework are not applicable for this partial validation.

3. METHODOLOGY AND PLANNING

3.1 Validation Team

Name	Role	Activities				
		Desk review	Site visit	Reporting	Supervision	Technical review
Janice McMahon	<ul style="list-style-type: none"> Project Manager/Planning/Team Coordination/ QAQC 			X	X	X
Shawn McMahon	<ul style="list-style-type: none"> Team Leader, Technical Expert, Lead Validator / Verifier, AFOLU Specialist / Desktop Review / Site Visit/ client communications 	X		X	X	
Matthew Perkowski	<ul style="list-style-type: none"> Technical Expert, Forest Biometrician / Team Member 	X		X		
Eric Jaeschke	<ul style="list-style-type: none"> Technical Expert / Remote Sensing and GIS Specialist Team Member 	X		X		
Caitlin Sellers	<ul style="list-style-type: none"> Independent Peer Reviewer (Technical Review) 					X
Natalie Hammer	<ul style="list-style-type: none"> Executive Services Administrator / Resource Manager 				X	
Taek Joo Kim	<ul style="list-style-type: none"> Technical Expert, Forest Biometrician / Team Member 	X		X		
Mansfield Fisher	<ul style="list-style-type: none"> Project Forester / Trainee / Team Member 	X		X		
David Shoch	<ul style="list-style-type: none"> REDD+ Technical Expert/Team Member 	X				

3.2 Validation schedule

Validation Activity/Milestone	Content (Explanation)	Proposed Delivery Date
Kick Off Call	Kick-off the partial validation and verification of Mozambique's ZILMP program	17 September 2020
Draft audit plan and hold meeting with FMT and Mozambique ER Program representatives	Draft audit plan submitted for review and approval – note that based on ISO 14064 and 14065 the final audit plan must be signed by the ER Program Entity	22 September 2020
VVB Initial Desk Review	Initial desk review to include preliminary review of documentation provided to inform our risk assessment and inputs into the Sampling Plan. If preliminary findings are discovered or documents are missing, Aster Global will notify FMT and ER Program Entity	06 October 2020
Sampling Plan hold meeting with FMT and Mozambique ER Program representatives	Sampling Plan submitted for review and approval – note that based on ISO 14064 and 14065 the final sampling plan must be signed by the ER Program Entity	13 October 2020
Aster Global starts desktop review	VVB conducts desktop review and generates Findings as they proceed	13 October 2020
Logistics Meeting to discuss virtual logistics	Alternative plans for conducting a virtual site visit	27 October 2020
Calculation walkthrough for Reference Level and Emission Factors Meeting	The validation team met with all members of the MRV Unit to discuss calculations related to the Reference Level which included but was not limited to activity data generation, sampling design, LULC classification, emission factor estimation.	3 November 2020
Remote Sensing/Monitoring, Reporting and Verification Activity Data Meeting	The validation team met with all members of the MRV Unit to discuss aspects of the remote sensing analysis performed to collected activity data, remote sensing analysis as it relates to monitoring.	5 November 2020
Meeting about Emission Factors	The validation team met with all members of the MRV Unit to discuss calculations related to estimating emission factors, sources of Tier 1 emission factors, and sampling design of the National Forest Inventory	5 November 2020
Aster Global Issues Round 1 Findings	Aster Global Issues Round 1 Findings	15 December 2020
Round 1 Findings Meeting	After Mozambique ER Program representatives and FMT have a chance to review the findings, Aster Global will hold a meeting to clarify any questions	21 December 2020

Round 1 Findings Meeting (2)	Follow up meeting to original round 1 findings meeting	29 January 2021
Mozambique ER Program representatives provide responses to Round 1 Findings and updated documents	Updated documentation, evidence and Findings responses provided to Aster Global	11 February 2021
Aster Global Completes Review of Round 1 Responses	Review of updated documentation, evidence, and finding responses provided to Aster Global	5 March 2021
Aster Global Issues Round 2 Findings	Aster Global Issues Round 2 Findings	25 March 2021
Mozambique ER Program representatives provide responses to Round 2 Findings and updated documents	Updated documentation, evidence and Findings responses provided to Aster Global	16 April 2021
Aster Global Issues Round 3 Findings	Aster Global Issues Round 3 Findings	27 April 2021
Mozambique ER Program representatives provide responses to Round 3 Findings and updated documents	Updated documentation, evidence and Findings responses provided to Aster Global	29 April 2021
Aster Global drafts validation and verification report and submits to peer reviewer	Aster Global prepares draft validation and verification plans using FCPF templates	11-14 May 2021
Draft validation and verification reports are updated as needed and provided to the FMT and Mozambique ER Program representatives for review	Aster Global makes updates to reports as needed after the Technical Reviewer is finished and then drafts are submitted to FMT and ER Program representatives	15 May 2021
Aster Global holds validation and verification closing meeting	After all representatives have had a chance to review, Aster Global will hold the closing meeting to review comments/suggestions about the draft reports and discuss feedback about the overall process.	24 May 2021
Aster Global issues final validation and verification report and statement (opinion)	Review of ER Program is complete.	25 May 2021

3.3 Methodology description

Desktop Review:

The desktop validation component included a full, risk-based review of all ER Program documentation/calculations received from ZILMP against the requirements and criterion of FCPF. The review focused on the ER Program Documents relative to the highest risk elements and complemented by interviews with program staff. ER Program details, implementation status, data and parameters, and quantification of GHG emission reductions and removals were thoroughly examined. Key supporting documents were also reviewed. These included, but were not limited to, monitoring data [i.e., remote sensing/Geographic Information System (GIS) data], Standard Operating Procedures (SOPs), geospatial

boundaries, maps and aerial images, biomass and carbon calculations for emission sources/sinks, and the overall results of the MRV (Monitoring, Reporting, and Verification) system.

Review of the ER Program documentation and elements as part of the desktop review included, but was not limited to, assessment of the following aspects of the ER Program:

- Current conditions, for example the presence of deforestation and degradation, emissions factor adjustments, forest characteristics and reported biomass volume (above- and/or below-ground)
- Confirmed that operational, data collection procedures and monitoring methods were implemented in accordance with the Standard Operating Procedures (SOPs) as they are written
- Reviewed all program and strata boundaries (where applied)
- Interviewed management team, including a series of interviews with in-country staff that support the mission of the ER Program
- Confirmed organizational structure and operation
- Confirmed data management, compilation, and storage
- Confirmed the quality control and quality assurance procedures are in place

Remote Sensing

ZILMP utilized remote sensing tools, including a satellite and land monitoring system, to produce estimates of the reference level and to generate the activity data. Geospatial data forms the basis for biomass and deforestation accounting estimates across landscapes, and therefore program integrity depends on a robust remote sensing assessment. The scope of the remote sensing review included *inter alia* the following:

- Expert judgement evaluation of remote sensing methods and implementation results
- Data selection suitability review: assessed the quality of acquired satellite data including review of minimum standards for remotely sensed analysis
- Reviewed classification results from Collect Earth including independent ground reference points as an indicator for accuracy
- Assessed the monitoring approach including data and methods
- Reviewed monitoring assumptions for inferences made using remotely sensed data and completeness checks on the analysis of drivers of emissions and removals
- Reviewed of uncertainty propagation
- Selected independent data checks on analysis including, for example, accuracy assessment generation, classification results, etc.

Aster Global follows ISO 14064-3 and our management systems manual to apply a risk-based approach to the remote sensing review, concentrating on the likely sources of material misstatements. Aster Global performed the assessment of the ZILMP compliance against the FCPF Methodological Framework requirements and associated guidelines (as applicable) with respect to remote sensing.

Based upon the information and documentation received from the ZILMP to-date, the validation team completed our Strategic Analysis and Risk Assessment (SARA). SARA is a risk assessment that includes strategic analysis to make sure the V/V Team have considered:

- Regulatory requirements
- GHG program requirements
- Industry factors
- And other non-technical risks (i.e., health and security issues)

An ER Program-specific Partial Validation and Verification Sampling Plan and Audit Plan were developed to guide the auditing process to ensure efficiency and effectiveness. The purpose of these documents was to present a risk assessment for determining the nature and extent of validation procedures necessary to ensure the risk of auditing error was reduced to a reasonable level. The Plan methodologies were derived from all items in our validation process stated above. Specifically, these documents utilized the FCPF normative documents and ISO 14064-3. Any modifications applied to the Plans were made based upon the conditions observed for monitoring to detect the processes with highest risk of material discrepancy.

The desktop partial-validation component included a review of all ER Program documentation and calculations received from ZILMP, as described throughout this report.

3.4 Review of documentation

A detailed review of all ER Program documentation was conducted to ensure consistency with and identify any deviation from FCPF program requirements.

Initial review focused on the Reference Level documentation, MR (ER Monitoring Report), Annex IV of the MR, and included an examination of the ER Program details, data and parameters, and quantification of GHG emission reductions and removals. Along with a review of the MR, selected documentation was requested, provided, and subsequently reviewed for consistency, accuracy, and appropriateness with regard to FCPF program requirements and methodological requirements. Documents reviewed included, but were not limited to, ER Program boundaries (Accounting Area), maps, aerial images (Activity Data), data from monitoring, reference level biomass and carbon calculation spreadsheets, and responses to Major and/or Minor CARs. The process of partial validation involved three formal rounds of assessment by the audit team and resulted in an ER Program that was in conformance with FCPF rules.

Please see Appendix 2 for a complete list of documents received and reviewed by Aster Global.

3.5 REDD Country Visit

As a result of the COVID-19 global pandemic, associated travel restrictions, and in consideration of the health of the validation team, client's staff, and ER Program participants the validation team was unable to travel to Mozambique. Aster Global has developed Virtual Site Visit Procedures that allowed the validation team to reach a reasonable level of assurance regarding the ZILMP's compliance with FCPF program documents (as described in Section 2.3 of this report).

Our Virtual Site Visit Procedures have been prepared in consideration of IAF Informative Document for Management of Extraordinary Events or Circumstances Affecting ABs, CABs and Certification Organizations (Issue 1, IAF ID 3: 2011, 08 November 2011), IAF Mandatory Document For The Use of Information and Communication Technology (ICT) For Auditing/Assessment Purposes (Issue 2, IAF MD 4:2018, 04 July 2018), and ANAB Accreditation Rule 9 (Issue Date 01 January 2014). This procedure is not implemented in the sole discretion of Aster Global but in coordination with each protocol/registry/program/standard and the guidance (if provided) they have provided during an extraordinary events or circumstances.

Definitions are provided to assist the reader.

Extraordinary Events or Circumstances: As defined by IAF ID 3:2011, a circumstance beyond the control of Aster Global or the clients, commonly referred to as an "act of God". Examples include, but not limited to, hurricanes, flooding, tsunamis, earthquakes, volcanoes, threats of terrorism, malicious computer hacking, geopolitical tension, pandemic diseases, and crippling labor strikes, or other man-made / natural disasters.

Examples of the use of ICT during audits/assessments may include but are not limited to:

- Meetings by means of teleconference facilities, including audio, video, and data sharing
- Audit/assessment of documents and records by means of remote access, either synchronously (in real time) or asynchronously (when applicable)
- Recording of information and evidence by means of still video, video, or audio recordings
- Providing visual/audio access to remote or potentially hazardous locations

Information and Communication Technology (ICT): As defined by IAF MD 4:2018, ICT is the use of technology for gathering, storing, retrieving, processing, analyzing, and transmitting information. It includes software and hardware such as smartphones, handheld devices, laptop computers, desktop computers, drones, video cameras, wearable technology, artificial intelligence, and others. The use of ICT may be appropriate for auditing/assessment both locally and remotely.

Virtual Site Visit: Aster Global conducted the virtual site visit using ICT without physically going onsite and still being able to reach a *reasonable* level of assurance. As defined by IAF MD 4:2018, virtual location where a client organization performs work or provides a service using an on-line environment allowing persons irrespective of physical locations to execute processes.

The procedures of the ICT document were followed to determine a normalized validation and verification process. The COVID-19 global pandemic has made it difficult to ensure (or protect) the safety and health of our employees, subcontractors, client's staff, and ER Program participants. The audit team determined that multiple audit activities can be conducted in a remote manner as the evidence needed to reach reasonable assurance is primarily digital in nature for this specific review. Regular coordination is handled via email and MS Teams, Skype or similar internet-enabled calling with the appropriate parties. An assessment of risk (on a ER Program basis) as to whether a virtual site visit can be conducted or if local subcontractors can be added to the validation/verification team is captured by the SARA table embedded within the Audit Plan. The following subset of topics are assessed for Virtual Site Visit:

What is being assessed	Type of ICT Used	Techniques Required to Reach Reasonable Assurance
Monitored Data and Parameters	Hard copy and screen-share of calculation worksheets, remotely sensed data, live stream video teleconferencing (MS Teams, WebEx, Zoom, related) walkthroughs, conference calls	<p>Confirm appropriate default factors, parameters, formulae, and related inputs for calculations through independent data checks, professional judgement.</p> <p>Aster Global met with the ZILMP during the week of November 2nd – 6th of 2020 to discuss the monitored parameters. Specifically, the monitoring system in place, remote sensed based activity data, and sampling designs.</p>
Quantification of Emission Reductions	Hard copy and screen-share calculation worksheets, live stream video teleconferencing (MS Teams, WebEx, Zoom, related) walkthroughs, conference calls	<p>Confirm appropriate default factors, parameters, formulas, and related inputs for calculations through independent data checks, professional judgement.</p> <p>Aster Global met with the ZILMP during the week of November 2nd – 6th of 2020 to discuss the quantification of emission reductions.</p>
Reference Level	Calculation worksheets, remotely sensed data, live stream video teleconferencing (MS Teams, WebEx, Zoom, related) walkthroughs, conference calls	<p>Confirm appropriate parameters, formulas, and related inputs for calculations through independent data checks, professional judgement.</p> <p>Aster Global met with the ZILMP during the week of November 2nd – 6th of 2020 to discuss different aspects of the estimation of Reference Level emissions.</p>
Uncertainty	Calculation worksheets, remotely sensed data, live stream video teleconferencing (MS Teams, WebEx, Zoom, related) walkthroughs, conference calls	<p>Confirm appropriate default factors, parameters, formulas, and related inputs for calculations through independent data checks, professional judgement.</p> <p>Aster Global met with the ZILMP on February 8th, 2021 to discuss the estimation of uncertainty and to observe the R-code run.</p>

Remote Sensing	Calculation worksheets, remotely sensed data, live stream video teleconferencing (MS Teams, WebEx, Zoom, related) walkthroughs, conference calls	<p>A walk-through may or may be necessary as this review is primarily desktop based and is combination qualitative/quantitative.</p> <p>Aster Global met with the ZILMP during the week of November 2nd – 6th of 2020 to discuss the remote sensing related to activity data in the Reference Level and monitoring data.</p>
Process for QA/QC and Standard Operating Procedures (SOPs)	Live stream video teleconferencing (MS Teams, WebEx, Zoom, related) walkthroughs	<p>Aster Global met with the ZILMP during the week of November 2nd – 6th of 2020 to discuss many different aspects of the ZILMP program. Throughout these meetings, the validation team was able to see the process for the QA/QC of data and see if SOPs relating to data collection, etc., were followed.</p>

4. VALIDATION OF ER PROGRAM DESIGN

4.1 Completeness of Report

After review of all ER Program information, procedures, calculations, and supporting documentation, Aster Global confirms that Annex IV contains the required updated information, specific to the partial validation. As directed by the scope of the partial validation, an audit of the ERPD was outside the scope of the partial validation.

4.2 Sources and Sinks

As only a partial validation was performed, this section is intentionally left blank.

4.3 Carbon pools and GHG

As only a partial validation was performed, this section is intentionally left blank.

4.4 Reference Period

As only a partial validation was performed, this section is intentionally left blank.

4.5 Forest Definition

As only a partial validation was performed, this section is intentionally left blank.

4.6 Calculation of average annual historical emissions

After review of all ER Program information, procedures, calculations, and supporting documentation, Aster Global confirms that ZILMP (the ER Program) 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. Furthermore, Aster Global confirms that all equation parameters and fixed data are appropriately linked to the equations used for the quantification of the Reference Level.

