

METHODOLOGY ASSESSMENT

Methodology for avoiding degradation and fostering regeneration in Miombo woodlands through fire management



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Summary:

Det Norske Veritas (U.S.A.), Inc. (DNV GL) has performed a second validation of “Methodology for avoiding degradation and fostering regeneration in Miombo woodlands through fire management” to confirm that the methodology design, as documented, is sound and reasonable and meets the identified criteria. The validation was performed on the basis of VCSA requirements for VCS methodologies, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation was conducted by means of document review, follow-up interviews, and the resolution of outstanding issues. The review of the methodology documentation and the subsequent follow-up interviews has provided DNV GL with sufficient evidence to determine the fulfilment of stated criteria.

The proposed Methodology is applicable to grouped or non-grouped projects that implement preventative early burning activities as the eligible activity against a baseline of forest degradation caused by predominantly late-dry-season burning in miombo woodlands in the Eastern Miombo Ecoregion of Africa. The methodology sets out conditions under which it can be applied. To calculate emission reductions and removals resulting from the project’s eligible fire management activities, the Methodology employs the GapFire Model, which was developed and calibrated to the Eastern Miombo Ecoregion by researchers at the School of GeoSciences, University of Edinburgh. The GapFire Model has been designed to predict changes in aboveground biomass of miombo woodlands in response to observations of early and late fire frequency. The Methodology also accounts for emissions from harvesting of trees allowed in the project scenario as well as emissions from forest fires in the baseline and project scenarios. The Methodology includes a monitoring plan that describes monitoring procedures for the project activities.

In summary, it is DNV GL’s opinion that the Methodology “Methodology for avoiding degradation and fostering regeneration in Miombo woodlands through fire management”, version 1, meets all relevant VCSA requirements set out in the VCS Program, VCS Standard version 3.4 and VCS AFOLU Requirements v3.4. Hence, DNV GL recommends the approval of the new methodology.

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ABBREVIATIONS

A/R CDM or CDM A/R	Afforestation / Reforestation Clean Development Mechanism
AFOLU	Agriculture, Forestry and Other Land Use
CAR	Corrective Action Request
CL	Clarification Request
GHG	Greenhouse Gas
MCDI	Mpingo Conservation and Development Initiative
REDD	Reduced Emissions from Deforestation and Degradation
SOC	Soil Organic Carbon
VCSA / VCS	Verified Carbon Standard Association
VCU	Verified Carbon Unit

1. INTRODUCTION

Mpingo Conservation and Development Initiative (MCDI) has commissioned DNV GL (U.S.A) Inc. to perform a second assessment of Methodology for avoiding degradation and fostering regeneration in Miombo woodlands through fire management. This report summarizes the findings of the validation of the methodology, performed on the basis of VCSA criteria for VCS methodologies, as well as criteria given to provide for consistent project operations, monitoring and reporting, i.e. VCSA criteria refer to VCS Standard, Version 3.4 /2/ and VCS AFOLU Requirements, Version 3.4. /3/. The methodology avoids degradation and fosters regeneration in Miombo woodlands through fire management.

1.1 Objective

The purpose of a validation is to have an independent third party assess the methodology revisions and design. In particular, the methodology's new allowable baselines, carbon accounting methodologies, and compliance with relevant VCSA criteria are validated in order to confirm that the revisions, as documented, are sound and reasonable and meet the identified criteria. Validation is a requirement for all VCS methodology revisions and is necessary to provide assurance to stakeholders of the quality of the projects that use this methodology and their intended generation of the Verified Carbon Units (VCUs).

1.2 Summary Description of the Methodology

The proposed Methodology/7/ is applicable to grouped and non-grouped projects that implement preventative early burning activities as the eligible activity against a baseline of forest degradation caused by predominantly late-dry-season burning in miombo woodlands in the Eastern Miombo Ecoregion of Africa. The methodology sets out conditions under which it can be applied. To calculate emission reductions and removals resulting from the project's eligible fire management activities, the Methodology employs the GapFire Model, which was developed and calibrated to the Eastern Miombo Ecoregion by researchers at the School of GeoSciences, University of Edinburgh. This Model (adequately described in Appendix 1 of the Methodology) models the growth and mortality of multiple individual trees using different fire regimes based on an ensemble of canopy-tree-sized woodland patches. The Methodology also accounts for emissions from harvesting of trees allowed in the project scenario as well as emissions from forest fires in the baseline and project scenarios. The Methodology/7/ includes a monitoring plan that describes monitoring procedures for the following project activities:

- Carbon density map validation
- Annual monitoring of fire frequencies
- Distribution of fire monitoring checkpoints
- Checking for forest loss to facilitate decadal revision of baseline carbon density maps.

2 ASSESSMENT APPROACH

2.1 Method and Criteria

The validation consisted of the following three phases:

- A desk review of the new methodology against the VCSA requirements listed in Table 1 below.
- Follow-up interviews
- The resolution of outstanding issues and the issuance of the final assessment report and opinion.

Table 1: Standards, methodologies, and other guidance by the VCSA

- /1/ VCSA: VCS Standard, Version 3.4., 8 October 2013
- /2/ VCSA: AFOLU Requirements, Version 3.4., 8 October 2013
- /3/ VCSA: Program Definitions, Version 3.5., 8 October 2013
- /4/ VCSA: VCS Methodology Template, Version 3, 8 October 2013
- /5/ VT0001 VCS AFOLU Additionality Tool: *VT0001, Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities*
- /6/ VCS AFOLU Non-Permanence Risk Tool

2.2 Document Review

The following tables list the documentation that was reviewed during the validation.

