RA-Cert Division Headquarters
65 Millet St. Suite 201
Richmond, VT 05477 USA
Tel: +1 802-434-5491
Fax: +1 802-434-3116
www.rainforest-alliance.org

Audit
Managed by:
Climate Program

Rainforest Alliance
665 Broadway, Ste 500
New York, NY 10012
Tel: 212-677-1900
Fax: 212-659-0098
Contact Person: Mark Moroge
Email: mmorge@ra.org

Methodology Assessment Report

Report for:

The Field Museum and TerraCarbon

Report Finalized:	21 June 2012
Draft Report Date:	05 April 2012
Methodology Assessment Dates:	12-16 March and 05 April, 2012
Lead Auditor:	Jared Nunery
Audit Team Member(s):	NA
Senior Internal Reviewer	Jeff Hayward
Audit Standard:	*VCS Version 3*
Methodology Version:	VM0007 BL-UP v3.0, and X-UNC v2.0
Project Proponent Contact:	Christina Magerkurth
Project Proponent Address:	The Field Museum 1400 South Lake Shore Drive Chicago, IL 60605

The Field Msueum VCS MTA (revision) 12

Document Prepared By Rainforest Alliance

Methodology Element Title	VCS Module VM0007
Version	BL-UP v3.0, and X-UNC v2.0
Methodology Element Category	Methodology Revision
Sectoral Scope(s)	AFOLU
Report Title	The Field Museum VCS MTA (revision) 12
Report Version	The Field Museum VCS MTA (revision) 12
Assessment Criteria	VCS Version 3
Client	The Field Museum and TerraCarbon
Pages	33
Date of Issue	June 21, 2012
Prepared By	Rainforest Alliance
Contact	Jared Nunery, Carbon Technical Specialist Rainforest Alliance 65 Millet Street Suite 201 Richmond, Vermont USA 05477 jnunery@ra.org
Approved By	Jeff Hayward
Work Carried Out By	Jared Nunery

Summary:

The assessment was required as per the VCS Methodology Approval Process where methodological revisions are required to undergo the VCS methodology approval process. The methodology assessment was conducted in the offices of Rainforest Alliance, with multiple phone conversations with the methodology developer to clarify points identified during the methodology element assessment.

The purpose of the methodology assessment was to evaluate the conformance of the revised modules (BL-UP, X-UNC, and REDD-MF) of VM0007 against the VCS Version 3. During the evaluation the audit team identified 5 nonconformances (see section 2.4 below) which were all addressed through revisions to the revised modules. In conclusion, following the revision of the revised modules to address nonconformances identified by the first and second validators during the methodology approval process, the revised modules were found to be in full conformance with the VCS Version 3.

Table of Contents

1 Introduction

Rainforest Alliance certification and auditing services are managed and implemented within its RA-Cert Division. All related personnel responsible for audit design, evaluation, and certification/verification/validation decisions are under the purview of the RA-Cert Division, hereafter referred to as Rainforest Alliance or RA. Rainforest Alliance is an ANSI ISO 14065:2007 accredited validation and verification body; additionally, Rainforest Alliance is a member of the Climate, Community, and Biodiversity Alliance (CCBA) standards, and an approved verification body with a number of other forest carbon project standards. For a complete list of the services provided by the Rainforest Alliance, see http://www.rainforest-alliance.org/climate.cfm?id=international_standards.

Dispute resolution: If Rainforest Alliance clients encounter organizations or individuals having concerns or comments about Rainforest Alliance and our services, these parties are strongly encouraged to contact the local Rainforest Alliance regional office or the RA-Cert Division headquarters directly. Formal complaints or concerns should be sent in writing.

1.1 Objective

The purpose of this report is to document the conformance of the revised VM0007 BL-UP v3.0 and X-UNC v2.0 which included minor revisions to the REDD-MF v2.0 module, with the requirements of the Verified Carbon Standard (VCS). The methodology was revised by The Field Museum and TerraCarbon, hereafter referred to as "Methodology Developer". The report represents the second assessment of the VCS methodology approval process. The report presents the findings of qualified Rainforest Alliance program auditors and technical experts in methodologies for greenhouse gas emissions and removals or who have assessed the methodology under review according to the applicable standard(s) and protocols of the Verified Carbon Standard. Section 2 below provides the assessment conclusions. Rainforest Alliance carbon evaluation reports will be available to the public only upon finalization and after agreement of both the proponents and the Rainforest Alliance. Particular material in the report identified as confidential by the proponent will be excluded from any publicly available reports.

1.2 Evidence of Fulfilment of VVB Eligibility Requirements

The Rainforest Alliance is an ISO 14065:2007 accredited validation and verification body. Additionally Rainforest Alliance retains two staff AFOLU Experts on staff, which are involved in the oversight and development of all Rainforest Alliance involvement within the VCS Methodology Approval Process. For a complete list of VCS project validations that Rainforest Alliance has completed, as well as expert staff listing, please see the Rainforest Alliance website.

1.3 Scope and Criteria

Scope: The assessment of a new methodology will evaluate whether or not the methodology has been prepared consistent with the guidance provided by the VCS Program, including Section 3 (project level requirements) and Section 4 (methodologies) of the VCS Standard Version 3.

The scope of this assessment includes, as a minimum:

1. Applicability conditions: Assessment of whether the proposed methodology's applicability conditions are appropriate, adequate and in compliance with the VCS rules.
2. Project boundary: Assessment of whether an appropriate and adequate approach is provided for the definition of the project's physical boundary and sources and types of GHGs included.
3. Procedure for determining the baseline scenario: Assessment of whether the approach for determining the baseline scenario is appropriate, adequate and in compliance with the VCS rules.
4. Procedure for demonstrating additionality: Assessment of whether the approach/tools for determining whether the project is additional are appropriate, adequate and in compliance with the VCS rules.
5. Baseline emissions: Assessment of whether the approach for calculating baseline emissions is appropriate, adequate and in compliance with the VCS rules.
6. Project emissions: Assessment of whether the approach for calculating project emissions is appropriate, adequate and in compliance with the VCS rules.
7. Leakage: Assessment of whether the approach for calculating leakage is appropriate, adequate and in compliance with the VCS rules.

8. Quantification of net GHG emission reductions and/or removals: Assessment of whether the approach for calculating the net GHG benefit of the project is appropriate, adequate and in compliance with the VCS rules.
9. Monitoring: Assessment of whether the monitoring approach is appropriate, adequate and in compliance with the VCS rules.
10. Data and parameters: Assessment of whether the specification for monitored and not monitored data and parameters is appropriate, adequate and in compliance with the VCS rules.
11. Adherence to the project principles of the VCS Program: Assessment of whether the methodology adheres to the VCS Program principles set out in the *VCS Standard*.
12. Relationship to approved or pending methodologies: Assessment of whether any existing methodology could reasonably be revised to serve the same purpose as the proposed methodology, determined in accordance with Section 5.2 of the VCS Methodology Approval process Version 3.
13. Public Review: Under the double approval process, new methodologies must be posted for public comment prior to the first assessment. Any comments made during this process will be reported here and addressed.