4.7 Activity data and emission factors

4.7.1 Activity data

Aster Global confirmed the reliability of the source and nature of the reported evidence justified the selection of the monitored data and parameters that all parameters related to activity data and described below have been reported in line with guidelines provided in the template. Further, Aster Global confirmed 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. Aster Global also confirmed that methodological steps and data were publicly available in accordance with applicable criteria. Aster Global confirms that the evidence provided by the ER Program to is sufficient and appropriate to determine the GHG reductions and removals. The source of activity data is from Collect Earth platform and activity data was exported as numerical data for analysis. Publicly available sources can be accessed at <<https://bit.ly/GeoportalMRVOnline>>. Assessment details are as follows.

Monitored Data and Parameters	$A(j,i)_{RP}$
Free of Material Misstatement (Yes/No)	Yes

Reported Appropriately (Yes/No)	Yes
Assessment Details	<p>This parameter represents the area converted from forest j to non-forest type i during the reference period and is the sole parameter related to activity data for the Reference Level. Activity data that form the basis of this parameter are based on annual historical time series analysis of land-use change and forestry across the Accounting Area. The validation team conducted an independent analysis of similar remotely sensed data to confirm that the source data was reliable and appropriate. Additionally, the audit team was able to ensure that LULC classification was appropriate and followed the pre-defined classification system.</p> <p>The validation team conducted independent data checks for each step necessary for the quantification of this parameter. A sample of activity data were examined using remotely sensed imagery within the Collect Earth program 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 parameter 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 quantification code. The calculation of uncertainty applied the methodology from Olofsson, et al. (2014), and the validation team reviewed and confirmed that the quantification code was correct and ran without any error.</p>

4.7.2 Emission Factors

Aster Global confirmed the reliability of the source and nature of the reported evidence justified the selection of the monitored data and parameters that all parameters related to activity data and described below have been reported in line with guidelines provided in the template. Further, Aster Global confirmed 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. Aster Global also confirmed that methodological steps and data were publicly available in accordance with applicable criteria. The source of emission factors is from field collected data and IPCC Guidance and Guidelines, and emission factors were calculated based on a set of equations from scientific literatures. Publicly available sources can be accessed at <<https://bit.ly/GeoportalMRVOnline>>. Assessment details are as follows.

Emission Factors	$AGB_{before,j}$
Free of Material Misstatement (Yes/No)	Yes
Reported Appropriately (Yes/No)	Yes
Assessment Details	<p>There were two different methods applied in the calculation of this parameter. For semi-deciduous and evergreen forest Tier 2 (country specific) estimates are used. These estimates are based on the National Forest Inventory for the Zambézia province. The audit team reviewed sampling design protocol, QA/QC SOPs, and QA/QC results and confirmed the appropriateness of each. The National Forest Inventory did not cover Mangrove forests, so this parameter for Mangrove forests was estimated from existing literature. The audit team confirmed that the literature underpinning the estimate of this parameter was appropriate for the forest</p>

	<p>type and region. Additionally, the validation team judged that the method to estimate this parameter was reasonable and appropriate.</p> <p>The validation team conducted independent data checks for each step necessary in the quantification of this parameter. 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 this parameter was independently calculated after a thorough review of the quantification code. The calculation of uncertainty applied the methodology from Bechtold et al. (2005) as the sampling design of the ER Program resembles the sampling design of Forest Inventory and Analysis (FIA). Additionally, sampling uncertainty was increased by 10% as recommended by the FCPF team. The validation team reviewed and confirmed that the estimation of uncertainty was correct, and the quantification code ran without any error.</p> <p>The validation team reviewed the Monitoring Report and associated links to ensure that all data related to this parameter are made public.</p>
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Emission Factors	BGB _{before,j}
Free of Material Misstatement (Yes/No)	Yes
Reported Appropriately (Yes/No)	Yes
Assessment Details	<p>There were two different methods applied in the calculation of this parameter. For semi-deciduous and evergreen forest Tier 2 (country specific) estimates are used. These estimates are based on the National Forest Inventory for the Zambézia province. The audit team reviewed sampling design protocol, QA/QC SOPs, and QA/QC results and confirmed the appropriateness of each. The National Forest Inventory did not cover Mangrove forests, so this parameter for Mangrove forests were estimated from existing literature. The audit team confirmed that the literature underpinning the estimate of this parameter was appropriate for the forest type and region. Additionally, the validation team judged that the method to estimate this parameter was reasonable and appropriate.</p> <p>The validation team conducted independent data checks for each step necessary in the quantification of this parameter. 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 this parameter was independently calculated after a thorough review of the quantification code. As with AGB_{before,j}, the uncertainty estimation applied the methodology from Bechtold et al. (2005), and sampling uncertainty was increased additionally by 10% as recommended by the FCPF team. The validation team reviewed and confirmed that the estimation of uncertainty was correct and the quantification code ran without any error.</p> <p>The validation team reviewed the Monitoring Report and associated links to ensure that all data related to this parameter are made public.</p>

Emission Factors	AGB _{after,i}
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Free of Material Misstatement (Yes/No)	Yes
Reported Appropriately (Yes/No)	Yes
Assessment Details	<p>This parameter was estimated for cropland, grassland, and other lands. The estimates for cropland and grassland are Tier 1 estimates from the IPCC Guidance and Guidelines. The ER Program indicated to the validation team that there are no Tier 2 or Tier 3 estimates for this parameter. As post deforestation stocks are necessary for the estimate of emission reductions, this was deemed appropriate. As there are no IPCC default values for post deforestation stocks for Other lands, the validation team determined that because this parameter estimate is the same for the Reference Level and subsequent Reporting Periods this is a justifiable estimate.</p> <p>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 this parameter. The uncertainty associated with this parameter is default factors from 2006 IPCC but as with AGB/BGB_{before}, sampling uncertainty was increased additionally by 10% as recommended by the FCPF team. The validation team reviewed and confirmed that the quantification code correctly applied 10% increase and ran without any error.</p> <p>The validation team reviewed the Monitoring Report and associated links to ensure that all data related to this parameter are made public.</p>

Emission Factors	BGB _{after,i}
Free of Material Misstatement (Yes/No)	Yes
Reported Appropriately (Yes/No)	Yes
Assessment Details	<p>This parameter was estimated for cropland, grassland, and other lands. The estimates for cropland and grassland are Tier 1 estimates from the IPCC Guidance and Guidelines. The ER Program indicated to the validation team that there are no Tier 2 or Tier 3 estimates for this parameter. As post deforestation stocks are necessary for the estimate of emission reductions, this was deemed appropriate. As there are no IPCC default values for post deforestation stocks for Other lands, the validation team determined that because this parameter estimate is the same for the Reference Level and subsequent Reporting Periods this is a justifiable estimate.</p> <p>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 this parameter. The uncertainty associated with this parameter is default factors from 2006 IPCC but as with AGB/BGB_{before}, sampling uncertainty was increased additionally by 10% as recommended by the FCPF team. The validation team reviewed and confirmed that the quantification code correctly applied 10% increase and ran without any error.</p>

The validation team reviewed the Monitoring Report and associated links to ensure that all data related to this parameter are made public.

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

The ER Program has not applied any adjustment to the Reference Level. Therefore, this section is intentionally left blank.

4.9 Estimated Reference Level

As stated in section 4.7.1 Activity Data, the validation team conducted a partial validation of Reference Level (e.g., activity data, emission factors) using similar historical time series remotely sensed data of land-use change and forestry across the Accounting Area. The validation team randomly selected several data points from collected remote sensing data by the ZILMP team and compared LULC classification to ensure the accuracy of classification. The validation team confirms that LULC classification was appropriate and followed the pre-defined classification system.

Crediting Period year <i>t</i>	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)
2018	5,253,267.99	-	-	-	5,253,267.99
2019	5,253,267.99	-	-	-	5,253,267.99
2020	5,253,267.99	-	-	-	5,253,267.99
2021	5,253,267.99	-	-	-	5,253,267.99
2022	5,253,267.99	-	-	-	5,253,267.99
2023	5,253,267.99	-	-	-	5,253,267.99
2024	5,253,267.99	-	-	-	5,253,267.99

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

As this is outside the scope of the partial validation, this section is intentionally left blank.

4.11 Uncertainty of the Reference Level

4.11.1 Identification and assessment of sources of uncertainty

Uncertainty was assessed as required. The audit 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 emission

reductions. Aster Global confirms that the sources of uncertainty are systematically identified and correctly assessed in the Reference Level, Monitoring, and Reporting. Additionally, Aster Global confirms that there is an appropriate process of reducing uncertainty in the activity data and emission factors, where possible.

4.11.2 Uncertainty of the estimate of the Reference Level

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, except for the activity data, of which the distribution is based on re-sampling, i.e., non-parametric bootstrapping. Non-parametric bootstrapping for the activity data is applied to relax the limitations stemming from Monte Carlo simulation. Only one datum is linked to two of the land use change categories of the activity data generating negative values if Monte Carlo simulation is used to determine the distribution. While non-parametric bootstrapping is applied to generate random samples from the activity data, random samples were generated from Monte Carlo simulation for the emission factors. The distributions of emission factors were assumed to be normal or t distributions. If calculation of degrees of freedom was available, t-distribution was assumed.

To ensure the accuracy of uncertainty estimates for the Reference Level, non-parametric bootstrapping and Monte Carlo simulation were based on 10,000 random permutations. Additionally, generation of carbon fraction were based on 10,000 random permutations of triangular distribution, where Min = 0.44, Max = 0.49, Mode = 0.47, and as noted above in Section 4.7.2 Emission Factors. Sampling uncertainty was increased additionally by 10% for the emission factors. Finally, the distribution of the Reference Level is determined by multiplying activity data, emission factors, and carbon fraction.

The validation team reviewed and confirmed that above-mentioned elements related to the estimation of uncertainty for the Reference Level were all addressed in the provided quantification code. The validation also confirmed that the quantification code ran without any error and that the results matched the Reference Level included in the Monitoring Report. Therefore, Aster Global concludes that the application of Monte Carlo simulation for the quantification of Uncertainty of the Reference Level was performed correctly.

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

Sensitivity analysis was conducted by fixing the following parameters: activity data (Reference Level), activity data (monitoring), emission factors, and carbon fraction. These parameters were fixed to generate emission reductions, and the emission reductions were compared against the emission reduction from the Monte Carlo simulation. The widths of confidence intervals for each fixed parameter emission reduction and the emission reduction from Monte Carlo simulation were compared. Fixing activity data (Reference Level) appeared to have the highest reduction of confidential interval, meaning that a large portion of the emission reduction uncertainty is explained by the activity data (Reference Level) uncertainty.

The validation team reviewed and confirmed that above-mentioned elements related to the sensitivity analysis were all addressed in the provided quantification code. The validation also confirmed that the quantification code ran without any error and the results matched the sensitivity analysis included in the monitoring report. Therefore, Aster Global concludes that the application of the sensitivity analysis was performed correctly.

4.12 Data quality and availability

The validation team closely followed the steps and re-calculated the Reference Level described in the monitoring report and related calculations files (e.g., Excel spreadsheets, R script), and confirmed that the steps were described in detail to reconstruct Reference Level without any difficulty. The validation team also confirmed that the quantification code to reconstruct Reference Level ran without any error, and the results matched the output included in the monitoring report.

Additionally, the validation team confirmed that the publicly available online sources related to Reference Level were included in the monitoring report. The addresses for website are provided in the monitoring report, e.g., <<https://bit.ly/Geoportalmrvonline>>, FCPF website, and FNDS website. While some

information such as forest inventory data (e.g., individual tree data), R script, or materials containing confidential information is not publicly available online, this information has been fully provided to the validation team for validation and verification.

Therefore, Aster Global concludes that the quality and description of the documented data and methods are detailed enough to enable the reconstruction of the Reference Level.

5. NON-COMPLIANCES AND OBSERVATIONS

During the validation process, there was a risk that potential errors, omissions, and misrepresentations would be found. The actions taken when errors, omissions, and misrepresentations were found included notifying the client of the issues identified and expanding our review/sample to the extent that satisfied the Team Leader's professional judgment.

This validation involved three (3) formal rounds of assessment by the validation team and resulted in a Reference Level and Monitoring Report that is in conformance with FCPF rules. Where findings were noted by the validation team, ZILMP implemented corrective actions by amending the MR and supporting documentation/calculations and providing written clarification responses. Types of findings were characterized in the following manner:

- Major Correction Action Requests (MCARs) were, in general, issued as a response to material discrepancies when: 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;
- underlying assumptions used to develop the reported estimates are not supported by data;
- material errors, omissions or misstatements have been made in applying assumptions, in data or calculations;
- non-compliance with Validation and Verification criteria;
- the REDD+ Country Participant has failed to implement or made inadequate progress with the mCARs from the previous verifications;

Minor Correction Action Requests (mCARs) were, in general, issued when:

- 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;
- non-material errors, omissions or misstatements have been made in applying assumptions, in data or calculations;

Observations (OBS) were issued when:

- 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; the VVB wishes to identify an area of the Forest Monitoring System that requires attention and/or adjustment in future monitoring and reporting.

During the course of the verification 50 MCARS, 0 mCARs, and 1 observation were identified. All were satisfactorily addressed by ZILMP. These findings provided necessary clarity to ensure the ER Program adhered to the requirements of the FCPF for GHG programs. For a complete list of all findings and their resolutions, please refer to Appendix 1.

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

Item Number	1
ER-PD template	<p>15.1 Description of benefit-sharing arrangements Please provide a description of the benefit-sharing arrangements for Monetary and Non-Monetary Benefits of the ER Program to the extent known, including:</p> <ul style="list-style-type: none"> i. the categories of potential Beneficiaries, eligibility and the types and scale of potential Monetary and Non-Monetary Benefits; ii. Criteria, process and timelines for the distribution of Monetary and Non-Monetary Benefits; iii. Monitoring provisions. <p>Where available, provide a link to the publicly available Benefit Sharing Plan or inform when the Benefit Sharing Plan is expected be concluded and available.</p> <p>Refer to criterion 29 and 30 of the Methodological Framework</p>
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	Mozambique_Revised ERPD_16April2018_CLEAN.pdf
Aster Global Findings (04 December 2020)	Benefit-Sharing Arrangements is not submitted.
Round 1 MCAR/mCAR/OBS	MCAR: Please provide Benefit-Sharing Arrangements.
Round 1 Response from ER Program Entity (DD MonthYYYY)	The benefit sharing plan is available and can be seen at the link: https://www.fnds.gov.mz/index.php/pt/component/edocman/plano-de-partilha-de-beneficio-erpa/download . However, please note that the validation and verification of the BSP are not within the objectives of the validation/verification as the paragraph 35 of the Validation and Verification Guidelines. Only carbon accounting is within the scope. BSP is covered by WB processes.
Aster Global Findings - Round 2 (04 December 2020)	The audit team agrees with the ER Program proponent's response that the BSP is outside of the scope of the current audit. This finding is considered addressed.

Item Number	2
ER-MR template	1.1 Implementation status of the ER Program and changes compared to the ER-PD
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	MR
Aster Global Findings (04 December 2020)	<p>Found in section 1.1 of the MR.</p> <p>However, the audit team noted that the link to the "geospatial platform where deforestation for 2017 and 2018 in the Districts outside of the ER Program and in other provinces" is broken.</p>
Round 1 MCAR/mCAR/OBS	MCAR: Please update the MR to include the correct link.
Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>The MR has been revised to use the correct link (https://bit.ly/GeoportalMRVOnline). We assume that the purpose is to assess the displacement of emissions out of the Program area. Although this is not required by the FCPF Methodological Framework (c.f. Criterion 17), but it was required by the ER Payment Agreement, Mozambique provides in Annex 5 a report on emissions out of the ER Program accounting area but within the Province. Results show that Emission Reductions have also been generated, confirming the lack of displacement.</p> <p>As a side note, please note that the FCPF Methodological Framework does not require the monitoring of leakage, as this is addressed through the program design and appropriate mitigation measures (c.f. 17.1 and 17.2). Mozambique has to have its strategy implemented by verification (c.f. I17.3) which is demonstrated as shown by Annex 5, and it is 'invited' to report on changes on drivers which has done (c.f. I17.4).</p>
Aster Global Findings - Round 2 (04 December 2020)	The audit team reviewed the provided link and confirms that it works and the MR has been updated. This criteria is satisfied.