Table 2: Documentation provided by the project participants

/7/	Methodology for Avoiding degradation and fostering regeneration in Miombo woodlands through fire management _v2, dated: May 2014.
/8/	SCS Global Services First Methodology Assessment Report, dated 01 April 2014
	Additional Documentation Reviewed
/9/	Chidumayo, E.N. (1997). Effects of accidental and prescribed fires on miombo woodland, Zambia: <i>The Commonwealth Forestry Review</i> , Vol. 76, No. 4 (1997), pp. 268-272
/10/	Shackleton, C.M. and J.M. Clarke (2007). Research and Management of Miombo Woodlands for Products in Support of Local Livelihoods, dated December 2007
/11/	Ryan, C.M & M. Williams. (2011). How does fire intensity and frequency affect miombo woodland tree populations and biomass? <i>Ecological Applications</i> , 21(1), 2011, pp. 48–60
/12/	IPCC (2006): 2006 IPCC Guidelines for National Greenhouse Gas Inventories, National Greenhouse Gas Inventories Programme. Eggleston et al (eds).
/13/	IPCC, 2003: Good Practice Guidance for Land Use, Land-Use Change and Forestry, prepared by the National Greenhouse Gas Inventories Programme, Penman et al

2.3 Interviews

On December 6 and December 12, 2014 DNV GL held a conference call with MCDI, performed interviews with the methodology developers and sought clarification from VCSA.

Date	Name	Organization	Topic
6 December, 2014	Jan Fehse; Steve Ball	Value for Nature Consulting; MCDI	Kick-off Meeting
12 December, 2014	Jan Fehse; Steve Ball	Value for Nature Consulting; MCDI	Proposed Time-line Revision
7 January, 2014	John Holler	VCSA	Applicability conditions

2.4 Assessment Team

Listed below are the members of the assessment team, their roles, and the nature of their involvement.

Role/Qualification	Last Name	First Name	Type of involvement					
			Desk review	Interviews	Reporting	Supervision of work	Technical review	Expert input
Project Manager	Silon	Kyle (Rwanda)		√		√		
Lead Validator	Kapambwe C	Misheck (Australia)	√	√	√			√
Technical Reviewer	Aalders	Edwin (Norway)					√	

2.5 Resolution of Findings

The objective of this phase of the validation was to resolve any outstanding issues that needed to be clarified prior to DNV GL's positive conclusion on the methodology design. In order to ensure transparency, a validation protocol was customized for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, details and clarifies the requirements a VCS project is expected to meet.
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

A corrective action request (CAR) is issued if one of the following occurs:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions.
- The VCS requirements have not been met.
- There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

During the assessment the audit team raised 4 Corrective Action Requests and 4 Clarification Requests. In addition, there were 3 comments from VCSA. Details of the individual CARs, CLs and VCSA comments and the consequent close out information can be found in Appendix A of this report.

3 ASSESSMENT FINDINGS

The assessment process focused on the principles set forth by the VCS Program. In particular, the proposed revisions were found to be in full compliance with the principles of relevance, completeness, consistency, accuracy, transparency, and conservativeness set out in Section 2.4 of the VCS Standard /1/.

- The Methodology adheres to the principle of relevance by selecting the GHG sources, GHG sinks, GHG reservoirs, data and methodologies appropriate to the needs of the VCS Program.
- The Methodology adheres to the principle of completeness by including all relevant GHG emissions and removals, and including all relevant information to support criteria and procedures.
- The Methodology adheres to the principle of consistency by enabling meaningful comparisons in GHG-related information.
- The Methodology adheres to the principle of accuracy by reducing bias and uncertainties as far as is practical.
- The Methodology adheres to the principle of transparency by disclosing sufficient and appropriate GHG-related information (i.e. giving sufficient and appropriate justification of procedures and criteria) to allow intended users to make decisions with reasonable confidence.
- The Methodology adheres to the principle of conservativeness by using conservative assumptions, values and procedures to ensure that net GHG emission reductions or removals are not overestimated.

3.1 Relationship to Approved or Pending Methodologies

Section 4.1.5 of the VCS Standard /1/ states that new methodologies shall not be developed where an existing methodology could reasonably be revised (i.e., developed as a methodology revision) to meet the objective of the proposed methodology. The assessment team checked and reviewed VCS approved and pending methodologies and other approved GHG programs that fall under the same sectoral scope and AFOLU project category. This was to determine whether any of those existing and pending methodologies could be reasonably revised to meet the objective of the proposed Methodology. The assessment team can confirm that no such methodologies dealing specifically with quantifying emission reductions and removals from fire management were identified, hence in compliance with the VCS Standard /1/.

3.2 Stakeholder Comments

Not applicable.

3.3 Structure and Clarity of Methodology

The assessment team assessed the Methodology /7/ for compliance with (a) the requirements in the methodology template, (b) appropriate use of terminology and keywords and (c) clarity. After some amendments and revisions to the methodology as a result of CARs, CLs and comments from the assessment team, as shown in Appendix A, the Methodology follows the instructions in the VCS methodology template as required by the VCS Standard /2/. The criteria and procedures are included in appropriate sections of the Methodology. The terminology used in the Methodology is consistent with the general requirements for GHG accounting and the specific requirements of the VCS program.

The assessment team can confirm that the Methodology also uses the standard language including definitions and keywords appropriately and consistently. VCS key terms such as *must*, *should* and *may* are used appropriately to distinguish mandatory requirements, recommendations (non-mandatory) and permissible or allowable options, respectively. The criteria and procedures are written in a manner that can be understood and applied readily and consistently by project proponents and would enable projects to be unambiguously audited against them.

Overall, DNV GL concludes that the Methodology /7/ has been written in a clear manner and structured according to the requirements of the VCS Program.

3.4 Definitions

Concise, clear and appropriate lists of definitions and acronyms are included under ‘definitions’ section and are used appropriately and consistently throughout the module. DNV GL concludes that the definitions are clear and appropriate enough to enable users to apply and interpret the Methodology /7/.