The methodology will be assessed against these thirteen criteria, in addition to those criteria required by the VCS Standard v3. Criteria one through twelve are outlined in the VCS Methodology Approval Process Version 3, and criterion 13 is an additional criteria required by the VCS Standard as part of the Methodology Approval Process. The following project level principles, based upon ISO 14064-2:2006, from Section 2.4 of the VCS Standard Version 3, were the principles considered in evaluating the methodology against the checklist criteria:

i. Relevance: Select the GHG sources, GHG sinks, GHG reservoirs, data and methodologies appropriate to the needs of the intended user.
ii. Completeness: Include all relevant GHG emissions and removals. Include all relevant information to support criteria and procedures.
iii. Consistency: Enable meaningful comparisons in GHG-related information.
iv. Accuracy: Reduce bias and uncertainties as far as is practical.
v. Transparency: Disclose sufficient and appropriate GHG-related information to allow intended users to make decisions with reasonable confidence; and
vi. Conservativeness: Use conservative assumptions, values and procedures to ensure that GHG emission reductions or removal enhancements are not overestimated

Standard criteria: Criteria from the following documents were used to assess this project:

- Verified Carbon Standard Program Guide Version 3;
- Verified Carbon Standard Version 3;
- Verified Carbon Standard Agriculture, Forestry and Other Land Use (AFOLU) Requirements Version 3;
- Verified Carbon Standard AFOLU Non-Permanence Risk Tool Version 3;
- Verified Carbon Standard Methodology Approval Process Version 3;
- Verified Carbon Standard Program Updates (please see VCS website for the latest updates); and as applicable,

1.4 Methodology Description

The following is taken from section 2 of the VM0007 REDD-MF V2.0 module:

"This 'REDD Methodology Framework' is the basic structure of a modular REDD methodology. It provides the generic functionality of the methodology, which frames pre-defined modules and tools that perform a specific function. It constitutes, together with the modules and tools it calls upon, a complete REDD baseline and monitoring methodology.
The modules and tools called upon in this document are applicable to project activities that reduce emissions from planned (APD) and unplanned (AUDD) deforestation, and for activities to reduce emissions from forest degradation.

The reference to this Framework and the modules used to construct the project-specific methodology shall be given in the VCS Project Description (VCS PD)."

The methodology revisions included the following modules within the VM0007 module framework: REDD-MF, BL-UP, and X-UNC.

2 Audit Overview

Based on Project's conformance with audit criteria, the auditor makes the following recommendation:		
Final Report Conclusions		
☒	Validation approved: *No NCRs issued*	
☐	Validation not approved: *Conformance with NCR(s) required*	
Draft Final Report Conclusions		
☒	Validation approved: *No NCRs issued*	The Methodology Developer has 7 days from the date of this report to submit any comments related to the factual accuracy of the report or the correctness of decisions reached. The auditors will not review any new material submitted at this time.
☐	Validation not approved: *Conformance with NCR(s) required*	
Draft Report Conclusions		
☐	Validation approved: *No NCRs issued*	The Methodology Developer has 30 days from the date of this report to revise documentation and provide any additional evidence necessary to close the open non-conformances (NCRs). If new material is submitted the auditor will review the material and add updated findings to this report and close NCRs appropriately. If no new material is received before the 30 day deadline, or the new material was insufficient to close all open NCRs the report will be finalised with the NCRs open, and validation and/or verification will not be achieved. If all NCRs are successfully addressed, the report will be finalised and proceed towards issuance of a assessment statement.
☒	Validation not approved: *Conformance with NCR(s) required*	

2.1 Audit Conclusions

Following the issuance of the Draft Report, the methodology developer revised the BL-UP, X-UNC and REDD-MF modules to address both the issues raised in the Draft Report as well as issues identified in the first validator's report. These revisions were reviewed by the audit team and found to sufficiently address all NCRs identified in the Draft Report. Following the submission of revised documentation on 13 and 18 June 2012, the audit team has found the revised modules to be in full conformance with the VCS standard.

2.2 Report Reconciliation

The first assessment report was completed prior to this report being finalized, and prior to the Methodology Developer's response to the NCRs raised in section 2 below. As such several NCRs were closed due to revisions made in response to the First Assessment Report which was finalized after the issuance of the Rainforest Alliance Draft Report.

In addition to numerous typographical errors, two significant changes were made to the methodology in response to the First Assessors findings:

1) Required carbon pools within the REDD-MF module were revised.
2) Uncertainty in X-UNC is aggregated to a cumulative total to align with other VM0007 modules.

The audit team reviewed these changes and found them to be in conformance with the VCS standard.

2.3 Signature

Signed for and on behalf of:

Name of entity: _Rainforest Alliance _____

Signature: _ _____
Name of signatory: _*Jeffrey Hayward* _____
Date: _*June 21, 2012*_____

2.4 Nonconformance evaluation

Note: A non-conformance is defined in this report as a deficiency, discrepancy or misrepresentation that in all probability materially affects carbon credit claims. Each NCR is brief and refers to a more detailed finding in the appendices.

NCRs identified in the Draft Report must be closed through submission of additional evidence by the Methodology Developer before Rainforest Alliance can submit an unqualified statement of conformance to the GHG program. Findings from additional evidence reviewed after the issuance of the draft report are presented in the NCR tables below.

NCR#:	01/12
Standard & Requirement:	VCS AFOLU Requirements Section 4.3.5
Report Section:	3.4
Description of Non-conformance and Related Evidence:	
The revised methodology includes specific guidance on how carbon stocks in belowground biomass, soil and dead wood shall be accounted for. The conservative assumption of zero carbon stocks in $C_{BB\_tree,i}$ $C_{SOC,i}$ *and* $C_{DW,I}$ may be in conformance with the most recent version of the VCS standard, however this creates a contradiction with the REDD-MF module. Specifically in Table 1 of REDD-MF these pools are listed as optional, however in the revised BL-UP module they are assumed to be equal to zero. As such it is not clear how a project developer choosing to include these carbon pools following the guidance of REDD-MF would do so when implementing the revised BL-UP. Recognizing the inter-connected nature of the VM0007 modules, the modules must not contradict one another as is the case with the proposed revisions to BL-UP.	
Corrective Action Request:	Organization shall implement corrective actions to demonstrate conformance with the requirement(s) referenced above. Note: Effective corrective actions focus on addressing the specific occurrence described in evidence above, as well as the root cause to eliminate and prevent recurrence of the non-conformance.
Timeline for Conformance:	Prior to Validation
Evidence Provided by Organization:	In response to this NCR the methodology developer stated: Referenced text in BL-UP has been removed and Table 1 of REDD-MF has been updated to exclude these pools and modules for the avoiding unplanned deforestation REDD activity type.
Findings for Evaluation of Evidence:	In order to address the issues raised by the audit team, the methodology developer has removed the text within BL-UP regarding the assumed zero carbon stocks in $C_{BB\_tree,i}$ $C_{SOC,i}$ *and* $C_{DW,I}$ and revised Table 1 within REDD-MF to exclude $C_{BB\_tree,i}$ $C_{SOC,i}$ *and* $C_{DW,I}$. This approach was found to technically conform with the requirements of section 4.3.5 of the AFOLU requirements with respect to carbon stock calculations for belowground, dead wood, and soil carbon pools. In an email correspondence from the VCSA on 14 June 2012, the VCSA noted: "*For the belowground biomass, deadwood and soil carbon pool in BL-UP and BL-PL modules, the change in carbon stocks in the baseline case is equivalent to the stock before deforestation minus the stock after deforestation (equations 3-5 in BL-PL, equations 16-18 in BL-UP). This procedure assumes immediate oxidation for these pools following a disturbance. This is non-conformant to the AFOLU Requirements, which explicitly states that it shall not be assumed*