Item Number	3
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ER-MR template	<p>Please provide an overview of all data and parameters that remain fixed throughout the Crediting Period. These parameters should link to the equations provided in section 2.2</p> <p>This shall include parameters that have been measured or estimated but will not be updated during the Crediting Period, such as:</p> <ul style="list-style-type: none"> · Biomass and carbon densities (e.g. $AGB_{Before,j}$, $AGB_{After,i}$, C_j) that were measured at the time of the ERPD and that will remain fixed during the Crediting period. · Biomass and carbon densities (e.g. $AGB_{Before,j}$, $AGB_{After,i}$, C_j) that are measured prior to this monitoring event and will remain fixed during the Crediting period. In this case, it shall be demonstrated that these are equivalent to the ones used for the establishment of the Reference Level as required by Indicator 14.3 of the MF. “equivalent” means that are equal or are comparable so that the difference is not linked to a methodological difference. Differences in the Emission Factor shall not lead to an overestimation of Emission Reductions. If this is the case, the ER Program shall apply technical corrections to the RL and update the Emission Factor by the most recent one. · Activity Data estimated during the Reference Period. <p>Default values, such as Carbon Fractions, root-to-shoot ratios or other parameters that are generically sourced from the IPCC values, shall be reported together with the relevant equations in Section 2.2, not in this section.</p> <p>Data and parameters monitored during the Crediting Period shall be included in section 0 below (Data and Parameters monitored). Use the table provided and copy table for each parameter, not for each value (multiple values may be reported per parameter, for instance AGB_{Before}, may include the estimates of the different forest types obtained with a same inventory). Where relevant, attach any spreadsheets, spatial information, maps and/or synthesized data used to derive the parameter.</p> <p>Regarding the Reporting Period, if ER Programs decide to use the Guidelines on the application of the MF Number 3 on reporting periods and use a Monitoring Period for monitoring, this section should reflect the value monitored during the monitoring period instead of the Reporting Period. In this case the Monitoring Report should clearly indicate the start and end date of the monitoring period.</p> <p>Refer to criterion 5, 6, 7, 8, 9, 14 and 16 of the Methodological Framework</p>
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	MR

Aster Global Findings (04 December 2020)	The audit team notes that this section is include in the MR. However, the audit team was unable to verify where the fixed parameters are used in the quantification workbooks to determine ER's for the reporting period. The audit team was unable to verify where these fixed parameters are used.
Round 1 MCAR/mCAR/OBS	MCAR: Please clarify where each of the fixed parameters are used in the quantification workbooks.
Round 1 Response from ER Program Entity (DD MonthYYYY)	It was added an explanation in the table of each fixed parameter described in the Section 3.1 of the report, in the row "Value applied" the name of the workbook and the exact place where each value is calculated and used for estimating emissions.
Aster Global Findings - Round 2 (04 December 2020)	The audit team reviewed the updated MR and confirms that a description of where the parameters are applied is included in the MR. The additional text describes how each parameter is used in the quantification workbooks and links the parameters back to the equations in section 2.2 of the MR.

Item Number	4
ER-MR template	Quantify the emissions by sources and removals by sinks from the ER Program during the Monitoring / Reporting Period following the formulae shown in Section 1.3.2 and linked to the parameters in Section 3. Provide sample calculations using the actual values from section 3 above with sufficient information to allow others to reproduce the calculation. Attach electronic spreadsheets, spatial information, maps and/or synthesized data as an appendix or separate file. At the end of the description, summarize the results in the table below. Regarding the reporting period, (step-by-step description of the calculation) should clearly describe the steps through which the pro-rata allocation has occurred and how the ERs for the Reporting Period have been calculated. Refer to criterion 5, 6, 7, 8, 9, 14 and 16 of the Methodological Framework
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	MR

Aster Global Findings (04 December 2020)	The audit team was unable to find a workbook that shows how these calculations were carried out.
Round 1 MCAR/mCAR/OBS	MCAR: Please provide the file to satisfy this criterion.
Round 1 Response from ER Program Entity (DD MonthYYYY)	Please find in the following link the workbook and a detailed explanation of how to use the workbook for estimating emissions: https://www.dropbox.com/s/we9qw3pkmmpkewb/ZILMP_Emissions_Calculations_MR_%282018%29.xlsx?dl=0
Aster Global Findings - Round 2 (04 December 2020)	The audit team reviewed the Emission Calculations for the Monitoring Period. Although there are still questions regarding the Emissions Calculations during the Monitoring Period. This criterion is satisfied.

Item Number	5
ER-MR template	2. Institutional Arrangements
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	MR
Aster Global Findings (04 December 2020)	The audit team confirms that this section is included in the MR; however, the audit team notes that the subsections in Section 2 are not numbered correctly.
Round 1 MCAR/mCAR/OBS	MCAR: Please renumber the subsections in this section to satisfy the requirements of the MR Template.
Round 1 Response from ER Program Entity	Thank you. We realized that the subsections under 2.2. did not have the number, this will be amended.

(DD MonthYYYY)	
Aster Global Findings - Round 2 (04 December 2020)	The audit team reviewed the updated MR and confirmed that the numbering of sections was corrected. This criterion is satisfied.

Item Number	6
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 6	Criterion 6: Key data and methods that are sufficiently detailed to enable the reconstruction of the Reference Level, and the reported emissions and removals (e.g., data, methods and assumptions), are documented and made publicly available online. In cases where the country's or ER Program's policies exempt sources of information from being publicly disclosed or shared, the information shall be made available to the third-party validation and verification body and a rationale is provided for not making these data publicly available. In these cases, reasonable efforts shall be made to make summary data publicly available to enable reconstruction.
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	ZILMP ER Monitoring Report - 2018 v.3.1_clean
Aster Global Findings (04 December 2020)	The audit team was unable to locate where the items listed in Indicator 6.1 are made publicly available.
Round 1 MCAR/mCAR/OBS	MCAR: Please provide evidence to show where these data are made publicly available.

Round 1 Response from ER Program Entity (DD MonthYYYY)	Indicator 6.2 of the FCPF MF refers to the publication of the methodological steps. All this information was provided in the ER Program Document which is publicly available in the FCPF website, c.f. https://www.forestcarbonpartnership.org/system/files/documents/Mozambique_Revised%20ERPD_16April2018_CLEAN.pdf . Moreover, this information is also provided in the MR which is subject to validation/verification and this has been made publicly available in the FCPF website c.f. https://www.forestcarbonpartnership.org/system/files/documents/ZILMP%20ER%20Monitoring%20Report%20-%202018%20v.3.1_final_without%20Annex%201-3.pdf and on the MRV website(https://www.fnfs.gov.mz/mrv/index.php/documentos/relatorios/40-zilmp-er-monitoring-report-2018-v-3-1/file). Information on the forest definition, forest types, activity data, emission factors, integration, estimation and uncertainties are all provided in these documents. Section 2.1.4 of the ER MR has been updated to make clear compliance with 6.1.
Aster Global Findings - Round 2 (04 December 2020)	Thank you for the clarification, the audit team was unaware the MR and ERPD were publicly available on the FCPF website. The audit team confirmed that these documents are located on the FCPF website and as a result are publicly available. This criterion is satisfied.

Item Number	7
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 6	Indicator 6.2: For the following spatial information, maps and/or synthesized data are displayed publicly, and reasonable efforts are made to explain how these were derived from the underlying spatial and other data, and to make key data sets or analyses publicly available:
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	ZILMP ER Monitoring Report - 2018 v.3.1_clean
Aster Global Findings (04 December 2020)	The audit team was unable to locate where the accounting area, activity data, emission factors, average annual emissions over the reference period, adjusted emissions, and any spatial data used to adjust emissions are made publicly available.
Round 1 MCAR/mCAR/OBS	MCAR: Please provide evidence to show where these data are made publicly available.

Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>As indicated in the previous finding, the ER MR providing information on the RL and the MMR are publicly available. More specifically:</p> <ol style="list-style-type: none"> 1) Accounting Area: Information on accounting area is available in Annex 4 of the MR. 2) Activity Data: Annual deforestation maps are available on the MRV web portal (https://bit.ly/GeoportalMRVOnline). Reference data (both for RL and annual) is not publicly available. However, it has been shared with the VVB. Reference level AD is in the file: ZILMP_AD_Calculations_RL_(2005_2015).xlsx in the ./Activity Data/Reference Level/ folder). 2018 AD is in the file ZILMP_AD_Calculations_MR_(2018).xlsx in the ./Activity Data/2018/ folder. 3) Emission factors for both RL and MMR which are the same, may be found in the Monitoring Report, the latest version of which can be found here: https://www.fnfs.gov.mz/mrv/index.php/documentos/relatorios. 4) Average annual emissions for both RL and MMR are also shown in the Monitoring Report. 5) Adjusted emissions are not applicable to the ZILMP 6) No adjustments have been made. <p>In addition, the REDD+ Registry Web Portal (http://bit.ly/sistemaregistoREDD) has specific information on the program, such as reference data emissions, annual emissions, and included activities and pools.</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>Thank you for the clarification, the audit team was unaware the MR and ERPD were publicly available on the FCPF website. The audit team confirmed that these documents are located on the FCPF website and as a result are publicly available. This criterion is satisfied.</p>

Item Number	8
Carbon Methodolog ical Framework Version 2, June 22, 2016 - Criterion 6	<p>- Accounting Area</p>
Applicability to the ER Program (Y or N/A)	<p>Y</p>
Requirement Met (Y, N, or Pending)	<p>Y</p>
Evidence Used to Assess (Location in PD, MR or Supporting Documents	<p>Simple guide_ERL, ZILMP_Emissions_Calculations_RL (2005-2015).xlsx</p>

Aster Global Findings (04 December 2020)	<p>The audit team reviewed the Reference Level calculations and notes that no reference source is provided that shows the size (in hectares) of each district.</p> <p>Furthermore it is unclear to the VVB what the true area of the ZILMP is. The ZILMP_Emissions_Calculations_RL workbook appears to use 5,310,265; however, the Area tab of the Emission_Factor_v1.1 has a value of 8,797,094 as the total acreage.</p>
Round 1 MCAR/mCAR/OBS	<p>MCAR: Please provide the reference source for the size (in hectares) of each district used in the calculations.</p> <p>MCAR: Please clarify the difference between the ZILMP area used in the ZILMP_Emissions_Calculations_RL workbook and Table 5 in the PD.</p>
Round 1 Response from ER Program Entity (DD MonthYYYY)	<ol style="list-style-type: none"> 1. Please note that the area of each district comes from an official national administrative boundaries shapefile provided by the National Cartography and Remote Sensing Centre (CENACARTA) under the umbrella of the Minister of State Administration and Civil Service (MAEFP) [2019], and this shapefile was officially published by The Humanitarian Data Exchange through the Instituto Nacional de Estadística (INE), a government institution. The shapefile was converted to Lambert Azimuthal Equal Area projection system. Please download here the shapefile: https://data.humdata.org/dataset/mozambique-administrative-levels-0-3. (Note: Please download the "moz_adm_20190607_SHP.zip" file, and then extract the "moz_admbnda_adm2_ine_20190607 " shapefile. The "ADM1_PT" column header refers to provincial level, and the "ADM2_PT" column header refers to district level.). 2. The area of 8,797,094 ha presented in the document "Emission_Factor_v1.1" corresponds to the sum of the forest strata areas of two maps (agro-ecological zoning and FNDS 2016 map) used to estimate the emission factors of Zambezia province, and it does not represent the real forest area of Zambezia province. The sum of the strata areas was done to correct the problem of the base map error (cluster that in the zoning map fell in non-forest strata, but which field data proved to be forest), and thus avoid bias in the estimates. While the area of 5,310,265 ha used in the ZILMP_Emissions_Calculations_RL workbook is the total area of the districts included in the ZILMP. The emission factors used for ZILMP were derived from the National Forest Inventory of the Zambezia Province, and these are used as emission factors for the ZILMP as well as for estimating emissions in the Zambezia province. As explained in Section 5.1., the Emission factors for the Zambezia province are representative for the forests found in ZILMP so they are considered to be accurate and they represent an improvement over the EFs used in the ERPD which were based on a non-representative inventory with a hazard sampling based on transects. The ER MR has been revised to make this clear.
Aster Global Findings - Round 2 (04 December 2020)	<ol style="list-style-type: none"> 1. The audit team downloaded the shapefiles and independently confirmed the size of each district in the project area (Accounting Area). The audit team noted minor discrepancies (less than 60 hectares) in the Accounting Area (about 5.3 million hectares) and determined that this was likely caused by projection discrepancies and as a result the audit team is reasonably assured that the Accounting Area is correctly stated in the MR. Additionally, the correct hectareage is applied in the quantification workbooks. <p>During the review of the shapefiles, the audit team noted that 4 plots used in the estimation of the RL were outside the project area (Accounting Area) and 1 plot from the activity for estimation during the monitoring period was outside the project area (Accounting Area).</p> <ol style="list-style-type: none"> 2. Thank you for the clarification. The audit team confirms that the appropriate area is being used for the emission estimates in the reference level and monitoring period.

Round 2 MCAR/mCA R/OBS	MCAR: Please exclude plots outside the Accounting Area in the estimation of the RL and during the Monitoring period. Additionally, please update all downstream calculations.
Round 2 Response from ER Program Entity (DD MonthYYYY)	We confirmed the existence of these plots outside Accounting Area. All downstream calculations have been updated.
Aster Global Findings - Round 3 (04 December 2020)	The audit team reviewed the updated calculation workbooks and confirmed that the requested updates have been made.

Item Number	9
Carbon Methodolog ical Framework Version 2, June 22, 2016 - Criterion 6	- Activity data (e.g., forest-cover change or transitions between forest categories) (1)
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents	Simple guide_ERL, ZILMP_Emissions_Calculations_RL (2005-2015).xlsx
Aster Global Findings (04 December 2020)	When the VVB reviewed the ZILMP_Emissions_Calculations_RL (2005-2015).xlsx, the team noted that in cells B43:B94 in the activity data tab there are numerous Countif formulas. It is unclear to the audit team what the codes are that used in the Countif formulas. For example, cell B45 has a Countif formula that calls the code "Reflor_2FXC". It is unclear what this code means and the audit team was unable to find a list of these codes and their meanings.
Round 1 MCAR/mCA R/OBS	MCAR: Please provide a list of all codes that refer to different forest type groups and Land use categories in cells B43:B94.

Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>It was added to the "ZILMP_Emissions_Calculations_RL (2005-2015)" workbook a new worksheet tab called "List of codes", which provides an explanation of the different codes of the land use categories that were used. In addition, another worksheet tab called "Readme", which provides an explanation on the different aspects of the "ZILMP_Emissions_Calculations_RL (2005-2015)" workbook. Please find here the workbook: https://www.dropbox.com/s/we9qw3pkmmpkewb/ZILMP_Emissions_Calculations_MR_%282018%29.xlsx?dl=0</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>The audit team reviewed the list of codes provided by the ER Program and noted the following:</p> <ol style="list-style-type: none"> 1. In the ZILMP_Emissions_Calculations_RL_(2005_2015) workbook Row ID 100679 has an image former and image current date that are the same. It is unclear how this is appropriate for detecting land use change. 2. In the ZILMP_Emissions_Calculations_RL_(2005_2015) workbook Row ID 98437 has an image former date that is later than the image current date. It is unclear how this is appropriate for detecting land use change. 3. In the ZILMP_AD_Calculations_MR_(2018) workbook the audit team noted that there were multiple plots contained within the Data tab that have a current image date that is earlier than the former image data. Additionally, the audit team noted that there are multiple plots that have the same date for the current image date and former image date. 4. The audit team noted that in the ZILMP_AD_Calculations_MR (2018) workbook, plot ID 1205 is classified as having 30-39% tree coverage but has a LULC change of F>C. It is unclear why these LULC change classifications are appropriate. 5. In the ZILMP_Emissions_Calculations_RL_(2005_2015) workbook Plot IDs 94995, 99507, 99674, and 100169 appear to have the final land use class misclassified. Please clarify why the current final land use classification is appropriate.
Round 2 MCAR/mCA R/OBS	<p>MCAR: Please address 1-5 in line with the findings and if necessary, update all downstream calculations. Please double check that all Activity data has been correctly coded.</p> <p>MCAR: Please provide the raw data that feeds the DATA tab in both the ZILMP_Emissions_Calculations_RL_(2005_2015) and ZILMP_AD_Calculations_MR_(2018) or where this data can be downloaded.</p> <p>MCAR: Please provide a geospatial file showing the strata used for the Activity Data in estimating emissions from the Monitoring Period.</p>
Round 2 Response from ER Program Entity (DD MonthYYYY)	<p>1 and 2. We believe that 2 factors led to the issues raised in findings 1 and 2. The first factor is that the field "Image_former_date" can refer to two different dates, depending on the situation. If the plot does not have a LULC change, then the date refers to the image used to determine the LULC at the start of the monitoring period (2001 for RL, 2018 for the MR). If there is a LULC change, then the date refers to when the change occurred. This is explained in the "Readme" sheet of both. "ZILMP_AD_Calculations_MR_(2018).xlsx" and "ZILMP_AD_Calculations_RL_(2005_2015).xlsx". The second factor is that, for the reference period, the field "image_current_date"</p>

	<p>refers to the date of the most recent high resolution image (Google Earth or Bing Maps) used to characterize the elements coverage and the current LULC. As an example, if the most recent high resolution image was from 2015, then that will be the image reported in the “image_current_date” field. Even if a change is detected using Sentinel-2 images, we would use this image as the “baseline” to help determine what elements were changed (e.g., cut trees). This approach was subsequently changed for the monitoring period, where the current date refers to the most recent image available, usually a medium resolution image from Sentinel-2.</p> <p>As a result of the 2 factors above, the date of the “current” image can be the same or earlier than the date of the “former” image. We realize that this is somewhat confusing, but the field names have been set since the beginning of our process and so we have adjusted to their meaning and have kept them as is.</p> <p>3. We confirm the existence of plots with mismatch between the “image_current_date” and “Image_former_date”, and that was in part due to the human error on the record. A spreadsheet containing all the identified problematic plots has been placed in the \Docs\MR_misdate folder (https://www.dropbox.com/s/fe03sb8p70eni2j/MR_plots_misdate.xlsx?dl=0). These errors have been corrected in the dataset.</p> <p>4. We acknowledge this error in the counting of the individual elements of the plot. The class change was correct, but the % of tree cover was incorrect. This has been corrected in the dataset.</p> <p>5. The land use classification in these plots was not misclassified, however, the decision tree needs to be updated to reflect the case of these plots. Specifically, these plots refer to the classification of the grassland class. When tree cover is below 30% (i.e., a plot is not forest), then tree elements count towards the class of shrubland. In other words, if conditions are not met for the plot to be classified as a settlement or cropland, then if the sum of tree and shrub elements is >20%, the plot will be classified as shrubland/thicket. This is the case even if there is 0% cover of shrubs, but >=20% cover of tree elements. The decision tree has been updated and this is reflected in the latest version of the MR report.</p> <p>6. The folder “.\Activity Data\2018\Map” has the map used as the basis of stratification for the Monitoring period. However, the map provided was for the whole province of Zambézia, instead of only the project area. We have now placed the stratification map for only the project area in that folder (https://www.dropbox.com/sh/ayydvmdbp0500v/AAArpyq7mGrYr5FWuyh2T-gpa?dl=0). Please note that this does not have any impact on the calculations, because the map used in all calculations was for the project area.</p>
<p>Aster Global Findings - Round 3 (04 December 2020)</p>	<p>1. 2 and, 3. The audit team better understands how these errors may have occurred. Additionally, the audit team reviewed the new MR and RL Emission Calculations workbook and MR Plots Misdate and confirms the issues have been addressed.</p> <p>4. The audit team reviewed the updated Activity Data and confirms that this issue has been resolved.</p> <p>5. The audit team better understands the application of the land use classification decision tree. Additionally, the audit team confirms that the decision tree has been updated.</p> <p>6. The audit team reviewed the stratification files and confirmed that plots were correctly allocated to each stratum.</p>

Item Number	10
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 6	- Activity data (e.g., forest-cover change or transitions between forest categories) (2)
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	ZILMP ER Monitoring Report - 2018 v.3.1_clean
Aster Global Findings (04 December 2020)	<p>The Monitoring Report states that a stratified random sample design was used, and then references a 4 * 4 km systematic grid. Alegria (2020) states that a random allocation of plots within strata was later altered to a grid-based sample.</p> <p>Sample design should be clarified. In particular, were cluster selection probabilities from the original pre-stratified random sample (referencing different strata based on the 2008 agro-ecological map) incorporated in estimators for the post-stratified systematic sample (referencing collapsed classes)?</p>
Round 1 MCAR/mCAR/OBS	MCAR: Please address in line with findings.

Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>Please note that there are several sampling designs and it seems these are being confounded:</p> <p>1) Activity data for Reference Level (RL): As explained in Section 8.3 of Annex 4 (Parameter A(j,i)RP) of the ER-MR, the activity data for the RL was estimated based on a systematic sampling design (4km*4km grid).</p> <p>2) Activity data for the monitoring period: As explained in Section 3.2 of the ER-MR (Parameter A(j,i)MP), the activity data for monitoring was based on a stratified estimation.</p> <p>3) Emission Factors based on provincial inventory: The initial sampling design was a pre-stratified simple random sampling, but the selected sample units were reallocated to match geolocate the points of the 4x4km grid. This was done to ensure consistency with the provincial inventories of Gaza and Cabo Delgado, that had been conducted by DINAF/JICA.</p> <p>The comment referred to in Alegria (2020) pertains to 3) above. Effectively, the initial estimation of carbon densities did not take into consideration the inclusion probabilities of the pre-stratification. However, Alegria (ex-USFS) supported Mozambique in addressing this issue by considering the inclusion probabilities induced by the pre-stratification and by using appropriate estimators for weights derived from the 4kmx4km grid (They are not exact as they are based on sampling). The MRV team with the support of Alegria, produced the calculation spreadsheet Emission_factor_v.1.1.xlsx (c.f. available in folder 'Mozambique ERPA 2018\Emission Factors') which shows the revised calculations.</p> <p>As a result of this change emission factors changed on both stratum: Semi-deciduous forest: changed from 140.08 +/-6.66 tdm/ha to 144.69 tdm/ha (AGB), and from 52.71 tdm/ha to 49.98 tdm/ha (BGB); Semi-evergreen forest: changed from 129.93 tdm/ha to 123.13 tdm/ha (AGB), and from 38.47 tdm/ha to 42.24 tdm/ha (BGB)</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>The audit team understands the sampling design of the ER Program however, more detailed information on how the collapse of strata from JICA Classes to FNDS: Analytical (Table 1: Collapsing of LULC Classes) affected the optimal allocation of clusters it would be helpful to better understand the sample design. In other words, does FNDS: Analytical have the equal probability of allocating clusters into each stratum as JICA Classes? This question relates to page 2 of "Independent evaluation of Mozambique national activity data collection protocols, forest inventory design, and, data analysis" <Final_Report_Alegria.pdf>.</p>
Round 2 MCAR/mCA R/OBS	<p>MCAR: Please address in line with Round 2 findings.</p>
Round 2 Response from ER Program Entity (DD MonthYYYY)	<p>We think that there may have been a misunderstanding regarding table 1 of the Alegria report, because it does not reflect the allocation of sample units, but rather the aggregation of strata for the estimation of emission factors, which presupposes not to affect the optimal allocation of clusters. The Alegria report was based on the National Forest Inventory report, and its recommendations were used in the production of emission factors in the province of Zambézia, whose data come from an optimal allocation considering 8 strata for collecting field data.</p> <p>Note: we will update the MR "sample design section", where it will be clear that the optimal allocation was made for eight strata (sheet "results" of the document "emission factor v.2"), and given the need to harmonize with the data activity, they were aggregated in two strata when calculating the emission factors.</p>

Aster Global Findings - Round 3 (04 December 2020)	<p>The audit team is confirmed that Table 1 is simply a land classification and not related to optimal allocation of plots. The audit team also confirmed the language of sampling design was updated in the Monitoring Report (page 21, ZILMP ER Monitoring Report - 2018 v.5.docx).</p> <p>This criterion is satisfied.</p>
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Item Number	11
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 6	- Emission factors (1)
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	Emission factor_v.1.1.xlsx
Aster Global Findings (04 December 2020)	Tree level data is provided as Emission factor_v.1.1.xlsx, however the audit team is unsure if the data is publicly available.
Round 1 MCAR/mCAR/OBS	MCAR: Is tree level data publicly available?
Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>Criterion 6 of the FCPF MF states "In cases where the country's or ER Program's policies exempt sources of information from being publicly disclosed or shared, the information shall be made available to the third-party validation and verification body and a rationale is provided for not making these data publicly available. In these cases, reasonable efforts shall be made to make summary data publicly available to enable reconstruction". Aggregated data at the plot level are publicly available in [https://www.dropbox.com/s/mjgc49toldgog8d/Data_IFN_plt.xlsx?dl=0], yet the raw data cannot be made publicly available as per the data sharing policies since these data can be sensitive as it can point out to loggers on the existence of high-timber value species or it can be used inappropriately. Thus, the raw data cannot be made publicly available, but it has been shared with the VVB (c.f. Tab 'Tree' in file Emission factor_v.1.1.xlsx, available in folder 'Mozambique ERPA 2018\Emission Factors'). Therefore, Mozambique would comply with Criterion 6 and thus Indicator 6.2.</p>

Aster Global Findings - Round 2 (04 December 2020)	The desire to keep plot level data unpublished is reasonable given the threat of harvest to high value species. The audit team confirms the Criterion 6 and agrees the non-disclosure of tree level to the public. This item is closed.
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Item Number	12						
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 6	- Emission factors (2)						
Applicability to the ER Program (Y or N/A)	Y						
Requirement Met (Y, N, or Pending)	Y						
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	Shoch ZILMP review prelim 13Nov2020.docx						
Aster Global Findings (04 December 2020)	<p>It is unclear where the 0.28 and 0.29 root:shoot values are derived in the Mokany 2006 paper.</p> <p>It is unclear where the aboveground biomass value of 269 tdm/ha for mangroves is derived in the Stringer et al 2015 paper – the study region is reasonably representative of the ZILMP area, but the paper presents results for 5 height class strata and does not provide an area-weighted average (nor do any of the stratum-specific values for overstory and understory aboveground biomass correspond to the value referenced in.</p> <p>Stratum stock values presented in the Monitoring Report (MR) do not correspond to values in “ZILMP_Emissions_Calculations_MR_(2018).xlsx” (Calc file)</p> <table border="1"> <thead> <tr> <th>Stratum</th> <th>MR Calc file (AGB)</th> </tr> </thead> <tbody> <tr> <td>Semi-deciduous forest (FSD)</td> <td>144.69 142.52</td> </tr> <tr> <td>Evergreen forest (FSSV)</td> <td>123.13 110.63</td> </tr> </tbody> </table> <p>Post deforestation stocks use 5 classes (wetland, crop, grass, settlement and other), with values ranging from 0 to 10 tdm/ha. Agro-pastoral systems in this region of Africa frequently include retained tree biomass - Banda et al 2006 estimated residual basal area of 12 m²/ha in Tanzania, which we estimate corresponds to ~25-30 tdm/ha, well above the default values incorporated in the emission factors.</p>	Stratum	MR Calc file (AGB)	Semi-deciduous forest (FSD)	144.69 142.52	Evergreen forest (FSSV)	123.13 110.63
Stratum	MR Calc file (AGB)						
Semi-deciduous forest (FSD)	144.69 142.52						
Evergreen forest (FSSV)	123.13 110.63						

Round 1 MCAR/mCAR/ OBS	MCAR: Please address in line with findings.
Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>1) The value of 0.28 used in the BGB estimate of the individual trees in the FSSV is referenced in the article by Mokany et al. (2006) in table 2, and the same corresponds to the median value of 0.275 which is recommended when the biomass above the ground per unit area is greater than 20 Mg. For calculation purposes, the value of 0.275 above was rounded up to 0.28. To avoid future confusion, we will update the calculation with the original value (0.275) and then the ER-MR will be updated accordingly.</p> <p>2) The emission factor of 269 tdm/ha used for the mangrove forest comes indirectly from table 1 of Stringer et al. (2015) article. For the determination of the value (269 tdm/ha), we first found the weighted average carbon of the two carbon reservoirs (overstory & understory), followed by conversion of carbon to biomass using the conversion factor of 0.47 proposed in the IPCC good practice guide.</p> <p>3. The correct values are: FSD (AGB: 144.69 tdm/ha; BGB: 49.98 tdm/ha); FSSV (AGB: 123.13 tdm/ha; BGB: 42.24 tdm/ha). There was a difference in the values because the application of the allometric equations at the tree level was updated and it was forgotten to update the values in the ER-MR. The ER-MR will be updated accordingly.</p> <p>4. Although agro-pastoral practice is common in sub-Saharan Africa, it is not common in Mozambique (the few agro-pastoral practices are associated with home gardens). In Mozambique, forest areas converted into agricultural fields are mostly for the planting of annual agricultural crops, hence the choice to use the values proposed by IPCC, instead of other values such as those of Banda et al.</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>1. The audit team confirmed that the 0.275 is correctly used per the Mokany et al. 2016 paper.</p> <p>2. The audit team was unable to determine if the emission factor for Mangroves is appropriate as there was no demonstration of the quantification. Specifically, the Stringer et al. paper stratifies by 5 height classes and it is unclear which height classes correspond to "overstory & understory". Please provide a quantitative demonstration that shows how this emission factor was estimated to the audit team can confirm whether it is appropriate and ensure the calculation was performed correctly.</p> <p>3. The audit team reviewed the updated MR and confirms that the stratum stocks are correctly stated in the MR and emission factor workbooks. However, the BGB tdm/ha referenced in the ER Programs Round 1 response (49.98, 42.24 are not what is stated in the MR nor used in the emission quantification workbooks. Additionally, the audit team reviewed the ER Program documents that were sent with the Round 1 responses and we were unable to find an updated ERPD that references all the newest information as it relates to the ER Program.</p> <p>4. The audit team found that in the activity data used in the RL and for the monitoring period that tree cover was retained in land classified as agricultural land in about 50% of the agriculture land. As a result, the audit team does not believe the post deforestation emission factors are appropriate.</p>

<p>Round 2 MCAR/mCAR/OBS</p>	<p>MCAR: Please provide the calculation of the emission factor 269 tdm/ha, the emission factor for Mangroves.</p> <p>MCAR: Please clarify if the ER Programs Round 1 response (3) incorrectly states the BGB tdm/ha emission factors.</p> <p>MCAR: Please update the ERPD to reflect all changes that have been made to the emission factors, emission quantification for the RL and Monitoring period and reflects all new changes related to updates from FCPF documents. Please also review for and make grammatical corrections and fix references such as "Error! Bookmark not defined" which is found in various portions of the document.</p> <p>MCAR: Please clarify in line with the finding 4.</p>
<p>Round 2 Response from ER Program Entity (DD MonthYYYY)</p>	<p>1. To calculate the biomass of mangrove forest the following steps was take:</p> <p>a. Compute mean AGC for two interest pool (overstory and understory) in each strata (table 1) Height Class 1 = 55.40+7.70= 63.10; Height Class 2 = 96.70+7.40= 104.10; Height Class 3 = 127.40+11.0 = 138.40; Height Class 4 = 183.30+3.70 = 187.00; Height Class 5 = 241.30+3.00= 244.30</p> <p>b. Compute the area proportion (Weight) for each strata (table 3) Height Class 1 = 4730/30267 = 0.16; Height Class 2 = 10536/30267 = 0.35; Height Class 3 = 8610/30267 = 0.28; Height Class 4 = 5522/30267 = 0.18; Height Class 5 = 869/30267 = 0.0.3</p> <p>c. Compute the mean carbon of the population Carbon mean = mean Height Class 1 * proportion Height Class 1 + mean Height Class 1 * proportion Height Class 1 + mean Height Class 1 * proportion Height Class 1+ mean Height Class 1 * proportion Height Class 1+ mean Height Class 1 * proportion Height Class 1 Carbon mean = 63.10tC/ha*0.16+104.10 tC/ha *0.35+138.40 tC/ha *0.28+187.00 tC/ha *0.18+244.30 tC/ha *0.03 Carbon mean = 126.60 tC/ha</p> <p>d. Compute the mean biomass of the population Biomass mean = Carbon mean/factor conversion (IPCC) Biomass mean = 126.60 tC/ha / 0.47 Biomass mean = 269.36 tdm/ha.</p> <p>2. The value of BGB we reported in the reply was an answer to the finding and referred to the value that was presented in the version 4.0 of the document. This value was updated in version 4.1 and that was the reason for the mismatch between our reply and the MR. The values in the report are the up to date values and match those of the spreadsheets.</p> <p>3. In our experience, tree cover remaining in deforested plots is a result of partial deforestation of the plot, not necessarily trees remaining in the actual agricultural field. Our methodology does not sample the polygon of deforestation, but rather samples a random pixel within the polygon of deforestation and then overlays a 1 ha plot on it. As a result, there are cases of deforestation where there remain trees, because only a part of the plot was deforested. On the other hand, there are cases where we have reported forest degradation, but what actually occurs is partial deforestation (clear cut), such that tree cover remains above 30%. In either case, the application of our decision tree determines the land use class, which then receives the corresponding emission factor.</p> <p>We have used the default IPCC values, which were also used in the National FREL. There are few studies looking at post-deforestation carbon stocks in miombo woodlands of southern Africa. Of note we found Williams et al. (2008) in Mozambique, Kalaba et al. (2013) in Zambia, and McNicol, Ryan, and Williams (2015)</p>