3.5 Applicability Conditions

The methodology has set out applicability conditions which project activities must satisfy in line with Section 4.3.1 of the VCS Standard /1/. For the methodology to be applied, the following conditions must be satisfied:

	Applicability Conditions	Audit Team Findings
1	The project must be located within the Eastern Miombo Ecoregion	<p>This applicability condition is written in a sufficiently clear and precise manner, and can be applied in determining and demonstrating (at validation) whether a project activity meets and conforms to the applicability condition.</p> <p>The applicability condition ensures that projects occurring on land areas other than within the Eastern Miombo wood lands cannot apply the methodology which uses</p>

		<p>the GapFire model to calculate emission reductions and removals. This model was developed and calibrated to the Eastern Miombo ecoregion and cannot be used in any other ecoregions without extensive recalibrations and revisions to the Methodology.</p>
2	<p>Projects must implement preventative early burning activities in miombo woodlands</p>	<p>Written in a sufficiently clear and precise manner, this condition imposes exclusivity to the type of eligible activities applicable to this methodology. The project to which the Methodology can be applied must implement preventative early burning activities in miombo woodlands, such that they result in net reductions and/or removals of anthropogenic emissions relative to the baseline scenario of forest biomass degradation.</p> <p>This exclusivity would readily enable project validators and verifiers to determine whether a project activity conforms to or meets with the applicability condition.</p>
3	<p>Projects may include the selective harvesting of trees, though the project description must specify how harvesting is managed, and specify how it will be monitored to ensure sustainability (i.e., that harvested biomass is not greater than regeneration capacity) using industry standard measures such as annual allowable cut and mean annual increment.</p>	<p>The applicability condition is clear, precise and deemed appropriate because it gives an option to projects to carry out selective but sustainable timber harvest. Furthermore, the condition also includes a caveat that the project proponents must describe, at validation, how harvesting would be managed sustainably, how this would be monitored, and demonstrate at verification that selective timber harvesting had been conducted in a sustainable manner.</p> <p>The type of standard metrics or measures suggested in the Methodology (i.e., Annual Allowable Cut and Mean Annual Increment) are appropriate and would allow for demonstration of conformance on the part of project participants and an assessment of conformance by validators and verifiers at the time of project validation and project verification, respectively.</p>
4	<p>The project areas meet an internationally accepted definition of forest and have done so for at least 10 years prior to the project start date.</p>	<p>This applicability condition aligns the Methodology with other international definitions of forests by e.g., UNFCCC, FAO or IPCC /12//13/ relative to such threshold parameters as minimum forest area, tree height and level of crown cover.</p>

		The applicability condition is sufficiently clear and precise and in line with Section 4.2.5 of AFOLU Requirements /2/ and will allow validation of conformance. It would also enable project proponents to demonstrate fulfilment or conformance with such threshold parameters at the time of project validation, to ensure that projects do not fall out of line with applicability condition.
5	The pre-project land use within the project area must have been continuously present for at least 10 years prior to the project start date.	This applicability condition puts the onus upon the project proponent to demonstrate the authenticity of pre-project baseline activities, failing which the project shall not be eligible. The applicability condition is sufficiently clear, precise and can be used to determine whether a project activity meets with the condition.
6	Fire must have been the predominant agent of degradation for at least 10 years prior to the project start date.	This applicability condition puts the onus upon the project proponent to demonstrate that fire had indeed been the predominant pre-project agent of degradation in the baseline scenario, failing which the project shall not be eligible. The applicability condition is sufficiently clear, precise and can be used to determine whether a project activity meets with the condition.
Methodology Not Applicable Under These Conditions		
1	The baseline scenario includes anthropogenic activities that increase carbon stocks or reduce carbon stock degradation relative to the pre-project land use.	The applicability criterion is precise and clear and clearly renders the Methodology inapplicable to such project activities as ARR and IFM and conformance can easily be checked at the time of validation.
2	The project includes the implementation of any activities not related to fire management or selective sustainable timber harvesting (e.g., charcoal production, unsustainable timber harvesting or grazing) that result in emissions, unless the project proponent demonstrates that these emissions will be <i>de minimis</i> for the entirety of the project crediting period.	The applicability criterion is precise and clear and clearly renders the Methodology inapplicable to those activities implementing non-fire management activities or selective sustainable timber harvesting and conformance can easily be checked at the time of validation.
3	More than 10 percent of the basal area of forests in the project area has been removed in the past 10 years prior to the project start date from logging, charcoal making, grazing or other activities that affect the stem size distribution	This applicability condition essentially ensures that the key component of the Methodology, GapFire model, remains relevant and useful in the estimation of the project's GHG emissions and removals. GapFire model may not be applicable in

		<p>projects where more than 10 percent of the basal area has been removed (as this disturbs stem diameter distribution and renders the model less applicable).</p>
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The assessment team sought clarification from the VCS on whether the applicability conditions in the Methodology needed to make explicit the fact that the Methodology could apply to both grouped and ungrouped project activities, including explicit requirement that those grouped projects applying the Methodology must include one or more sets of eligibility criteria for the inclusion of new project activity instances at subsequent verification events. According to VCS, the applicability conditions of the methodology need not explain that the methodology may apply to both grouped and non-grouped projects.

Overall, DNV GL concludes that, after satisfactory clarifications and revisions to the Methodology/7/ as a response to respective CARS, CLs and comments given in Appendix 1, applicability conditions are written in a sufficiently clear and precise manner and can be used to determine whether a project activity meets with the condition. As written, applicability conditions will enable projects to demonstrate conformance at the time of project validation to ensure that projects do not fall out of line with applicability conditions.

3.6 Project Boundary

The VCS Standard requires that the methodology establishes criteria and procedures for describing the project boundary and for identifying and selecting optional carbon pools, i.e. sources, sinks and reservoirs relevant to the baseline and project scenarios. Procedures to quantify emissions need to be included for each of these pools and sources in the project that can demonstrate significance when the appropriate VCS tools are applied.

The criteria and procedures for describing the project spatial, temporal and gaseous boundaries are clearly established in Section 5 of the Methodology. The Methodology /7/ clearly requires that each project category (non-grouped and grouped) defines its spatial (geographic), and carbon density boundaries (i.e., aboveground tree carbon density not lower than 5 tC/ha and not greater than 35 tC/ha at project start date).

The GHG sources and associated types of GHG emissions included or excluded from the project boundary are clearly stated in the Methodology/6/, including the justification for their exclusion or inclusion clearly stated in Table 2 of the Methodology /7/ compliant to AFOLU Requirements Section 4.2.14.