	that GHG emissions from the these pools occur instantaneously in the baseline case. *The BL-UP and BL-PL modules shall set out* criteria and procedures to reliably establish the pattern of carbon loss or apply an appropriate decay model for the decay of soil carbon, belowground biomass and dead wood. A default approach for modelling the decay of each of these pools is given in the AFOLU Requirements and may be applied." In response to this email Rainforest Alliance requested clarification from the VCSA regarding the applicability of this finding following the revisions to Table 1 of REDD-MF, which now exclude carbon stocks from $C_{BB\_tree,i}$ $C_{SOC,i}$ *and* $C_{DW,I}$. Following review of Table 1, the VCSA concluded this finding is no longer relevant. As such, the revisions to the methodology have now fully addressed the discrepancies noted by the auditor during the first review, and are now in full conformance with the VCS AFOLU Requirements with respect to section 4.3.5. It should be noted that step 4.2.1 in the revised BL-UP includes references to the use of modules CP-D and CP-S, however, below the equations within this section (as well as section 4.2.2) the module states: *"Carbon pools excluded from the project can be counted as zero. For determining which carbon pools shall be included in the calculations as a minimum, see Table 1 in REDD-MF and tool T-SIG."* As such the module clearly directs the project developer back to REDD-MF to evaluate which CP modules shall be applied. The reviewer finds this approach to be acceptable, and as such this NCR is closed.
NCR Status:	Closed
Comments (optional):	No comments

NCR#:	02/12
Standard & Requirement:	VCS AFOLU Requirements Section 4.4
Report Section:	5.3
Description of Non-conformance and Related Evidence:	

In step 3.1.1 of BL-UP v2.0, the methodology explicitly disallows the use of neural networks, recognizing that these types of models can be used as "black box" models, where data processing is not transparent making verification of the application of models difficult. The revised version of the methodology removes the explicit exclusion of neural network models, and has added in the following text:

"To be transparent, the modeling system should be able to provide feedback on the relative contribution of explanatory variables and provide skill measurements through comparison with a validate data set."

Given the rationale for the exclusion of neural networks being the lack of transparency associated with the use of these models, it is not clear how the added text addressing this concern. Further, the methodology developer provided supporting literature references which confirm the applicability of neural networks for modelling complicated dynamics such as spatially projecting deforestation (see Docs 9, 13 and 15 which were reviewed and found to confirm the applicability of neural networks). However, the added text does not address the transparency concerns associated with the use of neural networks. Although VCS methodologies are non-precedence setting, examples of how other methodologies have addressed this issue can be seen in VM0015 which allows the use of neural network models, however the methodology includes specific requirements to ensure transparency (e.g. require calibration in section 4.2.3 p.62 and model justification on the bottom of p.57). Specifically what the revised methodology fails to address are necessary requirements to ensure transparent use of neural networks such as, but not limited to:

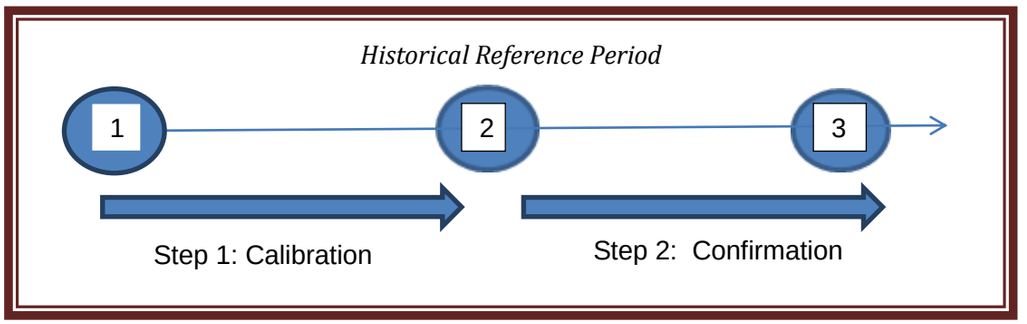
- Description of any supervised learning applied in model calibration to the project area and/or reference region;
- Required justification for the use of the applied methodology;
- Required listing of all assumptions applied when using the model; and,
- Required listing of all sources of independent parameters applied in modelling.

Neural network models may be appropriate for the use in projecting spatial location of deforestation when applying BL-UP, however the methodology must include safeguards to ensure that the VCS principle of transparency is fully met. The revised methodology does not include sufficient guidance and requirements to ensure the transparent application of neural network models, as such this revision is not found to be in conformance with the VCS AFOLU Requirements.	
Corrective Action Request:	Organization shall implement corrective actions to demonstrate conformance with the requirement(s) referenced above. Note: Effective corrective actions focus on addressing the specific occurrence described in evidence above, as well as the root cause to eliminate and prevent recurrence of the non-conformance.
Timeline for Conformance:	Prior to Validation
Evidence Provided by Organization:	In response to this NCR the methodology developer stated: Section 3.1.1 has been accordingly revised to require greater transparency in model use. The added text is italicized. **"*3.1.1 Requirements of spatial models*** *Project proponents must identify the model/software that will be used to analyze where deforestation is most likely to happen in future periods[1]. The model/software used must:* • *Be peer-reviewed* • *Be transparent (no "black box" calculations)* • *Incorporate spatial datasets that have been documented to explain patterns of and are correlated with deforestation (both raster and vector)* • *Be able to project location of future deforestation* *To be transparent, the modeling system must provide feedback on the relative contribution of explanatory variables and assess model fit through comparisons with empirical data. Further, in applying the model/software, project proponents must provide clear documentation and justification for all model inputs and assumptions."* In order to fully address the finding with regard to neural networks, a short overview of neural networks is included. This will illustrate how these approaches are equally transparent to other commonly used and accepted modeling approaches, and meet the VCS principle of transparency. As well, we respond with additional methodology requirements to ensure greater transparency. Artificial neural networks (ANN) were developed to mimic the brain's ability to learn from information by sorting patterns and learning from trial and error. The first ANN is credited to Rosenblat in 1958 and was called a "perceptron" (Pijanowski et al 2002). Neural networks are widely used today and have been successfully applied in a large range of fields from image recognition, medicine, molecular biology to ecological and environmental sciences (Mas et al 2004). The multi-layer perceptron (MLP) neural network is one of the most widely used ANNs (Lek and Guégan, 1999). ANN algorithms calculate weights for input values (i.e. risk factors identified in Step 3.1.2 of the methodology) (typically starting with randomly selected initial weights) and then compare the calculated output for a given observation with the expected output for that observation. The learning procedure in the MLP is based simply on the concept that if the network gives the wrong answer, the weights are adjusted to lessen the error, not unlike Least Sum of Squares in regression analysis. This process to improve the weighting is