	<p>in Tanzania. Of these 3, only McNicol, Ryan, and Williams (2015) report carbon stocks for active agricultural fields, with values between 6 and 20 tdm, with the large variation explained due to the presence of large trees in the plots. Williams et al. (2008) report that fields in fallow after 5 years have a carbon stock of less than 10 tdm. Kalaba et al. (2013) present mean carbon stocks of 5.4 tdm for slash and burn plots which have been abandoned for 5 years. These 3 studies report values that are within the margin of error of the IPCC defaults.</p> <p>As a result of the above points, we are confident that the application of the IPCC default value is consistent with best practices.</p> <p>References</p> <p>Kalaba, Felix Kanungwe, Claire Helen Quinn, Andrew John Dougill, and Royd Vinya. 2013. "Floristic Composition, Species Diversity and Carbon Storage in Charcoal and Agriculture Fallows and Management Implications in Miombo Woodlands of Zambia." <i>Forest Ecology and Management</i> 304:99–109.</p> <p>McNicol, Iain M., Casey M. Ryan, and Mathew Williams. 2015. "How Resilient Are African Woodlands to Disturbance from Shifting Cultivation?" <i>Ecological Applications</i> 25(8):2330–36.</p> <p>Williams, MRCM, C. M. Ryan, R. M. Rees, E. Sambane, J. Fernando, and J. Grace. 2008. "Carbon Sequestration and Biodiversity of Re-Growing Miombo Woodlands in Mozambique." <i>Forest Ecology and Management</i> 254(2):145–55.</p>
Aster Global Findings - Round 3 (04 December 2020)	<ol style="list-style-type: none"> 1. Thank for the clear explanation. The audit team reviewed the calculation and confirms that it is correct. 2. Thank you for the clarification. The audit team confirms that the MR states the correct emission factor and is applied correctly in the quantification workbooks. 3. Thank you for the clarification. This criterion is satisfied.

Item Number	13
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 6	- Emission factors (3)
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	Shoch ZILMP review prelim 13Nov2020.docx

Aster Global Findings (04 December 2020)	<p>Provide justifications for the following default non-forest stock values applied to derive emission factors:</p> <p>Crops are assigned 10 tdm/ha, corresponding to the IPCC 2006GL value for tropical wet perennial crops. Why was tropical moist not used? Why perennial (not annual) crops?</p> <p>Grasslands are assigned 2.3 tdm/ha aboveground, corresponding to the IPCC 2006GL value for tropical dry grasslands. Why was the tropical moist value (6.2) not applied?</p> <p>Allometric equations applied in the semi-deciduous forest type are predominately from Mugasha et al 2013. Data for that equation are all from Tanzania (Manyara, Lindi, Katavi and Tabora regions). Given the extra-national data source for this equation, validation of its application in, and potentially calibration to, Mozambique/ZILMP is appropriate. Confirmation by experts is insufficient.</p>
Round 1 MCAR/mCAR/OBS	<p>MCAR: Please address in line with findings.</p>
Round 1 Response from ER Program Entity (DD MonthYYYY)	<ol style="list-style-type: none"> 1. Please note that the value used is not the one for 'Tropical, Wet' but the one for 'Annual Cropland'. And the unit of mass used is not 'tC/ha', but 'tdm/ha'. We applied the value of 10 tdm/ha because the agricultural land in Mozambique is mostly under the annual-crop farming practices that drive conversion of forest land to agricultural lands. So, according to 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 4, Chapter 5, Section 5.28), for lands planted in annual crops, the default value of growth in crops planted after conversion is 10 tonnes of dry biomass per hectare. 2. For grassland, the value of 2.3 tdm/ha was extracted from Table 6.4 of the 2006 IPCC GL which corresponds to tropical dry grasslands as the climate in most of Mozambique is tropical dry to subtropical dry. 3. According to Table 1 of the FCPF Guidelines on Uncertainty analysis of ERs "The lack of validation of the allometric equation should be considered as a source of bias, discussed, and addressed as far as practical by the REDD Country. QA/QC procedures shall be in place to ensure that the best allometric model is used and that any identified bias have been addressed". The equation of Mugasha et al. 2013 is representative of Miombo Forest, which is the same forest in the ZILMP area. In ideal conditions, the equation should be validated with destructive sampling but this was not feasible due to financial reasons. As QA/QC procedure, the selection of the equations was discussed with experts from the Eduardo Mondlane University and IIAM who confirmed that these are the most representative and best available equations, which will provide accurate estimates, as far as practice. According to the experts, although there might be an associated bias from using the equation, it is safer to use the equation of Mugasha et al. 2013 (more representative "ecosystems and species") than using the adjusted equations in Mozambique (less representative "ecosystems and species"). It is because the adjusted equations in Mozambique mostly recommended for specific areas (example of one of the best-adjusted Miombo equation "Guedes et al. 2018" recommended only to estimate biomass in low Miombo of Beira corridor). In addition, if they are applicable to extensive ecosystems, they present a high level of uncertainty (example is the equation of Miombo adjusted by Chaúque 2004, which has $R^2 = 0.78$), which is associated with low representativity of species and diameter range of the trees used during equation adjustment. On the other hand, Mugasha et al 2013 used data from 60 species (about half of which occur in Zambézia) from 1 to 110 cm of dbh, coming from Miombo woodland (which according to Chidumayo & Gumbo, 2010 "The Dry Forests and Woodlands of Africa", this forest type are similar in terms of floristic composition and structure to those of Mozambique). In addition, the last paragraph of conclusion of the authors' article where they show no reservations about the use of the equation in other

	<p>regions of southeastern Africa.</p> <p>This has been included in the MR, Section 5.1. Currently the MRV unit has plans to establish MoU with research institutions to develop and/or adjust more accurate allometric equations for various ecosystems in the country, and thus update the emission factors.</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>1. The audit team now understands how 10 tdm/ha was derived. However, the audit team found no evidence demonstrating that this emission factor is relevant for the Accounting Area. Additionally, it appears in the 2019 Update to the 2006 IPCC Guidelines this parameter has been updated. According to FCPF the most recent IPCC guidelines should be used.</p> <p>2. The audit team conducted an analysis using the Holdridge System and confirms that the majority of the Accounting Area is either Tropical Dry or Subtropical Dry and as the area of Tropical Dry is significantly larger than the Subtropical Dry area. Emission factors for Tropical Dry are appropriate. Please ensure that this parameter is current to the most recent IPCC Guidelines.</p> <p>3. To address the uncertainty stemming from allometric equations, the new guideline from the World Bank suggests to add 10% of uncertainty to the allometric equations uncertainty, and the audit team confirmed that the 10% uncertainty was correctly applied in the R coding: "addAllometricUncertainty = function(proportional_SE){return (((proportional_SE * 1.645)**2 + 0.1**2) ** 0.5) / 1.645}}". This item is closed.</p>
Round 2 MCAR/mCAR/OBS	<p>MCAR: Please provide a evidence that supports the use emission factor referenced in Finding 1.</p> <p>MCAR: Please ensure all IPCC parameters are referenced from the most recent IPCC Guidelines and Guidance.</p>
Round 2 Response from ER Program Entity (DD MonthYYYY)	<p>1. The value 10 tdm/ha is consistent with the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, as described in section 5.3.1.2 (https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch05_Cropland.pdf). 2. The EFs are in line with the 2019 Refinement to the 2006 IPCC GLs for National GHGI.</p>
Aster Global Findings - Round 3 (04 December 2020)	<p>The audit team confirmed that all emission factors are in line with the 2019 Refinement of the 2006 IPCC guidelines.</p>

Item Number	14
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 7	Indicator 7.2: The sources of uncertainty identified in Indicator 7.1: are assessed for their relative contribution to the overall uncertainty of the emissions and removals.
Applicability to the ER	Y

Program (Y or N/A)	
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	Emission factor_v.1.1.1.xlsx / ZILMP ER Monitoring Report - 2018 v.3.1_clean.docx
Aster Global Findings (04 December 2020)	<p>Please check the equation for Step 7c. Compute variance (Rows 124:133), Area tab of Emission factor_v.1.1.1.xlsx. It looks like $(Ahd^2) \times Var(Phd\text{-bar})$ should be applied, so Eq.4.4 in Bechtold et al. (2005). For each stratum, this would be just simple random sampling. This should be checked as it subsequently affects estimation for degrees of freedom and other estimates. In addition, please also check Eq. 4.17 (Bechtold & Patterson, 2005) Rows 287:296, AGB tab of Emission factor_v.1.1.1.xlsx.</p> <p>The audit team checked "Monte Carlo v0.2.pdf" and found that "AGB_before (or, AGB_before.x)" values were different from the ones provided in the document "Monte Carlo v0.2.pdf", based on the R scripts provided.</p> <p>Where are the values of Column Parameter values in Table "Parameters and assumptions used in the Monte Carlo method" come from (Section 12.2 Quantification of uncertainty in Reference Level Setting of ZILMP ER Monitoring Report - 2018 v.3.1_clean.docx)?"</p> <p>How does the function "project_emissions <- mapply()" guarantee that the correct values for AGB_before, AGB_after, BGB_before, and BGB_after were applied in the outputs of "Areas_project (the name was changed to Areas_project_boo)"?</p>
Round 1 MCAR/mCA R/OBS	<p>MCAR: Please re-check the formula applied in 7c. Compute variance (Rows 124:133), Area tab of Emission factor_v.1.1.1.xlsx, as this affects subsequent calculations. The audit team suggests $(Ahd^2) \times Var(Phd\text{-bar})$, so Eq.4.4 in Bechtold et al. (2005), or provide any justification for the use of "Strata_info!D2^2*C89". Please also re-check Eq. 4.17 (Bechtold & Patterson, 2005) Rows 287:296, AGB tab of Emission factor_v.1.1.1.xlsx. Please refer to "Emission factor_v.1.1.1_AG_Check_Supplementary.docx" for details.</p> <p>MCAR: Please re-check the R script and check the discrepancy between "AGB_before (or, AGB_before.x)" values. However, the calculated values for "AGB_before (or, AGB_before.x)" are the same between "Monte Carlo v0.2.pdf" and "ZILMP_Emissions_Calculations_MR_(2018).xlsx". Please refer to "Uncertainty_Review_AG_Check_Supplementary.docx" for details.</p> <p>MCAR: Please provide the reference where Column Parameter values were obtained.</p> <p>MCAR: Regarding "project_emissions <- mapply()", please refer to Section 5.2 Non-parametric bootstrapping of "Uncertainty_Review_AG_Check_Supplementary.docx" for details.</p>

Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>1. There was an error in the variance calculation in section 7c, we will proceed with the update of the variance calculation and update the MR accordingly.</p> <p>2. This is different to what we have, we believe for two reasons:</p> <ul style="list-style-type: none"> i) The EFs were slightly updated between the Monte Carlo v0.2.pdf and the most recent runs. We have produced an updated version of the Monte Carlo pdf. ii) There shouldn't be an AGB_before.x and AGB_before.y repetition. Our best guess is that this is caused by a different version of R or the libraries we use. Are you using R 4.0.X by any chance? We developed this in R 3.6.1. <p>3. Carbon Fraction and ratio of molecular weights are described in section 2.2 of the MR. Biomass values are described in section 3.1 of the MR. Project area was obtained from the official district shapefiles (please see line 11: accounting area). The activity data values are derived from the nonparametric bootstrapping. They will be slightly different to the ones shown in section 3.2 of the MR.</p> <p>4. We believe that this is an issue caused by using R version 4.X. Please try to run the scripts again using R 3.6.3. We have added a comment in the R script stating that it should be run with R 3.6.3.</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>1. The calculation is updated in Emission factor_v.2.xlsx as suggested by the audit team according to Emission factor_v.1.1_AG_Check_Supplementary.docx. Emission factor_v.2.xlsx directly adopted the codings from the audit team in Emission factor_v.1.1_AG_Check.xlsx. The updated values are reflected in page 22 & 23 of ZILMP ER Monitoring Report - 2018 v.4.1.docx and BIOMASS tab of ZILMP_Emissions_Calculations_MR_(2018).xlsx. This item is closed.</p> <p>2. i) The audit team confirmed that the AGB_before values were correctly updated in the new R coding provided in line with Emission factor_v.2.xlsx. This item is closed. ii) These errors were due to the different versions of R. This is a minor error and negligible. This item is closed.</p> <p>3. The audit team confirmed the source of the in Table "Parameters and assumptions used in the Monte Carlo method". This item is closed.</p> <p>4. This issue was due to using different versions of R program. The audit team used R v4.0 whereas the ZILMP team used R v.3.6.3, and this issue was confirmed during the call on FEB 8, 2021 (recording available). This item is closed.</p>
Round 2 MCAR/mCA R/OBS	<p>MCAR: This is a minor finding. Based on Emission factor_v.2.xlsx, Lower (5th percentile) and Upper bound (95th percentile) of FSD need to be updated (page 22, ZILMP ER Monitoring Report – 2018 v.4.1.docx) to 116.15 and 173.22, respectively. Additionally, Lower (5th percentile) and Upper bound (95th percentile) for FSSV (page 23, ZILMP ER Monitoring Report - 2018 v.4.1.docx) do not match the values in Emission factor_v.2.xlsx. Please double-check if the correct values were put in.</p>
Round 2 Response from ER Program Entity (DD MonthYYYY)	<p>Uncertainty estimates of Emission Factors presented in the tables of section 3.1 are derived from the Monte Carlo Simulations, with 10% added allometric uncertainty following FCPF guidance. As a result, they will not be the same as the uncertainty estimates presented in the Emission factor_v.2.xlsx.</p> <p>However, we have noted an issue with the calculation of uncertainty for EFs in the Monte Carlo simulations. In the Monte Carlo simulations script we have used the Z value, instead of the t value that is used in the spreadsheet. As a result the uncertainty from the MC simulations is slightly lower than what it should be. We have updated the script to use a t value and the degrees of freedom from the Emission factor_v.2.xlsx. As a result, Monte Carlo summary table in the MR has been updated.</p>

Aster Global Findings - Round 3 (04 December 2020)	<p>The audit team confirmed the update of lower and upper bounds for the "subset = TRUE", so t-value, in the Monitoring Report (page 26, ZILMP ER Monitoring Report - 2018 v.5.docx).</p> <p>This criterion is satisfied.</p>
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Item Number	15
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 8	Indicator 8.2: 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. (2)
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	Shoch ZILMP review prelim 13Nov2020.docx
Aster Global Findings (04 December 2020)	<p>Full accounting of uncertainty should report results of independent check cruises and an estimation of measurement error.</p> <p>QA/QC procedures state: "An independent measurement of 10% of the plots. This activity was conducted by technicians of the National Directorate of Forests, who had participated in the Provincial Inventories of Gaza and Cabo Delgado. Diameter below 10%"</p> <p>What were the results of these independent measurements and where are they archived? What were the relevant measurement tolerances?</p>
Round 1 MCAR/mCAR/OBS	MCAR: Please address in line with findings.

Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>Table 1 of the FCPF Guidelines on Uncertainty Analysis of ERs for Measurement Error states that "The FMT conducted an assessment of the contribution of this source of error (c.f. Annex) and found that this source of error should be negligible for Emission Reduction estimation, provided minimal QA/QC procedures are in place. The contribution of this source of error to random error is low, yet QA/QC procedures should be in place to avoid systematic errors.". Column 7 indicates that measurement error does not need to be quantified.</p> <p>As explained in Section 3.1 of the ER MR, the QA/QC procedures that were implemented included different levels to reduce this error: a) Establishment of robust SOPs; b) Training of crews on SOPs; c) Remeasurement by supervisory of inventory team; d) Independent measurement (which is what is referred to).</p> <p>The remeasurement data is being processed and the results will be shared with the VVB with the next submission of the updated Monitoring Report.</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>More detailed information regarding assessment of sampling design and measurement error can be found in "Independent evaluation of Mozambique national activity data collection protocols, forest inventory design, and data analysis (James Alegria, 2020)", which concludes that the basic approach of the national activity data collection protocols, forest inventory design, and, data analysis as designed for the ER Program is overall sound while not perfect in implementation and execution. Therefore, the audit team concludes that the errors regarding sampling design including measurement errors are negligible.</p> <p>However, this item will be closed after confirming that the independent measurement is shared with the audit team and reflected in the updated Monitoring Report.</p>
Round 2 MCAR/mCA R/OBS	<p>MCAR: Please address in line with findings.</p>
Round 2 Response from ER Program Entity (DD MonthYYYY)	<p>The raw data for the independent measurements of the IFN will be shared with the VVB, as well as a brief analysis of the results. It will be placed in the .\Docs\QAQC_IFN\ folder (https://www.dropbox.com/sh/usoaqjfv1gsg6ef/AADEjxk7ZAxfhEzRXSBWV2IKa?dl=0)</p>
Aster Global Findings - Round 3 (04 December 2020)	<p>The audit team confirms the receipt of "QAQC_IFN" and appreciates the field efforts for QA/QC while "the NFI plots are temporary plots, and the trees are not individually marked or registered in the field. As a result, the re-measurement conducted in the QA process required the teams to locate and set up the cluster from scratch. Since the plots were not permanently marked, it is impossible to dissociate measurement error from plot delineation error." However, depending on the efforts put into the ER Program and professionals involved in, the audit team has a certain level of assurance that measurement errors are de minimis, and "Descricao_QAQC do IFN.docx" clearly states limitations and improvements for future QA/QC procedures. Therefore, the audit team concludes that the QA/QC for re-measurement is reasonable.</p> <p>This criterion is satisfied.</p>

Item Number	<p>16</p>
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<p>Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 14</p>	<p>Indicator 14.3: Emission factors or the methods to determine them are the same for Reference Level setting and for Monitoring, or are demonstrably equivalent. IPCC Tier 2 or higher methods are used to establish emission factors, and the uncertainty for each emission factor is documented. IPCC Tier 1 methods may be considered in exceptional cases.</p>
<p>Applicability to the ER Program (Y or N/A)</p>	<p>Y</p>
<p>Requirement Met (Y, N, or Pending)</p>	<p>Y</p>
<p>Evidence Used to Assess (Location in PD, MR or Supporting Documents)</p>	<p>ZILMP ER Monitoring Report - 2018 v.3.1_final_clean</p>
<p>Aster Global Findings (04 December 2020)</p>	<p>The audit team assessed the emission factors reported in the MR and ZILMP_Emissions_Calculations_RL workbook and noted that the AGB for F>C in the biomass tab of the previously mentioned workbook is 10. This appears to be a Tier 1 method and there is no explanation as to why a Tier 1 emission factor is used. The VVB notes that all the EFs for AGB in the Biomass tab of the RL workbook that come from the IPCC area all Tier 1 emission factors.</p> <p>Additionally, 10 is the the estimate for "Tropical, wet" but other emission factors are used are for "Tropical, dry".</p> <p>The audit team noted that the EF for BGB for F>P is 6.44 (cell B37 of the Biomass Tab in the ZILMP_Emissions_Calculations_RL workbook); however, there audit team was unable this value using the reference supplied by the ER Program.</p> <p>The audit team noted that the Carbon Fraction referenced in cell C55 of the Biomass Tab in the ZILMP_Emissions_Calculations_RL workbook appears to be a Tier 1 estimate.</p>

Round 1 MCAR/mCAR/OBS	<p>MCAR: Indicator 14.3 dictates that Tier 2 above emission factors must be used except in "exceptional cases". Please use an emission factor that satisfies this criterion for the AGB for Fores to Cropland, Forest to Pasture, Forest to Other, and Forest to Urban.</p> <p>MCAR: Additionally, the AGB emission factor for F>C conversion of 10 is for "Tropical, wet" but other emission factors used on for "Tropical, dry". Please explain this inconsistency.</p> <p>MCAR: Please correct the reference or value (whichever is incorrect) for the BGB for F>P (the value located in cell B37 of the Biomass Tab in the ZILMP_Emissions_Calculations_RL workbook).</p> <p>MCAR: Indicator 14.3 dictates that Tier 2 above emission factors must be used except in "exceptional cases". Please use a Carbon Fraction estimate that satisfies this criterion.</p>
Round 1 Response from ER Program Entity (DD MonthYYYY)	<ol style="list-style-type: none"> Indicator 14.3 of the FCPF MF requires the use of Tier 2 or higher methods, yet Tier 1 methods may be considered in exceptional cases. Unfortunately, Mozambique does not have the country-specific data for post-deforestation emission factors. The ERPD presented values for post deforestation agricultural lands. However, this data was based on a local study that was never published in a scientific article and we did not have access to the raw data. As a result, we decided to revert to the IPCC defaults, which were also used in Mozambique's National FREL. The value of 10 tdm/ha was used because the agricultural land in Mozambique is mostly under the annual-crop farming practices that drive conversion of forest land to agricultural lands. So, according to 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 4, Chapter 5, Section 5.28), for lands planted in annual crops, the default value of growth in crops planted after conversion is 5 tonnes of C per hectare, based on the original IPCC Guidelines recommendation of 10 tonnes of dry biomass per hectare (dry biomass has been converted to tonnes carbon in Table 5.9) (2006 IPCC, Volume 4, Chapter 5, Section 5.28). The values and assumptions of 2006 IPCC GL, Volume 4, Chapter 6, TABLE 6.1 and TABLE 6.4 are used. As the climate in most of Mozambique is tropical dry to subtropical dry, the value for semi-arid grassland in tropical dry climate zone is used, therefore a root-shoot ratio of 2.8 (TABLE 6.1) is applied to the value of peak above-ground biomass, 2.3 tonnes of dry biomass per hectare (TABLE 6.4), generating the expected values 6.44 tonnes of dry biomass per hectare. This will be better explained in the spreadsheet and the MR. Indicator 14.3 of the FCPF MF requires the use of Tier 2 or higher methods, yet Tier 1 methods may be considered in exceptional cases. Since there is no CF available in the country and the impact of this factor is very little, we consider this to be an exceptional case. It is worth noting that the reason why Tier 2 is preferred over Tier 1 is the uncertainty linked to Tier 1 as they might not be representative. Table 1 of the FCPF Guidelines on Uncertainty Analysis of ERs for 'Other parameters (e.g., Carbon Fraction, root-to-shoot ratios)' states that "These are usually not measured but sourced from scientific publications, databases or the 2006 IPCC Guidelines...the lack of QA/QC procedures for the selection of the values may lead to high systematic errors", so the concern of using Tier 1 is around systematic errors. Paragraph 5 of the same guidelines also indicate that systematic errors should be reduced as far as practical. As part of the QA/QC, the MRV team researched in the bibliography and held consultations with experts which resulted in using the value of 0.47 tC sourced from the 2006 IPCC GL and which is more conservative than the 0.5 that is commonly used and was used before consultations were undertaken.

Aster Global Findings - Round 2 (04 December 2020)	<p>1. The audit team understands that there are no Tier 2 emission factors for Mozambique for the reference parameters and the audit team is reasonably assured that this is true based on an independent search of the literature. However, the audit team noted that some of the referenced IPCC emission factors have been updated in the most recent 2019 Refinement to the 2006 IPCC Guidelines. Please update the emission factors to using the most recent IPCC Guidelines.</p> <p>2. Thank you for the clarification. The audit team reviewed the calculation for this parameter and confirms that it was carried out correctly. The audit team found that the Error % for the 10 tdm/ha is stated as 75% (the error percentage for 5 tonnes of C/ha); however, this error % does not account for the error of the in the conversion from tonnes of C/ha to tdm/ha).</p> <p>3. Thank you for the clarification. The audit team reviewed the the calculation for this parameter and confirms that it was carried out correctly. Similar to the Finding 2 (above), it appears as the error percentage for both parameters is not accounted for. In other words, the root-to-shoot ratio of 2.8 has the error of 95%, and for example of BGB F>P 6.44, the error 75% is only applied not accounting for the error 95% of the root-to-shoot ratio. More specifically, BGB F>P is a new variable based on (AGB * root-to-shoot ratio), and the variance should be VAR(AGB * root-to-shoot ratio) for BGB F>P, so in simple terms, VAR(XY). Please update with new errors or, provide justification on using the same errors as AGBs for BGBs for default factors.</p> <p>4.The audit team understands that there are no Tier 2 emission factors for Mozambique for the reference parameters and the audit team is reasonably assured that this is true based on an independent search of the literature.</p>
Round 2 MCAR/mCAR/OBS	<p>MCAR: Please ensure all parameters sourced from the IPCC guidelines utilize the most recent version of the IPCC guidelines.</p> <p>MCAR: Please account for the error percentages of both emission factors referenced in Findings 2 and 3.</p>
Round 2 Response from ER Program Entity (DD MonthYYYY)	<p>1. The parameters are in line with the 2019 Refinement to the 2006 IPCC GLs for National GHGI.</p> <p>2.We agree that the 75% uncertainty figure applies to tonnes of carbon rather than tonnes of dry biomass. However, we don't believe that our use of it for tonnes dry matter is unreasonable, on the basis that:</p> <ul style="list-style-type: none"> i) The figure is a nominal estimate of uncertainty, rather than one based on formal measurements as might be used if local inventory data were used. The nominal figure provides very large bounds (3.8 - 16.2 tonnes/ha at 90 percent confidence interval), and the impact of carbon fraction will be by far the smaller part of this uncertainty. ii) We consider that estimates of carbon content would have greater uncertainty than dry biomass as a result of variation in carbon fractions, so use of 75% is conservative. iii) In the Monte Carlo analysis an additional uncertainty is applied to the 10 tonnes dry matter figure to account for the carbon fraction (from a triangular distribution, based on IPCC estimates of 0.47 with a range of 0.44 - 0.49). Again, this is a conservative approach where alternatively a figure of 5 tC/ha ± 75% could be legitimately used. <p>3. We agree with the comment in point 3. We will update the relevant spreadsheets with the correct values for uncertainty of BGB for F>P</p>

Aster Global Findings - Round 3 (04 December 2020)	<p>1. The audit team confirmed that all emission factors are in line with the 2019 Refinement of the 2006 IPCC Guidelines.</p> <p>2. The audit team understands the reasoning provided in the response from the ER Program. We agree that the inclusion of the uncertainty for the carbon fraction is small and is significantly smaller than the uncertainty estimate associated with the carbon fraction. This criterion is satisfied.</p> <p>3. This finding is closed as "An additional 10% uncertainty is added at 90% confidence interval" in uncertainty analysis. This criterion is satisfied.</p>
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Item Number	17
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 17	Indicator 17.1: Deforestation and degradation drivers that may be impacted by the proposed ER Program Measures are identified, and their associated risk for Displacement is assessed, as well as possible risk mitigation strategies. This assessment categorizes Displacement risks as high, medium, or low.
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	ZILMP ER Monitoring Report - 2018 v.3.1_clean.docx
Aster Global Findings (04 December 2020)	<p>This indicator is addressed in "Update on the strategy to mitigate and/or minimize potential Displacement." of "ZILMP ER Monitoring Report - 2018 v.3.1_clean.docx". The MR identifies following three risks and categorizes risk of displacement as high, medium, or low: "slash and burn" agriculture, low / charcoal production, low / unsustainable forestry practices, medium.</p> <p>However, <https://bit.ly/geoportalmrvfnds> cannot be linked.</p>
Round 1 MCAR/mCAR/OBS	MCAR: Please provide the exact link of < https://bit.ly/geoportalmrvfnds >, or an appropriate source.
Round 1 Response from ER Program Entity (DD MonthYYYY)	Please note that Indicator 17.1 of the FCPF MF is not within the criteria of validation and verification as per Table 7 of the Validation and Verification Guidelines. In any case, we assume that the comment is related to Indicator 17.3 and 17.4 which is covered by the verification as per Para 32 b) of the VVG, so we have updated the referred link (https://bit.ly/GeoportalMRVOnline)

Aster Global Findings - Round 2 (04 December 2020)	The audit team reviewed the updated MR and confirms that the link is correct and functions as intended.
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Item Number	18
Carbon Methodological Framework Version 2, June 22, 2016 - Criterion 22	
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	
Aster Global Findings (04 December 2020)	<p>The audit team was unable to locate files that demonstrate how the "Aggregate Uncertainty of Emissions Reductions" are calculated.</p> <p>Is there a particular reason for using median as relativity? Or, is median same as mean, since the distribution is normal?</p>
Round 1 MCAR/mCAR/OBS	<p>MCAR: Please provide the files necessary to ensure that the ""Aggregate Uncertainty of Emissions Reductions" is quantified correctly.</p> <p>MCAR: Please address in line with findings.</p>
Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>1) The "Aggregate uncertainty of emission reductions" is taken from the output table "emissions_estimate_table.csv", located in ./uncertainty/output/tables.</p> <p>2) This has been estimated following the guidance provided in the ER MR Template, Section 5.1 > Quantification of the uncertainty of the estimate of Emission Reductions, that specifies that the relative margin of error is calculated by dividing the half width confidence interval by the median.</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>1. The audit team reviewed the Aggregate Uncertainty of Emissions and confirms that appropriate uncertainty discount 4% is applied correctly.</p> <p>2. The audit team confirmed that the median is same as mean as each parameter for uncertainty estimation assume normal distribution.</p>

Item Number	19
Carbon Methodological Framework Version 2, June 22, 2016	Indicator 37.4: Administrative procedures are defined for the operations of a national or centralized REDD+ Programs and Projects Data Management System; and an audit of the operations is carried out by an independent third party periodically, as agreed with the Carbon Fund.
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	Mozambique_Revised ERPD_16April2018_CLEAN.pdf
Aster Global Findings (04 December 2020)	This criterion is addressed in "Administrative procedure for the REDD+ Program and Project Data Management System" of "Mozambique_Revised ERPD_16April2018_CLEAN.pdf". It is stated that "The MRV team within FNDS is currently working on it and should make it available in the coming months."
Round 1 MCAR/mCAR/OBS	MCAR: Has document stating administrative procedures been released, or still in progress?
Round 1 Response from ER Program Entity (DD MonthYYYY)	The document describing the administrative procedures of the REDD+ Programs and Projects Data Management System is still in progress. Mozambique is developing and implementing its own comprehensive national REDD+ Program and Projects Data Management System. The system is hosted and managed by FNDS as per de REDD+ decree "the FNDS is responsible for (vi) managing the national REDD+ Programs and Projects Data Management System and for (vii) communicating to the entity in charge of the ER Transactions Registry all information related to ERs generated by REDD+ projects". Currently the system is implemented through a WebGIS platform (https://bit.ly/RegistoDeProgramas) alongside with the NFMS and the projects M&E Web portal. The system is still under development, as currently Mozambique only has one ER program. Please see section 6.2 of the MR for more details.
Aster Global Findings - Round 2 (04 December 2020)	Pending the receipt of the requested documents.
Round 2 MCAR/mCAR/OBS	

Round 2 Response from ER Program Entity (DD MonthYYYY)	We have shared the draft version of the Terms of Reference for the REDD+ Programs and Projects Registry Document as well as the Manual of Procedures for the Licensing of REDD+ Projects in the folder. \Docs\Supplementary\REDD+ Registry\ (https://www.dropbox.com/sh/in1yhzhpgrl9ob7/AACrJez4uYGN0u6Cw3FxnPOHa?dl=0)
Aster Global Findings - Round 3 (04 December 2020)	<p>The audit team confirmed the receipt of the draft version of the Terms of Reference for the REDD+ Programs and Projects Registry Document and the Manual of Procedures for the Licensing of REDD+ Projects.</p> <p>The VVB reached out to FCPF regarding the issue of whether or not draft forms of the documents provided to satisfy this criterion was sufficient as they are still in draft form. Guidance from FCPF received on 5/3/2021 states that the draft documents are sufficient to satisfy this criterion.</p> <p>However, this will be issued as an OBS which will require the VVB to review this item at the next verification.</p>
Round 3 MCAR/mCAR/OBS	OBS: Please ensure for future verifications that finalized administrative procedures are defined for the operations of the national REDD+ Programs and Projects Data Management System.