The Methodology/7/ requires that projects include and account for all significant carbon pools and sources of gaseous emissions in project boundaries and to conservatively exclude the insignificant ones. AFOLU Requirements, Section 4.3.3 /2/ requires the methodology to establish the criteria and procedures by which a pool or GHG source may be determined to be *de minimis*. Similarly, each baseline and project GHG emission source included in or excluded from the boundary of (and reasonably attributable to) each project type and activity is clearly stated and sufficiently justified and in compliance with AFOLU Requirements, Section 4.3.3 /2/

Overall, DNV GL concludes that, after satisfactory amendments and revisions to the Methodology /8/ as a result of CARs, CLs and Comments during the assessment, the criteria and procedures for describing the project boundary, identifying and selecting optional sources, sinks and reservoirs relevant to the baseline and project scenarios are sufficient, appropriate, and adequate for project scenarios and in compliance with the

AFOLU Requirements, Section 4.3.3 and the VCS Standard, Section 4.4 and are appropriate to the project activities covered by the Methodology /7/.

3.7 Baseline Scenario

VCS Standard, Section 4.5.4 /1/ requires the methodology to identify alternative baseline scenarios and determine either the most plausible baseline scenario or an aggregate baseline scenario for the project activity, and that aggregate baseline scenarios be determined by combining likely scenarios on a probabilistic (i.e., likelihood) basis.

The Methodology /7/ requires projects to apply Step 1 and Step 1c of the latest version of *VT0001, Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities* /5/. Application of this tool should result in a list of realistic and credible alternative land use scenarios to the project activity and identify the most plausible baseline scenario. The most plausible baseline scenario may not be a land use scenario (such as reforestation, enrichment planting or a reduction in fire occurrence and/or fire intensity due to fire management or due to other anthropogenic causes such as a reduction in population density) where anthropogenic activity increases carbon stocks or reduces carbon stock degradation relative to the pre-project land use.

Earlier, the Methodology /7/ did not include a step-by-step procedure and guidance to Methodology users on the selection of the most plausible baseline scenario. After satisfactory amendments and revisions to the procedure for determining the most plausible baseline scenario methodology as a result of the CAR (see Appendix 1), DNV GL concludes that the criteria and procedures for identifying alternative baseline scenarios and determining the most plausible baseline scenario are now consistent with the standard practice for VCS methodologies, comply with VCS requirements and are appropriate for the AFOLU project categories covered by the Methodology /7/.

3.8 Additionality

The Methodology/7/ requires projects to apply the latest version of *VT0001, Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities*/2/ /6/. The tool is appropriate for the project activities covered by the Methodology because it provides procedure to determine project additionality through evaluation of credible alternatives and proposed project scenarios.

DNV GL concludes that the criteria and procedures for determining additionality are appropriate for the project activities covered by the methodology framework and modules, and are in compliance with the requirements of VCS Standard, Section 4.6 /2/, and the VCS Methodology Template /4/.

3.9 Quantification of GHG Emission Reductions and Removals

3.9.1 Baseline Emissions

The VCS AFOLU Requirements, Section 4.5 /2/ and the VCS Standard, Section 4.7 /1/ require methodologies to establish procedures to quantify the GHG emissions or removals for the selected GHG sources, sinks and/or reservoirs, separately for the project and baseline scenario. The Methodology /8/ has established procedures for quantifying baseline emissions for the selected GHG sources, sinks and/or reservoirs. Equations (1) to (5) in Section 8.1 of the Methodology are used to calculate the baseline emissions. Step 7 in Section 8.1.1.7 employs the GapFire model to determine baseline emissions from aboveground biomass degradation due to fire.

The GapFire Model was developed and calibrated to the Eastern Miombo Ecoregion by researchers at the School of GeoSciences, University of Edinburgh. This is a relatively simple Model (adequately described in Appendix 1 of the Methodology) that models the growth and mortality of multiple individual trees using different fire regimes based on an ensemble of canopy-tree-sized woodland patches. The assessment checked and can confirm that the Gapfire Model complies with the requirements of Section 4.1.6 and the requirements set out in Section 4.1.7(1) of the VCS Standard in that:

- The Model has been developed by researchers at the School of GeoSciences, University of Edinburgh, a reputable and recognized source, and is publicly available (<http://www.geos.ed.ac.uk/gcel/gapfire.html>);
- Model parameters have been determined based upon studies that identify the parameters as important drivers of the model output variable(s) /9//10/. These studies have been conducted in the Eastern Miombo Ecoregion (where the Methodology would be applied) by appropriately qualified experts (i.e., researchers at the School of GeoSciences, University of Edinburgh);
- The model has been calibrated to the Eastern Miombo Ecoregion by researchers at the School of GeoSciences, University of Edinburgh; and
- The Model has been appropriately reviewed and tested by appropriate peer reviewers, e.g., Ryan and Williams. (2011) /11/ and researchers at the School of GeoSciences, University of Edinburgh.

Overall, DNV GL concludes that the procedure for quantifying baseline emissions is appropriate for the project activities covered by the methodology. The IPCC 2006 Guidelines for National GHG Inventories or the IPCC 2003 Good Practice Guidance for Land Use, Land-Use Change and Forestry and other credible literature references have been used as guidance for quantifying increases or decreases in carbon stocks and GHG emissions. The equations and formulas used are appropriate and without error, and default factors and parameters used are appropriate and in conformance with VCS requirements.

3.9.2 Project Emissions

Project emissions for each monitoring period are quantified using clearly stated procedures and Equations (6) to (10) in Section 8.2 of the Methodology/7/. The assessment team checked and can confirm that the Methodology/7/ applies the IPCC 2006 Guidelines for National GHG Inventories or the IPCC 2003 Good Practice Guidance for Land Use, Land-Use Change and Forestry /12//13/. In addition, other credible literature references have been used as guidance for quantifying increases or decreases in carbon stocks and GHG emissions. This is deemed to be in line with AFOLU Requirements set out in Section 4.1.2 /2/. Similar to the determination of emissions in the Baseline scenario, Step 2 in Section 8.2.1.2 employs the GapFire model to calculate Project emissions.