[1] Many models exist; examples include GEOMOD (http://www.clarklabs.org/) and Land Change Modeler (http://www.clarklabs.org/) but these models are merely examples and are neither required nor pre-approved for use

repeated iteratively, in many cases thousands of times, until the error stabilizes at a low level (Pijanowski et al 2002). The MLP is developed with minimal user bias. The input values which train the network are based on examples of data with known outputs (thus are tested against empirical evidence), and these are drawn through random sampling. Therefore there is an internal training and testing of the network that is entirely random, *i.e. weights are not assigned subjectively by the user*. The training is done solely from the samples presented (i.e. random samples from the time series of classified imagery), and the factor maps provided, and these contain all the information from which the weighting of relationships is developed.

Land cover change modeling requires two phases; calibration and confirmation. The historical reference period is divided into 2 time steps. Three classified images of remotely sensed data are needed, (1) an origin date, or the beginning of the time series, (2) an intermediate date, ideally close to the mid-point in the time series and (3) a final date, which is within two years of the project start date. These three dates define the two time steps used for modeling as shown below.



The first time step, from the image date 1 to image date 2, is used to calibrate the model. The second time step, from image date 2 to image date 3, is used to validate the model's predictive capacity. For calibration, the classified maps from the first two time points are analyzed. Locations that experienced a transition from forest to non-forest ("transition") and locations that do not transition but remain as forest ("persistence") are used to develop and test for relationships with potential driver variables chosen in Step 3.1.2 (factor maps) . A large number of sample locations (typically individual pixels) are randomly chosen from both of these categories. They are then divided into training samples and testing samples that are used in the calibration of the model. This number may be user-defined, and should be a minimum of 5,000 samples in each category. This internal testing informs the adjustment of the weighting of factor maps in the model. Individual runs of the neural network consist of many iterations that are conducted either until a final number of iterations is reached or until the testing error stabilizes at a low rate. Allowing the model to run through 10,000 iterations has been determined to be a good standard (Eastman, 2009). These parameters can be reported as part of the independent parameters used in model development.

The strengths of neural networks are clear in that they are able to incorporate non-linear functions, to perform free of user pre-defined function estimation (thus avoiding another source of user bias), and to learn from data relationships that are not otherwise known (Mas et al 2004). The internal testing and evaluation of the model prediction based on large numbers of random samples and large numbers of iterations tests the outcome of the derived relationship and corrects until the best fit model is developed. This increases the likelihood that the model has uncovered actual relationships without user bias and should increase confidence in the model.

As with all models, the greatest source of influence are the selected inputs, and thus the greatest concern of transparency remains the process by which risk factors are selected, which is already addressed in methodology section 3.1.2 requiring that independent parameters used in the model must be clearly reported.

	As defined by the VCS, transparency is to "disclose sufficient and appropriate GHG-related information to allow intended users to make decisions with reasonable confidence" (from ISO 14064-2:2006, clause 3 and referenced in the VCS Standard v3.1 Section 2.4 Principles). To further address this principle, we have added the following requirements to Section 3.3 of BL-UP: "*When using Artificial Neural Networks to determine the best fit (lowest error) model, project proponents will apply the following guidance:* 1. *For the calibration period (i.e. the first time step in the historical reference period, used to calibrate the model), a minimum of 5,000 samples (pixels) of the "transition" category (forest to non-forest) and 5,000 samples (pixels) of the "persistence" category (locations that do not transition but remain as forest) will be randomly selected and used for training and testing.* 2. *A minimum of 10,000 iterations of the model will be run before selecting the best fit model."* Citations: Eastman, J.R. 2009. Idrisi Taiga: Guide to GIS & Image Processing. Clark Labs. Clark University. Lek,S., J.F. Guégan. 1999 Artificial neural networks as a tool in ecological modelling, an introduction Ecological Modelling, 120 : 65–73 Maier, H.R., G.C. Dandy 2000. Neural networks for the prediction and forecasting of water resources variables: a review of modelling issues and applications. Environmental Modelling and Software, 15 (1) : 101–124 Mas, F., H. Puig, J.L. Palacio, A. Sosa-López. 2004 Modelling deforestation using GIS and artificial neural networks. Environmental Modelling & Software Volume 19, Issue 5: 461–471 Pijanowski,, B.C. , D.G. Brown, B.A. Shellito, G.A. 2002 Using neural networks and GIS to forescast land use changes: a land transformation model. Computers. Environment and Urban Systems, 26 (6)–575
Findings for Evaluation of Evidence:	The revised text within the methodology now requires increased safeguards to ensure transparent use of models. These requirements ensure that any model used includes a minimum description of the model application and validation, as well as supporting justification for the use of all model inputs and assumptions (see revised text in Step 3.1.1). This revised text was found to be sufficient to fully address the reviewer's concerns, and as such this NCR is closed.
NCR Status:	Closed
Comments (optional):	No comments

NCR#:	03/12
Standard & Requirement:	VCS AFOLU Requirements Section 4.3.4
Report Section:	3.4
Description of Non-conformance and Related Evidence:	