Item Number	20
Carbon Methodological Framework Version 2, June 22, 2016	Indicator 37.3: The information contained in a national or centralized REDD+ Programs and Projects Data Management System is available to the public via the internet in the national official language of the host country (other means may be considered as required).
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	Mozambique_Revised ERPD_16April2018_CLEAN.pdf
Aster Global Findings (04 December 2020)	1) What is the central publicly available website for the ER Program? Is < https://www.forestcarbonpartnership.org/ > the website for all public resources? 2) What is the level of information that can be released to the public? For example, is plot-level individual tree data publicly available?
Round 1 MCAR/mCAR/OBS	MCAR: Please see the questions in the finding related to availability of information to the public.

Round 1 Response from ER Program Entity (DD MonthYYYY)	<p>1) The DMS is available here: http://bit.ly/sistemaregistoREDD</p> <p>2) Indicator 37.2 provides the type of data that should be available in the Projects and Program DMS, i.e., i. The entity that has Title to ERs produced; ii. Geographical boundaries of the ER Program or project; iii. Scope of REDD+ activities and Carbon Pools; and iv. The Reference Level used. There is no requirement to publish plot data, which is part of Indicator 6.2. As explained in the applicable finding, aggregated data at the plot level are publicly available in [include link], yet the raw data cannot be made publicly available as per the data sharing policies since these data can be sensitive as it can point out to loggers on the existence of high-timber value species or it can be used inappropriately. Thus, the raw data cannot be made publicly available, but it has been shared with the VVB (c.f. Tab 'Tree' in file Emission factor_v.1.1.xlsx, available in folder 'Mozambique ERPA 2018\Emission Factors'). Therefore, Mozambique would comply with Criterion 6 and thus Indicator 6.2.</p>
Aster Global Findings - Round 2 (04 December 2020)	<p>1) The website <http://bit.ly/sistemaregistoREDD> is confirmed. This item is closed.</p> <p>2) See Row 14 findings "The audit team confirms the Criterion 6 and agrees the non-disclosure of tree level to the public." This item is closed.</p>

Item Number	21
FCPF Glossary of Terms V2 - April 2021 - Definition/C riteria	<p>Crediting Period - The period between the Crediting Period Start Date and the end date of the last Reporting Period under the ER Program which consists of at least two (2) Reporting Periods.</p>
Applicability to the ER Program (Y or N/A)	<p>Y</p>
Requirement Met (Y, N, or Pending)	<p>Y</p>
Evidence Used to Assess (Location in PD, MR or Supporting Documents	<p>MR</p>
Aster Global Findings (04 December 2020)	<p>The audit team was unable to confirm that this criterion is satisfied.</p>
Round 1 MCAR/mCA R/OBS	<p>MCAR: Please clarify where in the MR there is language that satisfies this criterion or add additional language to the MR.</p>
Round 1 Response from ER Program	<p>A subsection named Crediting Period Start Date was added in Section 1.1. This subsection specifically states the Crediting Period and contains tables which include the implementation date of the 4 WB projects in the ERPA region, as well as the</p>

Entity (DD MonthYYYY)	specific on-the-ground activities and enabling environment interventions conducted in 2018.
Aster Global Findings - Round 2 (04 December 2020)	The audit team reviewed the projects listed in Table 1 but was unable to find verifiable evidence that these programs commenced prior to the start date. The PADs folder has the project proposals for all four projects but these proposals do not indicate when the program started.
Round 2 MCAR/mCAR/OBS	MCAR: Please address in line with the finding.
Round 2 Response from ER Program Entity (DD MonthYYYY)	We have removed Table 1 in the updated version of the report, since it did not serve any purpose with regards to evidence of implementation of activities. We kept Table 2, which does have that evidence (it is now numbered Table 1). MozFIP: There is evidence of community delimitations as early as 26 February 2018, which can be seen in the dashboard of results of the service provider (https://sites.google.com/site/verdeazullandscape/rduat). Sustenta: The business plans provided are from August 2017 (https://www.dropbox.com/s/vpd1h9vjrj47f9a/Planos%20de%20Negocio.rar?dl=0) and the invoices of purchase of agricultural inputs are from December 2017 (https://www.dropbox.com/s/y6d6rqyuc0s7hp7/Facturas.rar?dl=0). MozBIO: Please see the Addendum #1 of the contract with ETC Terra (https://www.dropbox.com/s/x2sf9sh8xtfzqso/3%20-%20Adenda.pdf?dl=0), which justifies the payment of activities in 2018, because activities had been successfully implemented since 2016. These activities are described in Annex A of this Addendum (pages 5 and 6). Additional evidence of implementation of activities can be found in the Project Activity Report 2017 (https://www.dropbox.com/s/vhhmfnmxrjit0ac/2017%20-%20Relat%C3%B3rio%20de%20Actividades_Mozbio1_180329-2.pdf?dl=0).
Aster Global Findings - Round 3 (04 December 2020)	Thank you for clarifying the crediting period in the updated Monitoring report. As the crediting period January 1 2018 - December 31 2024 covers two reporting periods this criteria is satisfied.

Item Number	22
FCPF Glossary of Terms V2 - April 2021 - Definition/Criteria	Crediting Period Start Date - Is the date that complies with the following conditions: 1. It is not earlier than the date the first ER Program Measure(s) (including any SubProject(s)) begins generating ERs, i.e., first implementation2.
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y

Evidence Used to Assess (Location in PD, MR or Supporting Documents)	MR
Aster Global Findings (04 December 2020)	1. The audit team was unable to locate within the MR where the crediting period start date is justified.
Round 1 MCAR/mCAR/OBS	MCAR: Please clarify where there is language in the MR that satisfies this criterion or add additional language to the MR.
Round 1 Response from ER Program Entity (DD MonthYYYY)	Sustenta, MozBio and MozFIP all had on-the-ground activities in 2018. Please see Table 2 in the MR, in section 1.1.
Aster Global Findings - Round 2 (04 December 2020)	<p>The audit team reviewed the documents provided however it is unclear which document justifies a start date of January 1, 2018. The vast majority of documents provided were dated after the start date. Additionally, the documents in the PAD all appear to be grant proposals which are all dated prior to the start date but fail to show that the start date is not prior to the first ER Program Measures.</p> <p>Additionally, it was noted that the crediting period is not stated in the MR. For clarity it would be useful to state the crediting period. The audit team also noted that the MR incorrectly states that "The Crediting Period for this Report is from January 1st 2018 to December 31st 2018." The time covered in the MR should be correctly termed the reporting period. With the crediting period being about 5 years (per the ERPD).</p>
Round 2 MCAR/mCAR/OBS	<p>MCAR: Please clarify for the audit team when the first ER measure was implemented that justifies the use of the current start date.</p> <p>MCAR: Please update the MR to reflect the definitions given in the FCPF Glossary of terms.</p>
Round 2 Response from ER Program Entity (DD MonthYYYY)	<p>1. For MozBio project we have: support to implementation of agriculture campaign in 2016, nurseries established in 2017, training of forest rangers in 2016 (https://www.dropbox.com/s/vhhmfmxrjit0ac/2017%20-%20Relat%C3%B3rio%20de%20Actividades_Mozbio1_180329-2.pdf?dl=0). For MozFIP we have the delimitation of communities starting on 26 February. For Sustenta we have the invoices of purchase of agricultural inputs from December 2017. 2. Thank you for the correction. We were in fact misunderstanding the meaning of the Crediting Period. The text has been changed in the MR, with the crediting period being from 1st January 2018 to 31st December 2024. The evidence for this is the Amendment to the ERPA, which was signed on July 30 2020 (https://www.dropbox.com/s/c804u02cpj1l0sn/Tranche%20A%20ERPA.pdf?dl=0 and https://www.dropbox.com/s/7bxf6stv6lj0jzi/Tranche%20B%20ERPA.pdf?dl=0).</p>

Aster Global Findings - Round 3 (04 December 2020)	Thank you clarifying the different project timelines and providing evidence to support the use of the start date. The audit team reviewed the updated MR and confirms that the crediting period is stated correctly in the MR. Additionally, the audit team reviewed the evidence provided and is reasonably assured that start date is not before the ER Program Measures began generating ERs, in line with the FCPF Methodological Framework.
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Item Number	23
FCPF Glossary of Terms V2 - April 2021 - Definition/Criteria	Crediting Period Start Date- 2. It is justified with objective evidence by the ER Program Entity and it is independently assessed by a Validation Verification Body during Validation.
Applicability to the ER Program (Y or N/A)	Y
Requirement Met (Y, N, or Pending)	Y
Evidence Used to Assess (Location in PD, MR or Supporting Documents)	MR
Aster Global Findings (04 December 2020)	2. Additionally, the audit team was unable to find evidence that supports the justification of the start date of the crediting period.
Round 1 MCAR/mCAR/OBS	MCAR: Please provide verifiable evidence that supports the justification of the Crediting Period Start Date.
Round 1 Response from ER Program Entity (DD MonthYYYY)	A new folder has been added to the Mozambique ERPA 2018 dropbox (\\Docs\Supplementary\Evidence of implementation). This folder contains the PADs of the 4 WB projects, as well as specific evidence of activities conducted in 2018. Each file is referenced in the MR (Tables 1 and 2).
Aster Global Findings - Round 2 (04 December 2020)	The audit team reviewed the folder as directed but was unable to find any contract/document that fell prior to the Jan 1, 2018 start dated.
Round 2 MCAR/mCAR/OBS	MCAR: Please clarify for the audit team which of these documents supports the use of the current start date.

Round 2 Response from ER Program Entity (DD MonthYYYY)	MozFIP: There is evidence of community delimitations as early as 26 February 2018, which can be seen in the dashboard of results of the service provider (https://sites.google.com/site/verdeazullandscape/rduat). INDUFOR Sustenta: The business plans provided are from August 2017 (https://www.dropbox.com/s/vpd1h9vjrj47f9a/Planos%20de%20Negocio.rar?dl=0) and the invoices of purchase of agricultural inputs are from December 2017 (https://www.dropbox.com/s/y6d6rqyuc0s7hp7/Facturas.rar?dl=0). MozBIO: Please see the Addendum #1 of the contract with ETC Terra (https://www.dropbox.com/s/x2sf9sh8xtfzqso/3%20-%20Adenda.pdf?dl=0), which justifies the payment of activities in 2018, because activities had been successfully implemented since 2016. These activities are described in Annex A of this Addendum (pages 5 and 6). Additional evidence of implementation of activities can be found in the Project Activity Report 2017 (https://www.dropbox.com/s/vhhmfnmxrjit0ac/2017%20-%20Relat%C3%B3rio%20de%20Actividades_Mozbio1_180329-2.pdf?dl=0).
Aster Global Findings - Round 3 (04 December 2020)	Thank you clarifying the different project timelines and providing evidence to support the use of the start date. The audit team reviewed the updated MR and confirms that the crediting period is stated correctly in the MR. Additionally, the audit team reviewed the evidence provided and is reasonably assured that start date is not before the the ER Program Measures began generating ERs, in line with the FCPF Methodological Framework.

APPENDIX 2: List of Documents Received and Reviewed by Aster Global

File Name	Date Received
FCPF Charter_April 8 2020_amended_clean_1.pdf	September 8, 2020
Mozambique_Revised ERPD_16April2018_CLEAN.pdf	September 8, 2020
OneDrive_1_9-10-2020.zip	September 8, 2020
ZILMP ER Monitoring Report - 2018 v.3.1_final_clean.docx	September 8, 2020
ReadMe - Folder Structure.docx	September 8, 2020
Simple guide_AD_MP.docx	September 8, 2020
ZILMP_AD_Calculations_MR_(2018).xlsx	September 8, 2020
Simple guide_AD_RL.docx	September 8, 2020
ZILMP_AD_Calculations_RL_(2005_2015).xlsx	September 8, 2020
Emission factor procedure v.1.1.docx	September 8, 2020
Emission factor_v.1.1.xlsx	September 8, 2020
Nota das atualizações dos factores de emissão.docx	September 8, 2020
Dates of deforestation events.xlsx	September 8, 2020
Emissions reductions calculations.xlsx	September 8, 2020
Simple guide_EMP.docx	September 8, 2020
ZILMP_Emissions_Calculations_MR_(2018).xlsx	September 8, 2020
Simple guide_ERL.docx	September 8, 2020
ZILMP_Emissions_Calculations_RL_(2005_2015).xlsx	September 8, 2020
GHG emission estimation SOP.DOCX	September 8, 2020
Passo a Passo para o Levantamento e Estimativa de Emissões do AFOLU.pdf	September 8, 2020
SOP0_MapProduction_MRV_03.08.2020.docx	September 8, 2020
SOP1_SampligDesign_MRV_03.08.2020.docx	September 8, 2020
SOP2_response_design_MRV_31.07.20.docx	September 8, 2020
SOP3_data_collection_MRV_31.07.20.docx	September 8, 2020
SOP4_Analysis_MRV_23.06.20(1).DOCX	September 8, 2020
.gitignore	September 8, 2020
.Rhistory	September 8, 2020
FNDS_emissions.Rproj	September 8, 2020
config	September 8, 2020



description	September 8, 2020
FETCH_HEAD	September 8, 2020
HEAD	September 8, 2020
index	September 8, 2020
index (LAPMRV010's conflicted copy 2020-07-29)	September 8, 2020
ORIG_HEAD	September 8, 2020
packed-refs	September 8, 2020
applypatch-msg.sample	September 8, 2020
commit-msg.sample	September 8, 2020
fsmonitor-watchman.sample	September 8, 2020
post-update.sample	September 8, 2020
pre-applypatch.sample	September 8, 2020
pre-commit.sample	September 8, 2020
pre-merge-commit.sample	September 8, 2020
pre-push.sample	September 8, 2020
pre-rebase.sample	September 8, 2020
pre-receive.sample	September 8, 2020
prepare-commit-msg.sample	September 8, 2020
update.sample	September 8, 2020
exclude	September 8, 2020
HEAD	September 8, 2020
bootstrapping_edits	September 8, 2020
master	September 8, 2020
muri_edits	September 8, 2020
bootstrapping_edits	September 8, 2020
HEAD	September 8, 2020
muri_edits	September 8, 2020
663fd7efb1d2b941b34b9bd80a49da9668853f	September 8, 2020
0cbfad4cf77e2db68e3f745b2944e38403257e	September 8, 2020
0ab323f926506d1e2993fd8660d1adf2603416	September 8, 2020
26040602348c6991bc4246d252886e5b8613c0	September 8, 2020
2ab058086bd5effd15f758c476e00d2621ed12	September 8, 2020
3876927a2c9097434d78d45612187d27ad3f37	September 8, 2020
43659c49047e7db0aa5f52cd672941523ea7a5	September 8, 2020
550719c06ecb64fbc37146d686d1dfd5091612	September 8, 2020
5d86b847edc8ac2f0fc08b7c13ae275ac3be63	September 8, 2020
2ee3c91436ea206d29b38410fbb3fe7a21ae05	September 8, 2020
b08acf49c6a65fe86a0559da9d9fd9d69c87c1	September 8, 2020
a999f372d7365ca4db3fce42cdfefab91ec8cf	September 8, 2020
b5848ae208976ed515d8b68d8309eea9926061	September 8, 2020
1c21a2795b5cb874a9870531c8e5017dc9a87e	September 8, 2020
3d3ef5223e9b828d0b0d533eddd739ff91b226	September 8, 2020
695294749bb1817b018f70f247aa85fb3beed4	September 8, 2020
ee92182f5d6c2d5e69a042dfe109ec54f1f313	September 8, 2020
de5de62a8400f205673fb52efd460cc5b4e209	September 8, 2020
97975ea680b9fbf276b6825b507054b3a4bc86	September 8, 2020
pack-01692316612979043ab4755d6fc22fd2568762b2.idx	September 8, 2020
pack-01692316612979043ab4755d6fc22fd2568762b2.pack	September 8, 2020
bootstrapping_edits	September 8, 2020
master	September 8, 2020
muri_edits	September 8, 2020
bootstrapping_edits	September 8, 2020
HEAD	September 8, 2020
muri_edits	September 8, 2020