Overall, DNV GL concludes that after satisfactory amendments and revisions to relevant sections of the Methodology /7/ (see Appendix 1), the procedures for quantifying project emissions are appropriate for the project activities covered by the methodology. The equations and formulas used are appropriate and without error, and default factors and parameters used are appropriate and in conformance with VCS requirements.

3.9.3 Leakage

According to the VCS Standard, Section 4.7 /1/ and AFOLU Requirements Section 4.6 /3/, methodologies are required to establish procedures to quantify all significant sources of leakage (i.e., any increase in GHG emissions that occurs outside the project boundary (but within the same country), and is measurable and attributable to the project activities).

The Methodology provides procedures to quantify Activity Shifting Leakage in Section 8.3. The Methodology /7/ requires that projects include in their project description document an estimate of *ex ante* activity shifting leakage that takes into account all fire driving activities and that this estimate must be based on interviews, rural appraisals and/or other local expert knowledge.

Section 8.3.1 of the Methodology provides the matrix computation procedure that guides projects in the estimation of the proportion of the project area that is burned outside of the project area from the shifting of fire driving activities. Furthermore, the Methodology requires a decadal revalidation of the activity shifting leakage estimate. Annual estimates of activity shifting leakage are calculated using the procedure in Section 8.3.2 of the Methodology /7/. The methodology requires that if total estimated activity shifting leakage is equal to or greater than *de minimis* (i.e., leakage that is equal to or higher than 5 percent of the project's overall emission reductions), emission removals must be subtracted in the final calculation of Net GHG emission reductions and removals.

Overall, DNV GL concludes that Methodology has identified all possible leakage sources relevant and appropriate for the project activities covered by the Methodology. The methods provided to quantify the activity shifting leakage are mathematically correct and the procedures are adequate and in line with the AFOLU Requirements in Sections 4.3.3 and 4.6.1 /2/.

3.9.4 Net GHG Emission Reductions and Removals

Sections 8.4 of the Methodology provides appropriate criteria and procedures for quantifying net GHG emission reductions and removals generated by each project activity. For each monitoring period, the net GHG emissions reductions and removals (NERR) are quantified by subtracting baseline emissions and activity shifting leakage from project net removals or emissions in year y . The number of VCUs to be issued to a project in year y during the crediting period is calculated by subtracting the buffer credits (determined using the latest version of the VCS *AFOLU Non-Permanence Risk Tool* /6/) from net GHG emissions reductions and removals.

Overall, DNV GL concludes that the procedures for calculating net GHG emission reductions and removals are appropriate for the project activities covered by the Methodology /7/. The equations and formulas used are appropriate and without error; the uncertainties associated with the quantification of net GHG emission reductions and removals are addressed appropriately and in line with the VCS AFOLU requirements, Section 4.7 /2/.

3.10 Monitoring

The criteria for the monitoring plan and monitoring activities are set out in Section 9 of the methodology and found to be in line with the VCS AFOLU requirements and Section 4.8.1 of the VCS Standard /1/. The Methodology /7/ has listed and described all data and parameters (including sources of data and units of measurement) to be available at validation in Section 9.1 and those that need to be monitored as part of the project implementation are listed in Section 9.2.

Available and monitored parameters are summarised below.

Data and Parameters Available at Validation

- $A_{i,y}$, Area of stratum i in year y within the project area (ha) used in the calculation of baseline emissions, project emissions and removals and leakage emissions
- BE_y , Baseline emissions in year y (tCO₂e) and used in the calculation of baseline emissions

- $BE_{BM,y}$, Baseline emissions from aboveground biomass degradation in year y (tCO_2e) used in the calculation of baseline emissions
- $BE_{Biomassburn,y}$, Baseline emissions from biomass burning in year y (tCO_2e) used in the Calculation of baseline emissions
- $BE_{Harvest,y}$, Baseline emissions from selective tree harvesting in year y (tCO_2e) used in the calculation of baseline emissions
- $BLPROB_{Earlyburn,i}$, Baseline early burning probability occurring in stratum i (fraction) used in the calculation of baseline emissions
- $BLPROB_{Lateburn,i}$, Baseline late burning probability occurring in stratum i (fraction) used in the calculation of baseline emissions
- *Earliest Possible Burn Date*, which represents the first day of the Early Burning Season and is used in the calculation of baseline emissions. This parameter is properly justified and based on empirical research within the Eastern Miombo Ecoregion.
- *Early Burning Season Cut-off Date*, which represents the last day of the Early Burning Season and is used in the calculation of baseline emissions. The cut-off date is chosen and fixed at project validation for the duration of the crediting period. The methodology applies 30th day of June (day 181 of the year or 182 in leap years) as the default early burning season cut-off date. Alternatively, the methodology allows projects to use expert opinion to establish a project-specific cut-off date if so required. This parameter is adequately justified.
- *End of Burning Season Date*, which represents the last day of the dry season, marking the typical onset of the rains. This date is used in the calculation of baseline emissions and project emissions and removals. Projects are to use historical meteorological data and/or expert opinion to choose and fix this date at project validation for the duration of the crediting period. This parameter is properly justified and based on empirical research within the Eastern Miombo Ecoregion.
- $CountPix,i,y$, which represents number of countable pixels in stratum i in year y (count) and used in Equation [2] of the methodology to calculate baseline emissions. The data is to be sourced from composite map of satellite images. The choice of this parameter is adequately justified.
- $CountEarlyburn_{i,y}$, which represents number of countable pixels in stratum i in year y that showed burning in the Early Burning Season (count) and used in Equation [2] of the methodology to calculate baseline emissions. This data is sourced from the composite map of satellite images made by compiling as many images as possible for the 10-year period of analysis and then applying a burned areas detection algorithm.
- $CountLateburn_{i,y}$, Number of countable pixels in stratum i in year y that showed burning in the late burning season (count) and used in calculating baseline emissions.
- $CountNoburn_{i,y}$, Number of countable pixels in stratum i in year y that showed no burning in both the early and the late burning season (count). Used in calculating baseline emissions.
- $BBMC_{i,sy}$, Carbon stored in aboveground biomass per hectare in stratum i in GapFire simulation year y in the baseline scenario (tC/ha). Used in calculating baseline emissions.
- $AvCMortBL_{i,y}$, Average yearly carbon stored in biomass dying as a result of tree mortality over the first 10 years' output of the yearly GapFire model baseline simulation for stratum i in year y (tC/ha). Used in calculating baseline emissions.