In the previous version of the methodology, specific thresholds for frontier and mosaic configurations were given (40% and 80% respectively), based on citations from Brown et al. 2007 and Harris et al. 2008. The revised methodology has removed these thresholds (which it should be noted are used as a reference mark in other VCS methodologies such as VM0015) and replaced the requirement with a project specific FOM threshold. The revised methodology required the defined net observed change in the reference region for the "calibration period of the model" to be used as the threshold. This is based on a number of studies (see Docs 10-14 which were reviewed by the audit team) which conclude that the previously defined thresholds are unrealistic. Most notably, Pontius et al. 2008 concluded that the most significant relationship with model predictive accuracy was the amount of observed net change in the reference maps (e.g. the more observed net change the greater the model accuracy and subsequent FOM). As such the revised methodology sets the minimum threshold of observed net change for the RR. Further, the revised methodology includes the following caveat: *"If the FOM value is below this threshold, project proponents should provide evidence that the FOM achieved is consistent with comparable studies given the nature of the project area and the data available."* This revision allows for greater flexibility in model use. The revision does not increase the conservatism of the methodology, however as the methodology developer highlights in their comments within Doc 4, the previous FOM thresholds were not realistically achievable for many projects, as noted in the referenced documents. The greatest challenge would be for those projects that have experienced little net observed change within the reference period, as Pontius et al. 2008 noted the challenges in obtaining a strong FOM in these situations. Following the review of the referenced documents the audit team has found the revised threshold which is determined on a project specific case to be appropriate. However, the term "calibration period" is not explicitly defined within BL-UP. As this term is critical to the quantification of the FOM threshold, the methodology must clearly define this period. For example, it is not clear if this period applies to the initial calibration of the model or the calibration of the model each time the baseline is re-evaluated. The revised methodology does not clearly define the "calibration period" within the current revised text.	
Corrective Action Request:	Organization shall implement corrective actions to demonstrate conformance with the requirement(s) referenced above. Note: Effective corrective actions focus on addressing the specific occurrence described in evidence above, as well as the root cause to eliminate and prevent recurrence of the non-conformance.
Timeline for Conformance:	Prior to Validation
Evidence Provided by Organization:	In response to this NCR the methodology developer stated: To clarify, "calibration period" has been added to the definitions at the beginning of the module: "Calibration period - The first time step in the historical reference period, used to calibrate the Artificial Neural Network model"
Findings for Evaluation of Evidence:	Following the submission of the revised BL-UP, the audit team requested clarification as to why "Artificial Neural Network" was specified in the calibration period definition. The methodology developer clarified that it is not intended for this definition to be specific to ANN models only, and following this conversation the methodology developer revised the BL-UP module to produce the 18 June 2012 version of the BL-UP module which includes the following definition of calibration period: "Calibration period - The first time step in the historical reference period, used to calibrate the model" The audit team finds the revised definition to more appropriately address non-ANN models. Section 3 of the BL-UP module now clearly defines the calibration period. The addition of this definition addresses the reviewer's concerns, and as such this NCR is closed.
NCR Status:	Closed
Comments (optional):	No comments

NCR#:	04/12
Standard & Requirement:	VCS Standard 4.8.1

Report Section:	10.2
Description of Non-conformance and Related Evidence:	
The revised methodology modules utilize an alternative approach where uncertainty is applied to the "total net GHG emission reductions" at a specific time point, rather than the cumulative uncertainty for the time period. Below are findings related to these revisions: <u>Introduced typographical errors in revised text/equations:</u> • REDD-MF VM0007 V2.0 p.20: In the paragraph immediately above equation 10, the word "The" is missing from the line "adjusted value for $C_{REDD,t}$ to account for uncertainty shall be calculated as:" • X-UNC VMD0017 V2.0 p.4: Equation 2: Subscript labels are included within the equation, however the labels are not included as actual subscripts. Further, the dependent variable, $Uncertainty_{BSL,RATE,t}$ is included twice. • X-UNC VMD0017 V2.0 p.6: Equation 3 has been revised to include the subscript "t" in each parameter to reflect the time specific calculation of each parameter. However, not all of the parameter descriptions immediately following equation 3 have not been updated to reflect the addition of the "t" subscript (see $U_{BSL,SS,i}$ and $E_{BSL,SS,i}$). Further in the numerator, the commas in the subscripts of the second $E_{BSL,SS,i}$ parameter appear to incorrect, see: $$\text{Uncertainty}_{\text{BSL,SS,t,i}} = \frac{\sqrt{\left(U_{BSL,SS1,t,i} * E_{BSL,SS1,t,i}\right)^2 + \left(U_{BSL,SS2,t,i} * E_{BSL,SS2,,ti}\right)^2 + ... + \left(U_{BSL,SSn,t,i} * E_{BSL,SSn,t,i}\right)^2}}{E_{BSL,SS1,t,i} + E_{BSL,SS2,t,i} + ... + E_{BSL,SSn,t,i}}.$$ • X-UNC VMD0017 V2.0 p.6. Equation 4, the subscript "i" is used to denote strata, however in the last parameter within the numerator of the equation, the subscript "i" is not included, see "$Uncertainty_{BSL,\mathbf{SSM},t}$". • X-UNC VMD0017 V2.0 p.6: Equation 4, the dependent variable $Uncertainty_{BSL,SS,t}$ includes in extra space between the "t" and the "y" in the word Uncertainty. • X-UNC VMD0017 V2.0 p.7: Equation 5, the parameter description for $Uncertainty_{BSL,t}$ includes a backslash that appears to be a typo. Further, it is not clear how strata are included within this equation as referenced in the parameter description. • X-UNC VMD0017 V2.0 p.10: Equation 6, the parameter description for $Uncertainty_{P,i,t}$ includes a backslash (or incorrectly italicized capital "I") that appears to be a typo. Additionally, it appears the subscripts in the parameter descriptions include a capital "I" in place of the lower case "i" that represents strata. This may be an autocorrect issue with Microsoft Word. • X-UNC VMD0017 v2.0 p.14: Parameter r^2, this parameter is no longer applied as Eqn 1 has been revised, and no longer includes this parameter. As such it is not clear why this parameter table is included in the revised module. The revised methodology includes multiple minor typographical errors that create confusion when applying equation logic. The methodology must be presented free of typographical errors.	
Corrective Action Request:	Organization shall implement corrective actions to demonstrate conformance with the requirement(s) referenced above. Note: Effective corrective actions focus on addressing the specific occurrence described in evidence above, as well as the root cause to eliminate and prevent recurrence of the non-conformance.
Timeline for Conformance:	Prior to Validation
Evidence Provided by Organization:	In response to this NCR the methodology developer stated: All typographical errors in revised text/equations listed above (and more) have been corrected.
Findings for Evaluation of Evidence:	All noted typographical errors were corrected in the revised documents, as such this NCR is closed.
NCR Status:	Closed
Comments (optional):	No comments

NCR#:	05/12
Standard & Requirement:	VCS Standard 4.8.1
Report Section:	10.2
Description of Non-conformance and Related Evidence:	