persistent-state	September 8, 2020
build_options	September 8, 2020
persistent-state	September 8, 2020
rmd-outputs	September 8, 2020
saved_source_markers	September 8, 2020
1799716015e24d53a4ce80519757aae5	September 8, 2020
debug-breakpoints.pper	September 8, 2020
files-pane.pper	September 8, 2020
source-pane.pper	September 8, 2020
windowlayoutstate.pper	September 8, 2020
workbench-pane.pper	September 8, 2020
00046B71	September 8, 2020
0BB8285A	September 8, 2020
439E2087	September 8, 2020
6866517E	September 8, 2020
99A0619B	September 8, 2020
B3D1217D	September 8, 2020
E253424C	September 8, 2020
E617C819	September 8, 2020
F05CBBC5	September 8, 2020
INDEX	September 8, 2020
6AE489AA	September 8, 2020
6E7E2E9A	September 8, 2020
6E7E2E9A-contents	September 8, 2020
rmd-outputs	September 8, 2020
saved_source_markers	September 8, 2020
files-pane.pper	September 8, 2020
source-pane.pper	September 8, 2020
windowlayoutstate.pper	September 8, 2020
workbench-pane.pper	September 8, 2020
2A15AF7F-contents	September 8, 2020
4E3CA7FA-contents	September 8, 2020
79B3D639-contents	September 8, 2020
88A333BA-contents	September 8, 2020
A7E02B30-contents	September 8, 2020
194C2611	September 8, 2020
4933044E	September 8, 2020
58D82020	September 8, 2020
7501819A	September 8, 2020
AE2E9B9D	September 8, 2020
EC703023	September 8, 2020
INDEX	September 8, 2020
console_actions	September 8, 2020
environment	September 8, 2020
environment_vars	September 8, 2020
history	September 8, 2020
libpaths	September 8, 2020
options	September 8, 2020
rversion	September 8, 2020
settings	September 8, 2020
packages-pane.pper	September 8, 2020
source-pane.pper	September 8, 2020
workbench-pane.pper	September 8, 2020
paths	September 8, 2020

CD_2018_collectedData_earthad_100120.csv	September 8, 2020
ZILMP_2018_poststratified.csv	September 8, 2020
emission_factors.csv	September 8, 2020
emission_factors_old.csv	September 8, 2020
strata_lulc_relation.csv	September 8, 2020
Cabo_Delgado_lulucf_2018.tif	September 8, 2020
zambezia_RF_pb_lulucf_up_final_2018.tif	September 8, 2020
zilmp_lulcc_2018.tif	September 8, 2020
ZILMP_RF_pb_lulucf_up_6_classes_2018.tif	September 8, 2020
Zambezia_2018_Reference_points_2018_27.09.19.csv	September 8, 2020
Zambezia_2018_Reference_points_post_stratification_28.04.2020.csv	September 8, 2020
ZILMP_2005_2015_collectedData_earthad.csv	September 8, 2020
Activity data_FREL_Update_2018.xlsx	September 8, 2020
EF_uncertainty_calculation.xlsx	September 8, 2020
Emissões_2017-2018_Zambézia_EF_provincial_SB.xlsx	September 8, 2020
Zambézia_Resultados_AD_100%(2005_2015)_EF_provincial_08_02_20.xlsx	September 8, 2020
ZILMP_Emissions_2018_08.05.20 (post-stratified).xlsx	September 8, 2020
ZILMP_Emissions_2018_08.05.20 (Updated).xlsx	September 8, 2020
zilmp_2018_deforestation_area.png	September 8, 2020
AD_project_uncertainty.csv	September 8, 2020
AD_reference_uncertainty.csv	September 8, 2020
EF_aboveground.csv	September 8, 2020
EF_belowground.csv	September 8, 2020
emissions_estimate_table.csv	September 8, 2020
mc_summary_table.csv	September 8, 2020
reference_emissions_estimate_table.csv	September 8, 2020
results_corrected_map_areas.csv	September 8, 2020
sensitivity_analysis.csv	September 8, 2020
zilmp_2005_2015_deforestation_results.csv	September 8, 2020
zilmp_2018_corrected_map_areas.csv	September 8, 2020
zilmp_2018_deforestation_results.csv	September 8, 2020
zilmp_2018_deforestation_results_updated.csv	September 8, 2020
Monte Carlo v0.2.pdf	September 8, 2020
monte_carlo_v0.html	September 8, 2020
monte_carlo_v0.Rmd	September 8, 2020
monte_carlo_v0_1.html	September 8, 2020
monte_carlo_v0_1.Rmd	September 8, 2020
monte_carlo_v0_2.html	September 8, 2020
monte_carlo_v0_2.Rmd	September 8, 2020
monte_carlo_v0_3.html	September 8, 2020
monte_carlo_v0_3.Rmd	September 8, 2020
zilmp_overview.PNG	September 8, 2020
emissions_estimation.R	September 8, 2020
emissions_estimation_simple.R	September 8, 2020
statified_area_estimation.R	September 8, 2020
area_estimation.R	September 8, 2020
calculate_emissions.R	September 8, 2020
emissions.R	September 8, 2020
raster.R	September 8, 2020
reference.R	September 8, 2020
ZILMP ER Monitoring Report - 2018 v.3.1_clean.docx	September 21, 2020
zilmp_limits.zip	September 23, 2020
2018_Project Forms.cep	October 15, 2020
ad123-2020-10-15T21_44_00.collect-data	October 15, 2020

Coordinates_AD_MRV.csv	October 15, 2020
Coordinates_AD_RL.csv	October 15, 2020
MRV data.collect-data	October 15, 2020
Reference Level_Project Forms.cep	October 15, 2020
RL data.collect-data	October 15, 2020
20064.00 AG ZILMP Round1Findings WBFinal 20201209_MRV.xlsx	December 21, 2020
FCPF Guidelines on Uncertainty Analysis_2020_TrackChanges.docx	January 7, 2021
20064.00 AG ZILMP Round1Findings WBFinal 20201209_MRV_final_AM.xlsx	February 2, 2021
ReadMe - Folder Structure.docx	February 11, 2021
BSP FINAL_JAN 2020.pdf	February 11, 2021
Inventario Florestal Nacional.pdf	February 11, 2021
Manual do Inventario Florestal.pdf	February 11, 2021
moz_frel_report_final.v03_03102018.pdf	February 11, 2021
Emission factor procedure v.1.1.docx	February 11, 2021
Emission factor_v.1.1.xlsx	February 11, 2021
Emission factor_v.2.xlsx	February 11, 2021
Nota das actualizações dos factores de emissão.docx	February 11, 2021
Dates of deforestation events.xlsx	February 11, 2021
Emissions reductions calculations.xlsx	February 11, 2021
ZILMP ER Monitoring Report - 2018 v.3.1_clean.docx	February 11, 2021
ZILMP ER Monitoring Report - 2018 v.3.1_with_track_changes.docx	February 11, 2021
ZILMP ER Monitoring Report - 2018 v.4.1.docx	February 11, 2021
GHG emission estimation SOP.DOCX	February 11, 2021
Passo a Passo para o Levantamento e Estimativa de Emissões do AFOLU.pdf	February 11, 2021
SOP0_MapProduction_MRV_03.08.2020.docx	February 11, 2021
SOP1_SampligDesign_MRV_03.08.2020.docx	February 11, 2021
SOP2_response_design_MRV_31.07.20.docx	February 11, 2021
SOP3_data_collection_MRV_31.07.20.docx	February 11, 2021
SOP4_Analysis_MRV_23.06.20 (1).DOCX	February 11, 2021
.gitignore	February 11, 2021
.Rhistory	February 11, 2021
FNDS_emissions.Rproj	February 11, 2021
20064.00 AG ZILMP Round2Findings (1).xlsx	April 16, 2021
ZILMP ER Monitoring Report - 2018 v.5.docx	April 16, 2021
ReadMe - Folder Structure.docx	April 16, 2021
ZILMP_AD_Calculations_MR_(2018).xlsx	April 16, 2021
zambezia_RF_pb_lulucf_up_final_2018.qml	April 16, 2021
zambezia_RF_pb_lulucf_up_final_2018.tif	April 16, 2021
ZILMP_RF_pb_lulucf_up_6_classes_2018.qml	April 16, 2021
ZILMP_RF_pb_lulucf_up_6_classes_2018.tif	April 16, 2021
2018_Project Forms.cep	April 16, 2021
2018_Reference Points.xlsx	April 16, 2021
Reference Level_Project Forms.cep	April 16, 2021
Software.txt	April 16, 2021
List of all codes.xlsx	April 16, 2021
ZILMP_AD_Calculations_RL_(2005_2015).xlsx	April 16, 2021
BSP FINAL_JAN 2020.pdf	April 16, 2021
Inventario Florestal Nacional.pdf	April 16, 2021
Manual do Inventario Florestal.pdf	April 16, 2021
Mozambique_Revised ERPD_16April2018_CLEAN.pdf	April 16, 2021
moz_frel_report_final.v03_03102018.pdf	April 16, 2021
Relatório_Inventário_Zambezia_atualização_09_02_2021.pdf	April 16, 2021
Relatório_Inventário_Zambezia_atualização_24_08_2020.pdf	April 16, 2021

Bechtold, Patterson - 2005 - The Enhanced Forest Inventory and Analysis Program — National Sampling Design and Estimation Procedures.pdf	April 16, 2021
Kalaba et al. - 2013 - Floristic composition, species diversity and carbon storage in charcoal and agriculture fallows and management im.pdf	April 16, 2021
Lisboa et al. - 2018 - Biomass allometric equation and expansion factor for a mountain moist evergreen forest in Mozambique.pdf	April 16, 2021
Mate, Johansson, Siteo - 2014 - Biomass equations for tropical forest tree species in mozambique.pdf	April 16, 2021
McNicol, Ryan, Williams - 2015 - How resilient are African woodlands to disturbance from shifting cultivation.pdf	April 16, 2021
Mokany, Raison, Prokushkin - 2006 - Critical analysis of root Shoot ratios in terrestrial biomes.pdf	April 16, 2021
Mugasha et al. - 2013 - Allometric models for prediction of above- and belowground biomass of trees in the miombo woodlands of Tanzania.pdf	April 16, 2021
Olofsson et al. - 2014 - Good practices for estimating area and assessing accuracy of land change.pdf	April 16, 2021
Stringer et al. - 2015 - Carbon stocks of mangroves within the Zambezi River Delta, Mozambique.pdf	April 16, 2021
Williams et al. - 2008 - Carbon sequestration and biodiversity of re-growing miombo woodlands in Mozambique.pdf	April 16, 2021
BSP FINAL_JAN 2020.pdf	April 16, 2021
Inventario Florestal Nacional.pdf	April 16, 2021
Manual do Inventario Florestal.pdf	April 16, 2021
Mozambique_Revised ERPD_16April2018_CLEAN.pdf	April 16, 2021
moz_frel_report_final.v03_03102018.pdf	April 16, 2021
Relatório_Inventário_Zambezia_atualização_09_02_2021.pdf	April 16, 2021
Relatório_Inventário_Zambezia_atualização_24_08_2020.pdf	April 16, 2021
Supplementary - Shortcut.Ink	April 16, 2021
1 - MozBio_ANAC_1.pdf	April 16, 2021
2 - ANAC_MozBio_Nota liquidacao.pdf	April 16, 2021
3 - Adenda.pdf	April 16, 2021
4 - ANAC_MozBio_Recibo.pdf	April 16, 2021
2Relatório final _rev-161019FNDS.pdf	April 16, 2021
AideMemoire_MozFip_Dec4 (002).pdf	April 16, 2021
Alberto Jaime Macucule -- 397.288.80.pdf	April 16, 2021
CONTRACTO_TARQUINO NIPIODE UAPE.pdf	April 16, 2021
Contrato Dr Walter (1).pdf	April 16, 2021
Management Letter- MozFIP supervision mission Nov 5-15.pdf	April 16, 2021
Plano de Maneio_UAPÉ .pdf	April 16, 2021
Relatorio Final do Curso de Governanca e MCRN - Zambezia.docx.pdf	April 16, 2021
Relatório de Inventário Florestal_UAPÉ.pdf	April 16, 2021
Relatório Final do curso de Fiscalização e Legislação Florestal.pdf	April 16, 2021
SIGNED Project CONTRACT FNDS_Indufor Oy.pdf	April 16, 2021
Tarquino Magalhaes 539.616,00.pdf	April 16, 2021
MozBIO.pdf	April 16, 2021
MozDGM.pdf	April 16, 2021
MozFIP.pdf	April 16, 2021
Sustenta.pdf	April 16, 2021
Artur Stevens Contract.pdf	April 16, 2021
CONTRACTO HORFPEC.Lda.pdf	April 16, 2021
Contrato e Adenda UICN.pdf	April 16, 2021
Contrato Gapi - Cadeias de valor sustenta.pdf	April 16, 2021
Facturas.rar	April 16, 2021
Planos de Negocio.rar	April 16, 2021

MR_plots_misdate.xlsx	April 16, 2021
Analise_QA_QC.xlsx	April 16, 2021
Descricao_QAQC do IFN.docx	April 16, 2021
Manual de Procedimentos_Licenciamento.docx	April 16, 2021
ToR Sistema de Registo de projectos REDD+.doc	April 16, 2021
Emission factor procedure v.2.docx	April 16, 2021
Emission factor_v.1.1.xlsx	April 16, 2021
Emission factor_v.2.xlsx	April 16, 2021
Nota das actualizações dos factores de emissão.docx	April 16, 2021
Emission factor_v.1.1.xlsx	April 16, 2021
Dates of deforestation events.xlsx	April 16, 2021
Emissions reductions calculations.xlsx	April 16, 2021
Simple guide_EMP.docx	April 16, 2021
ZILMP_Emissions_Calculations_MR_(2018).xlsx	April 16, 2021
Simple guide_ERL.docx	April 16, 2021
ZILMP_Emissions_Calculations_RL_(2005_2015).xlsx	April 16, 2021
ZILMP ER Monitoring Report - 2018 v.3.1_clean.docx	April 16, 2021
ZILMP ER Monitoring Report - 2018 v.3.1_with_track_changes.docx	April 16, 2021
ZILMP ER Monitoring Report - 2018 v.4.1.docx	April 16, 2021
ZILMP ER Monitoring Report - 2018 v.4.docx	April 16, 2021
ZILMP ER Monitoring Report - 2018 v.5.docx	April 16, 2021
GHG emission estimation SOP.DOCX	April 16, 2021
Passo a Passo para o Levantamento e Estimativa de Emissões do AFOLU.pdf	April 16, 2021
SOP0_MapProduction_MRV_03.08.2020.docx	April 16, 2021
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Document information

Version	Date	Description
1.1	November 2020	Reference to the newly approved Guidelines on Uncertainty Analysis of Emission Reductions.
1.0	August 2020	Initial version adopted.