- G_g , Emission factor for gas g (kg t^{-1} dry matter burnt). Calculation of baseline and project emissions from biomass burning
- GWP_g , Global warming potential for gas g ($t\ CO_2/t\ gas\ g$). Calculation of baseline and project emissions from biomass burning
- $NP_{PA,b}$ Total number of pixels in the project area in stratum (count). Calculation of project emissions
- *Dimensionless constant*, Fraction of extracted biomass effectively emitted to the atmosphere during production (value applied 0.24). Calculation of project emissions.
- BEF, Biomass expansion factor (Dimensionless constant). Calculation of project emissions.
- CF, Carbon fraction of biomass (tC/tDry Matter, 0.47). Calculation of baseline emissions

Data and Parameters Monitored

- *Aboveground tree biomass*, Aboveground tree biomass is determined in sample plots for the purpose of validation of the carbon density map (tC/ha). Calculation of baseline and project emissions
- $A_{i,y}$, The area of stratum i in year y within the project area (ha). Calculation of baseline emissions, project emissions, and leakage emissions
- $Area_{z,y}$, The area of FMU z in year y within the project area (ha). Calculation of project emissions
- $FF_{EarlyBurn,z,y}$, Early burning fire frequency in FMU z in year y (Fraction (dimensionless)). Calculation of project emissions
- $FF_{LateBurn,z,y}$, Late burning fire frequency in FMU z in year y (Fraction (dimensionless)). Calculation of project emissions.
- $FF_{NoBurn,z,y}$, No burning fire frequency in FMU z in year y (Fraction (dimensionless)). Calculation of project emissions.
- $PBMC_{i,sy}$, Carbon stored in aboveground biomass per hectare in stratum i in GapFire simulation year y in the project scenario (tC/ha). Calculation of project emissions
- A_{deg} , Area that has degraded below the minimum 5tC/ha threshold (ha). Calculation of project emissions.
- $AvCmortPR_{i,y}$, Average annual carbon stored in biomass dying as a result of tree mortality over the first 10 years' output of the annual GapFire model project simulation for stratum i (tC/ha). Calculation of project emissions.
- $A_{reg,y}$, Areas that previously degraded below the 5 tC/ha threshold, but that in year y regenerate above this threshold (ha). Calculation of project emissions.
- $HV_{j,y}$, Harvested bole volume of species j in the project area in year y (m^3). Calculation of project emissions.
- $D_{t,j,y}$, Diameter at Breast Height of harvested tree t of species j in year y (cm). Calculation of project emissions and removals
- WD_j , Wood density of harvested species j ($t\ dry\ matter / m^3$). Calculation of project emissions and removals.
- $V_{MT,j,y}$, Volume of species j in year y that enters the medium-term wood products pool (remaining in this pool between 3 and 100 years) (m^3). Calculation of project emissions and removals.

- $FS_{m,fc}$, Proportion of fires started by fire cause fc in month m , weighted by area affected (%). Calculation of leakage emissions.
- D_{fc} , Rate of fire displaceability of fire cause fc (%). Calculation of leakage emissions.

Section 9.3 of the methodology describes the criteria for the monitoring plan and required monitoring activities. Monitoring activities include:

- (a) Carbon Density Map Validation, which requires ground-truthing of carbon density map using field data from sample plots
- (b) *Annual Monitoring of Fire Frequencies*, which requires a twice yearly monitoring of fire frequencies at the end of the Early Burning Season, and at the end of the Late Burning Season.
- (c) *Decadal Revision of Carbon Density Map*, which requires the carbon density map to be updated at least every ten years
- (d) *Decadal Revision of Fire History Baseline*, which requires the baseline to be revalidated at least every ten years

Following satisfactory responses and amendments as requested by the assessment team, DNV GL concludes that data and parameters to be reported, including sources of data and units of measurement are clearly stated and their inclusion and/or exclusion sufficiently justified in the Methodology. In addition, the methodology framework includes requirements for the development of a project monitoring plan. Tasks to be addressed by the monitoring plan include revision of the baseline; monitoring of project implementation; monitoring of actual stock changes and GHG emissions; monitoring of leakage carbon stock changes and GHG emissions; and estimation of ex-post net carbon stock changes and GHG emissions. These monitoring tasks are deemed to be (a) compliant with the VCS requirements outlined in VCS Standard, Section 4.8.1 /1/ and AFOLU Requirements, Section 4.8 /2/ and, (b) sufficient to be used for monitoring projects covered by this Methodology.

4 ASSESSMENT CONCLUSION

DNV (U.S.A) Inc. has performed a validation of the “Methodology for avoiding degradation and fostering regeneration in Miombo woodlands through fire management. The validation was performed on the basis of VCSA criteria for methodologies as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the methodology documentation and the subsequent follow-up interviews, have provided DNV GL with sufficient evidence to determine the fulfilment of stated criteria.

The “Methodology for avoiding degradation and fostering regeneration in Miombo woodlands through fire management”, correctly applies the requirements set out under the VCS Program Guide, version 3.5, VCS Standard, version 3.4 /1/, and AFOLU Requirements, version 3.4 /2/.

Projects applying the methodology will result in reductions of CO₂ emissions which are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that by applying the Methodology, projects are able to demonstrate that they are not likely to be the baseline scenario. Emission reductions attributable to the project applying and meeting the requirements of the Methodology are hence additional to any that would occur in the absence of the project activity.

In summary, it is DNV GL’s opinion that the “Methodology for avoiding degradation and fostering regeneration in Miombo woodlands through fire management” as described therein, meets all relevant VCSA requirements

for the VCS Methodologies. Hence, DNV GL recommends the approval of Methodology for avoiding degradation and fostering regeneration in Miombo woodlands through fire management.