In response to the first validators concerns regarding the period of time which uncertainty is calculated, the methodology developer has added clarifying text to p.4 of X-UNC where it now states: *"Note: throughout this module,* ***uncertainty is assessed at time t, which represents uncertainty of emissions taking place in the monitoring period*** *T = t2-t1, as used in module REDD-MF equation 8."* This text directly contradicts the text included within the parameter descriptions where "t" is included in equations. For example, in Equation 2 of the revised X-UNC module, the parameter description for "t" states the following: "1,2,3…t years elapsed since the **start of the REDD VCS project activity**." The revised text within the X-UNC module creates further confusion over how time is represented within the X-UNC module.	
Corrective Action Request:	Organization shall implement corrective actions to demonstrate conformance with the requirement(s) referenced above. Note: Effective corrective actions focus on addressing the specific occurrence described in evidence above, as well as the root cause to eliminate and prevent recurrence of the non-conformance.
Timeline for Conformance:	Prior to Validation
Evidence Provided by Organization:	In response to this NCR the methodology developer stated: Referenced text has been deleted. Consistent with original treatment of uncertainty in X-UNC and REDD-MF, the X-UNC module now produces a cumulative (rather than periodic) uncertainty parameter, $C_{REDD\_ERROR,t*}$ Cumulative uncertainty for REDD project activity ***through*** time *t*; %
Findings for Evaluation of Evidence:	Following the assessment of the first version of the revision, the X-UNC module was further revised to evaluate uncertainty as a cumulative value. In order to do this equation 3 was added to the methodology module: $Uncertainty_{BSL,RATE,t*} = \frac{\sqrt{\sum_{t=1}^{t*}(Uncertainty_{BSL,RATE,t} * \sum_{j=1}^{N}\sum_{i}^{M} A_{BSL,i,j,unplanned,t})^2}}{\sum_{t=1}^{t*}\sum_{j=1}^{N}\sum_{i}^{M} A_{BSL,i,j,unplanned,t}}$ In this equation uncertainty is summed in order to calculate the cumulative uncertainty in the baseline rate of deforestation through time t. This process is consistent with the application of cumulative values throughout the VM0007 modules, and as such this NCR has been fully addressed and is closed.
NCR Status:	Closed
Comments (optional):	No comments

2.5 Observations

Note: Observations are issued for areas that the auditor sees the potential for improvement in implementing standard requirements or in the quality system; observations may lead to direct non-conformances if not addressed. Unlike NCRs, observations are not formally closed. Findings from the Methodology Assessment related to observations are discussed in Appendix A below.

OBS 01/12	Reference Standard & Requirement: VCS AFOLU Requirements Section 4.3.4
Description of findings leading to observation: The revised methodology includes a direct quote from the VCS AFOLU Requirements on p.30 of the VMD0007 BL-UP v3.0. The insertion of this text, along with the subsequent similar text inserted on the following page can potentially lead to future discrepancies with the VCS standard as VCS programmatic documents are updated. In the past Rainforest Alliance has received clarification from the VCSA that it is not appropriate to directly quote VCS standards within methodologies. The rationale for this is that when standard documents are subsequently updated, the methodology may no longer be in conformance with the methodology. As such the VCSA suggest referencing the most current version of an applicable document and not including direct quotations.	
Observation: The Methodology Developer should not include direct quotes from VCS programmatic documents.	

2.6 Actions taken by the Methodology Developer address NCRs (including any resolution of material discrepancy)

Action Taken by Methodology Developer following the issuance of the Draft Report		**Date**
Additional documents submitted to audit team (additional documents listed below)	☒ Yes ☐ No ☐ N/A	13 June 2012 18 June 2012
Additional stakeholder consultation conducted (evidence described below)	☐ Yes ☒ No ☐ N/A	
Additional clarification provided	☒ Yes ☐ No ☐ N/A	13 June 2012
Documents revised (document revision description noted below)	☒ Yes ☐ No ☐ N/A	
GHG calculation revised (evidence described below)	☐ Yes ☒ No ☐ N/A	

Included in the actions taken by the Methodology Developer to address NCRs was the submission of the following revised files:

Ref	**Title, Author(s), Version, Date**	**Electronic Filename**
1a.	TFM Response to RA NCRs, June 2012	RA responses Jun 2012.docx
2a.	X-UNC Version 2, 13 Jun 2012	X_UNCVersion2 13Jun2012.docx
3a.	REDD-MF Version 2, 13 June 2012	REDD-MFVersion2 13Jun2012.docx
4a.	BL-UP Version 3 18 June 2012	BL-UPVersion3 Jun182012
5a.	SCS First Assessors Validation Report, 08 June 2012	VCS-FieldMuseum_VM0007Revision_RPT_060812.pdf

3 Audit Methodology

3.1 Audit Team

Overview of roles and responsibilities:

Auditor(s)	Responsibilities				
	Lead	Desk Review	AFOLU Expert	Report	Senior Internal Review
Jared Nunery	☒	☒	☐	☒	☐
Jeffrey Hayward	☐	☐	☒	☐	☒

Auditor qualifications:

Auditor(s)	Qualifications
Jared Nunery Carbon Technical Specialist	Jared has participated in over 30 forest carbon project and methodology assessments, spanning four continents. In addition he has led the technical review and approval of the first IFM LtPF Methodology under the VCS, and participate in the evaluation of over a half dozen other AFOLU methodologies against the VCS. Before joining the Rainforest Alliance, Jared worked as a member of the Carbon Dynamics Lab at the University of Vermont, where he conducted research on the effects of forest management on carbon sequestration. Jared has published multiple scientific articles on forest carbon dynamics as well as general forest ecological processes. Jared has presented research and guest lectured on the topic of forest management and forest carbon dynamics at over a dozen scientific conferences and universities both within the USA and abroad. Jared has a B.S. in Environmental Sciences from the University of Vermont and earned his M.Sc. in Forestry from the University of Vermont. Jared has extensive experience in forest stand dynamics, forest carbon dynamics, forest mensuration, GHG quantification, forest growth and yield modeling, and wildlife habitat conservation. In addition Jared is a certified lead auditor with the Climate Action Reserve for Forest and Urban Forest projects, and ISO 14001. Jared is also an approved AFOLU IFM Expert with the VCSA.
Jeffrey Hayward Senior Internal Reviewer	Jeff Hayward is Director, Climate Program at the Rainforest Alliance. Based in Washington, DC, he leads a global program active in carbon verification, best practices and standards for climate mitigation and adaptation, REDD+ capacity building, and facilitation of carbon forestry and agroforestry projects. He has 20 years experience working to advance sustainability in natural resource management, particularly through policy mechanisms that harness markets responsibly. For nearly six years he managed the Rainforest Alliance forest certification programs in the Asia-Pacific region from Jakarta, Indonesia. Jeff earned an Msci in forestry, (Univ. of British Columbia, Canada); and a B.A. in Latin American development with a specialization on forestry (Univ. of Washington, USA). In forest certification and carbon verification, he has conducted over 100 assessments or audits. Jeff is a registered AFOLU expert with VCS and lead verifier with Climate Action Reserve.

3.2 Description of the Audit Process

Location/Facility	Date(s)	Length of Audit	Auditor(s)
Rainforest Alliance Office	14 March 2012	1 day	Jared Nunery
Rainforest Alliance Office	15 March 2012	1 day	Jared Nunery
Rainforest Alliance Office	16 March 2012	1 day	Jared Nunery

3.3 Review of Documents

The following documents were viewed as a part of the Methodology Assessment:

Ref	Title, Author(s), Version, Date	Electronic Filename
1	VM0007 REDD Methodology Module REDD Methodology Framework (REDD-MF), The Field Museum and TerraCarbon, 11 March 2012, v2.0	REDD-MFVersion2_03_11_2012.doc
2	VM0007 REDD Methodology Module: Estimation of Baseline Carbon Stock Changes and GHG Emissions from Unplanned Deforestation (BL-UP), The Field Museum and TerraCarbon, 11 March 2012, v3.0	BL-UPVersion3_3_11_12.doc
3	VM0007 REDD Methodology Module: Estimation of Uncertainty for REDD Project Activities, The Field Museum and TerraCarbon, 11 March 2012, v3.0	X_UNCVersion2_03_11_2012.doc
4	Proposed revisions to VCS REDD Methodology VM0007, The Field Museum and TerraCarbon, Feb 2012	Rev Ver2 VM0007 explanations.doc
5	BL rate uncertainty treatment	BL rate uncertainty treatment.xls
6	1. REDD-MF REDD methodology framework rev11Mar2012trkchgs	1. REDD-MF REDD methodology framework rev11Mar2012trkchgs.doc
7	8 BL-UP Unplanned baseline revision The Field Museum rev3_11_12tck changes	8 BL-UP Unplanned baseline revision The Field Museum rev3_11_12tck changes.doc
8	18. X-UNC Uncertainty analysis rev11Mar2012trackedchgs	18. X-UNC Uncertainty analysis rev11Mar2012trackedchgs.doc
9	Transition potential modelling for land cover, Eastman_and Van Fossen, 2005	Eastman_2005_chapter_17.pdf
10	A high resolution land use/cover modelling framework for Europe: Introducing the EU-Clue Scanner 100 model, Lavalle et al., 2011	Carlo_Lavalle_2011.pdf
11	Deforestation projections for carbon-rich peat swamp forests of Central Kalimantan, Indonesia, Fuller et al., 2011	Fuller_2011.pdf
12	Projecting land cover change and avian community responses in rapidly urbanizing environments, Hepinstall et al., 2008	Jeffrey_Hepinstall_2008.pdf
13	An assessment of deforestation models for REDD, Kim, 2010	Kim_2010.pdf
14	Comparing the input, output, and validation maps for several models of land change, Pontius et al, 2008	pontius_etal_2008_ars.pdf
15	Similarity weighted instance-based learning for the generation of transition potentials in land use change modelling, Sangermano et al, 2010	Sangermano_2010
16	First Validator responses 11Mar2012	SCS response 11Mar2012.doc
17	Example of uncertainty calculation 30Mar2012	BL rate uncertainty treatment 30Mar2012.xls
18	18. X-UNC Uncertainty analysis rev30Mar2012	18. X-UNC Uncertainty analysis rev30Mar2012.doc

3.4 Interviews

The following is a list of the people interviewed as part of the audit. The interviewees included those people directly, and in some cases indirectly, involved and/or affected by the project activities.

Audit Date	Name	Title
16 Mar 2012	Christina Magerkurth	Environment, Culture and Conservation, The Field Museum
05 Apr 2012	David Shoch	Director, Forestry and Technical Services, TerraCarbon

12 Jun 2012	Christina Magerkurth	Environment, Culture and Conservation, The Field Museum
12 Jun 2012	David Shoch	Director, Forestry and Technical Services, TerraCarbon

APPENDIX A: Methodology Assessment Findings

Note: Findings presented in this section are specific to the findings resulting from the Methodology Assessment as presented in the Draft Audit Report. Any non-conformances or observations identified during the Methodology Assessment are noted in this section, and specific NCR and OBS tables are included in section 2 of this report for each identified non-conformance and observations. All findings related to audit team review of additional evidence submitted by the Methodology Developer following the issuance of the Draft Audit Report by Rainforest Alliance, is included within section 2 of this report.

1. General Requirements

The methodology shall contain eligibility criteria which are appropriate and adequate.

1.1. Methodologies may employ a modular approach in which a framework document provides the structure of the methodology and separate modules and/or tools are used to perform specific methodological tasks. Such methodologies shall use the *VCS Methodology Template* for the framework document and the *VCS Module Template* for the modules and tools. The framework document shall clearly state how the modules and/or tools are to be used within the context of the methodology. (VCS Standard 4.1)

Findings from Methodology Assessment			
In response to findings from the first validator, the methodology developer has revised the three modules to use the most current VCS Module Template. The REDD-MF module clearly describes how the modules and tools are to be used within the context of the methodology.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

1.2. Methodology revisions are appropriate where a project activity is broadly similar to the project activities eligible under an existing methodology and such project activity can be included through reasonable changes to that methodology. Methodology revisions are also appropriate where an existing methodology can be materially improved. Materially improving a methodology involves comparing the existing and proposed methodologies so as to show that the changes will deliver material improvements that will result in greater accuracy of measurement of GHG emissions reductions or removals, improved conservatism and/or reduced transaction costs.

Methodology revisions shall be prepared using the VCS Methodology Template and shall be managed via the methodology approval process. They may be prepared and submitted to the methodology approval process by the developer of the original methodology or any other entity. (VCS Standard 4.1)

(The VCS Program distinguishes between revisions to VCS methodologies and revisions to approved GHG program methodologies. The requirements for the development and assessment of each are set out in VCS document Methodology Approval Process.)

Findings from Methodology Assessment			
The methodology revision is appropriate given that the project activities are broadly similar to the project activities under the existing VM0007. Revisions are restricted to the calculation of uncertainty in GHG calculations, and the application of models to calculate net project emissions. The revisions do not alter the allowed project types, and as such are an appropriate methodological revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

1.3. As set out in the *VCS Standard*, standards and factors used to derive GHG emissions data as well as any supporting data for baseline scenarios and additionality shall be publicly available and come from a reputable and recognized source, such as *IPCC 2006 Guidelines for National GHG Inventories or the IPCC 2003 Good Practice Guidelines for Land Use, Land-Use Change and Forestry*. (VCS AFOLU Requirements 4.1.2)

Findings from Methodology Assessment
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.

Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

2. Applicability Conditions

There are currently five AFOLU project categories under the VCS Program, as further described below. Proposed methodologies shall fall within one or more of these AFOLU project categories.