5 REPORT RECONCILIATION

Not Applicable as this is the first draft of the second validation.

6 EVIDENCE OF FULFILMENT OF VVB ELIGIBILITY REQUIREMENTS

DNV (U.S.A.), Inc. holds accreditation to perform validation for projects under Sectoral Scope 3 (agriculture, forestry, other land use) under the American National Standards Institute (ANSI). DNV GL, therefore, is eligible under the VCS Program to perform assessments for the MED, which falls under the Sectoral Scope 3.

7 SIGNATURE

Signed for and on behalf of:

Name of entity: _DNV (U.S.A) Inc._____

Signature: _____



Name of signatory: _Dave Knight_____

Date: _28th January 2015_____

8 APPENDIX A

CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

CAR/CL ID	Clarifications and Corrective action requests by verification team	Summary of response from Proponent	Assessment team conclusion
CAR 1	<p><u>Requirements:</u></p> <p>VCS Standard v3.4, Section 3.4.9: <i>Grouped projects shall include one or more sets of eligibility criteria for the inclusion of new project activity instances.</i></p> <p>VCS Standard v3.4, Section 3.4.11(4): <i>A grouped project shall be described in a single project description, which shall contain the following (in addition to the content required for non-grouped projects): One or more sets of eligibility criteria for the inclusion of new project activity instances at subsequent verification events.</i></p> <p>AFOLU Requirements v3, Section 3.4.3(2): <i>Where the project intends to add instances of the project activity (e.g., additional polygons/parcels), the project shall follow the requirements for grouped projects set out in the VCS Standard</i></p> <p>AFOLU Requirements v3, Section 3.8.1: <i>AFOLU grouped projects shall follow the requirements for grouped projects set out in the VCS Standard.</i></p>		

	<p>Non-Compliance:</p> <p>Failure to require those grouped projects applying the methodology to include one or more sets of eligibility criteria for the inclusion of new project activity instances at subsequent verification events.</p> <p>Objective evidence:</p> <p>Second sentence of first paragraph after Table 6 in Section 8.1.1.6 states that:</p> <p><i>“... This analysis of similarity must be performed for the entire project area each time the project area is adjusted (e.g., when new project activity instances are added). Where more than one BRR has been defined, each discreet area of the new project activity instance must be coupled to one BRR”.</i></p> <p>This implies that the methodology is applicable to grouped projects but this is not stated or included in the applicability conditions or elsewhere in the methodology.</p> <p>If this interpretation is correct, then the methodology should clearly state the applicability of the methodology to grouped projects.</p> <p>Furthermore, the methodology should require those grouped projects applying it (i.e., methodology) to include one or more sets of eligibility criteria for the inclusion of new project activity instances at subsequent</p>	<p>The MED clearly stated the applicability to grouped projects before the VCS revision (in the first sentence of Section 2), but this was removed by VCS. Apparently VCS finds it unnecessary or undesirable to make this statement.</p> <p>All the AFOLU requirements with respect to grouped projects quoted above refer to the eligibility criteria being described <i>in the project description by the project</i>. This implies it is not the task of the methodology to prescribe these requirements, but that the references in the VCS Standard and the VCS AFOLU Requirements suffice on this point.</p>	<p>The assessment team sought clarification from the VCS on whether the applicability conditions in the Methodology need to make explicit the fact that the Methodology could apply to both grouped and ungrouped project activities, including explicit requirement that those grouped projects applying the Methodology must include one or more sets of eligibility criteria for the inclusion of new project activity instances at subsequent verification events.</p> <p>According to VCS, the applicability conditions of the methodology need not explain that the methodology may apply to both grouped and non-grouped projects.</p> <p>Hence, the assessment team deems the response by the Methodology developers adequate or acceptable to meet the stated VCS requirements.</p> <p>CAR1 is closed</p>
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	verification events.		
CL1	<p>Finding:</p> <p>Section 8.1.2 Baseline emissions from biomass burning</p> <p>Equation (4):</p> <p>Definition for parameter CF = Carbon Fraction of <i>died</i> tree biomass (default =0.47) (dimensionless)</p> <p>PP must whether '<i>dead</i>' tree biomass was intended.</p>	<p>Word “died” deleted. It was intended to denote that in this case we were using it to compute the carbon content of trees which had died during fires. However, it is extraneous and confusing hence we have removed it.</p> <p>Note the same parameter is used in several equations, including those relating to selective timber harvesting.</p>	<p>Assessment team checked and confirms that the word ‘died’ has been deleted.</p> <p>CL1 is closed</p>
CL2	<p>Finding:</p> <p>Section 8.1.3 Baseline emissions from selective tree harvesting</p> <p>First paragraph states that:</p> <p><i>Baseline emissions from selective tree harvesting are conservatively not quantified.</i></p> <p>PP must clarify why justification/explanation for not quantifying baseline emissions from selective tree harvesting is not included in Table 2</p>	<p>Table 2 now explicitly states that these emissions from selective tree harvesting in the baseline scenario are conservatively excluded.</p> <p>It does not seem in keeping with the design of that part of the doc to provide a detailed justification. But essentially it boils down to the difficulty of accurately assessing timber harvesting levels prior to the introduction of adequate management control. It is conservative to omit any emissions from the baseline scenario, hence this is the simplest and most appropriate solution for this method.</p>	<p>Assessment team checked and confirms that Table 2 now includes justification/explanation for not quantifying baseline emissions from selective tree harvesting.</p> <p>CL2 is closed</p>
CL3	<p>Finding:</p> <p>Section 8.2.1.1 - Step 1: Calculate the probabilities of</p>	<p>The unit for early burning fire frequency in FMU in Equation (7) should be (%), not (ha). This has been changed in the MED.</p>	<p>Assessment team checked and confirms that the unit for early burning fire frequency in FMU in</p>

	<p>early burning, late burning and no burning</p> <p><u>Equation (7):</u> PP shall clarify whether (ha) is the unit for early burning fire frequency in FMU in Equation (7)</p>		<p>Equation (7) is now (%)</p> <p>CL3 is closed</p>
CL4	<p>Finding:</p> <p>Section 8.2.2 - Project emissions from biomass burning</p> <p><u>Equation (10):</u> Definition for parameter CF = Carbon Fraction of <i>died</i> tree biomass (default =0.47) (dimensionless) PP shall clarify whether '<i>dead</i>' tree biomass was intended.</p>	<p>Word "died" deleted. It was intended to denote that in this case we were using it to compute the carbon content of trees which had died during fires. However, it is extraneous and confusing hence we have removed it.</p> <p>Note the same parameter is used in several equations, including those relating to selective timber harvesting.</p>	<p>Assessment team checked and confirms that the word 'died' has been deleted.</p> <p>CL4 is closed</p>
VCSA	VCSA COMMENTS/QUESTIONS		
CAR2	<p><u>Baseline Scenario and Applicability Conditions</u></p> <p>Originally, the first exclusionary applicability condition contained language that prevented the baseline from plausibly containing land use scenarios where anthropogenic activities increase carbon stocks or reduce degradation. We identified this as a potential conflict with step 1(a) of VT0001 used in section 6 of the methodology element, which requires that implementation of the project without being registered</p>	<p>The edits have been removed.</p>	<p>Assessment team checked and confirms that the edits have been deleted.</p> <p>CAR2 is closed</p>

	<p>as a VCS project be included as a credible alternative land use scenario to the proposed activity.</p> <p>However, we revised the language of the first exclusionary applicability condition to focus on the baseline scenario (i.e. the baseline scenario selected by the project proponent when following the procedures for baseline selection set out in the methodology, as opposed to the credible/plausible alternative baseline scenarios). This is to say that, per VT0001, one could include implementation of the project without registration with VCS as a credible alternative baseline scenario (which is not to say it's the most plausible), and there would be no conflict with the applicability condition. If one were to find that implementation without registration with VCS was the most plausible, the methodology simply is not applicable, per the applicability condition. Our conclusion therefore is that the latest edits in the baseline section "overriding" the applicability conditions is not necessary.</p> <p><u>DNV GL ASSESSMENT TEAM'S COMMENT</u></p> <p>DNV GL agrees with VCS conclusion. The edits are not necessary and should be removed. The removal would not affect the integrity of the section on baseline scenario.</p>		
<p>CAR 3</p>	<p><u>Selection of Baseline Scenario</u></p> <p>Our second concern is that the element relies on VT0001 to determine <i>the most plausible</i> alternative</p>	<p>A step-by-step procedure has now been included in Section 6.</p> <p>The MED now follows the procedure as</p>	<p>Section 6 of the Methodology now includes a step-by-step procedure under Step 1c of VT0001, <i>Tool for the Demonstration and Assessment of</i></p>

	<p>scenario, but as per step 1(c) of VT0001, that's for the methodology to prescribe. The element currently points to steps 2-4 of the tool as the procedure to follow. However, please note that steps 2-4 are not designed to select a baseline scenario. Rather, these steps are meant to assess additionality of the project activity.</p> <p><u>DNV GL ASSESSMENT TEAM'S COMMENT</u></p> <p>Except for the small number of methodologies (e.g., VCS methodology VM0017) that require projects to use prescribed Tools to select the most plausible baseline scenario, it is common practice (if not the standard practice for VCS methodologies to prescribe the Tool followed by a step-by-step procedure and guidance to methodology users on the selection of the most plausible baseline scenario.</p> <p>To be consistent with the standard practice for VCS methodologies, PP is requested to include a step-by-step procedure that would guide projects in selecting the most plausible baseline scenario</p>	<p>prescribed in Section 6 of VM0026, with minor edits to make it applicable to this MED.</p>	<p><i>Additionality in VCS AFOLU Project Activities.</i></p> <p>CAR3 is closed</p>
<p>CAR 4</p>	<p><u>Baseline Reassessment</u></p> <p>There was some language in the element that suggested reassessment of the baseline could take place more frequently than every 10 years. As per VCS requirements, this would not be permitted. The language has since been revised, however we would encourage DNV to keep this in mind to ensure that</p>	<p>The attached copy of the latest revised MED should be clean on the relevant language</p>	<p>Assessment team checked the revised Methodology and confirms that reassessment language is consistent with VCS requirements.</p> <p>CAR4 closed</p>

	<p>reassessment language is consistent with VCS requirements.</p> <p><u>DNV GL ASSESSMENT TEAM'S COMMENT</u></p> <p>PP should provide a clean copy of the latest revised methodology to enable DNV GL to check the consistence of reassessment language with VCS requirements.</p>		
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Three final modifications made in the methodology

The three modifications to the Methodology are given in the table below. Methodology developer believes that the first and last modifications are minor but useful improvements to the MED with no material impact on total VCUs while the second modification would have some material impact on total VCUs which would be computed, adding about 3% to the total.

	MODIFICATION	DNV COMMENTS	VCS COMMENTS
1	p. 9 Removal of reference to work on forest definition by Lamprey, which further analysis (by Lamprey himself) showed was compatible with the bigger study by Isango, and therefore it was not necessary to explain why we were ignoring his initial findings.	Reference removal deemed OK.	The first modification seems fine.
2	p.19 Adjusting the minimum threshold of burn likelihood which must be used by the classifier algorithm to 60%+ based on a newly located reference. (The previous suggested threshold of 67% was not supported by any literature.) Anything over 50% is self-evidently conservative	Reference checked and the adjustment deemed reasonable and conservative.	With regards to the second modification, it sounds like a reference was located which cites a 60% threshold whereas the 67% is not rooted in any known reference? If DNV considers this

	so we think this is reasonable.		adjustment reasonable, then likely the only potential challenge to this new threshold would come from SCS during reconciliation. I would not anticipate VCS will have any comments on this adjustment based on the information provided.
3	p.43-44 Clarification on what would be an appropriate re-measurement protocol for DBH measurements used to determine ABG tree biomass.	Clarification on appropriate re-measurement protocol for DBH measurement deemed appropriate.	The third modification is difficult to comment on without seeing the exact adjustments to the text.