2.1. The methodology shall identify the project activities to which it applies and shall establish criteria that describe the conditions under which the methodology can (and cannot, if appropriate) be applied. Any applicability conditions set out in tools or modules used by the methodology shall also apply (VCS Standard 4.3)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

2.2. Where a methodology combines AFOLU project categories, the methodology shall adhere to all sets of requirements pertaining to each and every project category covered, either separating activities, or where activities cannot be separated, taking a conservative approach to each requirement. (VCS AFOLU Requirements 4.1.2)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

2.3. The methodology shall provide a methodological procedure for developing an AFOLU project type accepted VCS AFOLU as defined in section 4.2 of the VCS AFOLU Requirements Version 3.

i. Afforestation, Reforestation and Revegetation (ARR – Section 4.2.1)

ii. Agricultural Land Management (ALM – Section 4.2.2)

iii. Improved Forest Management (IFM – Sections 4.2.3 and 4.2.4)

iv. Reduced Emissions from Deforestation and Degradation (REDD – Sections 4.2.5 – 4.2.9)

v. Peatland Rewetting and Conservation (PRC Sections 4.2.10 – 4.2.13)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

3. Project Boundary

3.1. The methodology shall establish criteria and procedures for describing the project boundary and identifying and assessing GHG sources, sinks and reservoirs relevant to the project and baseline scenarios. Justification for GHG sources, sinks and reservoirs included or excluded shall be provided. (VCS Standards 4.4)

Findings from Methodology Assessment
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. However, se 3.4 below regarding findings related specifically to the identification of SSRs to be included when calculating emission reductions using BL-UP.

Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

3.2. In identifying GHG sources, sinks and reservoirs relevant to the project, the methodology shall set out criteria and procedures for identifying and assessing GHG sources, sinks and reservoirs that are controlled by the project proponent, related to the project or affected by the project (i.e., leakage).

In identifying GHG sources, sinks and reservoirs relevant to the baseline scenario, the methodology shall:

I. Set out criteria and procedures used for identifying the GHG sources, sinks and reservoirs relevant for the project.
II. Where necessary, explain and apply additional criteria for identifying relevant baseline GHG sources, sinks and reservoirs.
III. Compare the GHG sources, sinks and reservoirs identified for the project with those identified in the baseline scenario, to ensure equivalency and consistency. (VCS Standard 4.4)

The relevant carbon pools for AFOLU project categories are aboveground tree biomass (or aboveground woody biomass in ARR and ALM projects), aboveground non-tree biomass (aboveground non-woody biomass in ARR and ALM projects), belowground biomass, litter, dead wood, soil (including peat) and wood products. Methodologies shall include the relevant carbon pools set out in Table 2 of section 4.3.1 of the VCS AFOLU Requirements Version 3. (VCS AFOLU Requirements 4.3.1)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. However, se 3.4 below regarding findings related specifically to the identification of SSRs to be included when calculating emission reductions using BL-UP.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

3.3. Specific carbon pools and GHG sources, including carbon pools and GHG sources that cause project and leakage emissions, may be deemed *de minimis* and do not have to be accounted for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than five percent of the total GHG benefit generated by the project. The methodology shall establish the criteria and procedures by which a pool or GHG source may be determined to be *de minimis*. For example, peer reviewed literature or the CDM A/R methodological tool *Tool for testing significance of GHG emissions in A/R CDM project activities* may be used to determine whether decreases in carbon pools and increases in GHG emissions are *de minimis*. the project description, including identified GHG sources, sinks and reservoirs;

Further, the following GHG sources may be deemed *de minimis* and need not be accounted for:

I. ARR, IFM and REDD: N2O emissions from project activities that apply nitrogen containing soil amendments and N2O emissions caused by microbial decomposition of plant materials that fix nitrogen. ALM projects that apply nitrogen fertilizer and/or manure or plant nitrogen fixing species shall account for N2O emissions;
II. ARR, IFM, REDD and PRC: GHG emissions from the removal or burning of herbaceous vegetation and collection of non-renewable wood sources for fencing of the project area; and,
III. ARR, IFM, REDD and PRC: Fossil fuel combustion from transport and machinery use in project activities. Where machinery use for selective harvesting activities may be significant in IFM project activities as compared to the baseline, emissions shall be accounted for if above *de minimis.*.(VCS AFOLU Requirements 4.3.3)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

3.4. Specific carbon pools and GHG sources do not have to be accounted for if their exclusion leads to conservative estimates of the total GHG emission reductions or removals generated. The methodology shall establish criteria and procedures by which a project proponent may determine a carbon pool or GHG source to be conservatively excluded. Such conservative exclusion may be determined by using tools from an approved GHG program, such as the CDM A/R methodological tool *Procedure to determine when accounting of the soil organic carbon pool may be conservatively neglected in CDM A/R project activities*, or by using peer-reviewed literature. (VCS AFOLU Requirements 4.3.5)

Findings from Methodology Assessment			
The revised methodology includes the following text on p.30 of the VMD0007 BL-UP v3.0: *"To conform with VCS AFOLU guidance 3.2,* *"Where carbon would have been lost in the baseline scenario due to land use conversion or disturbance, GHG emissions from soil carbon, belowground biomass, wood products and dead wood carbon pools generally occur over a period of time following the event. It shall not be assumed that all GHG emissions from these carbon pools in the project categories specified below occur instantaneously or within a short period of time."* *it is conservatively assumed that parameters $C_{BB\_tree,i}$ $C_{SOC,i}$ and $C_{DW,i}$ are equal to zero (i.e. that no emissions take place from these pools in the baseline)."* The insertion of this text, along with the subsequent similar text inserted on the following page includes two issues: 1) In the past Rainforest Alliance has received clarification from the VCSA that it is not appropriate to directly quote VCS standards within methodologies. The rationale for this is that when standard documents are subsequently updated, the methodology may no longer be in conformance with the methodology. As such the VCSA suggest referencing the most current version of an applicable document and not including direct quotations. (**OBS 01/12**) 2) The conservative assumption of zero carbon stocks in $C_{BB\_tree,i}$ $C_{SOC,i}$ *and* $C_{DW,I}$ may be in conformance with the standard, however this creates a contradiction with the REDD-MF module. Specifically in Table 1 of REDD-MF these pools are listed as optional, however in the revised BL-UP module they are assumed to be equal to zero. As such it is not clear how a project developer choosing to include these carbon pools following the guidance of REDD-MF would do so when implementing the revised BL-UP. Recognizing the inter-connected nature of the VM0007 modules, the modules must not contradict one another as is the case with the proposed revisions to BL-UP. (**NCR 01/12**)		
Conformance	Yes ☐	No ☒	N/A ☐
NCR/OBS	**NCR 01/12** **OBS 01/12**		

3.5. Reductions of N2O and/or CH4 emissions are eligible for crediting if in the baseline scenario the project area would have been subject to livestock grazing, rice cultivation, burning and/or nitrogen fertilization (VCS AFOLU Requirements 4.3.5)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

3.6. Reductions of CH4 emissions are eligible for crediting if fire would have been used to clear the land in the baseline scenario. (VCS AFOLU Requirements 4.3.6)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

3.7. Project type specific guidance within the VCS AFOLU Requirements regarding the calculation of SSRs must be met.

I. ARR projects must meet additional criteria outlined in section 4.3.7 of the VCS AFOLU Requirements Version 3;
II. IFM projects must meet additional criteria outlined in sections 4.3.12 – 4.3.15 of the VCS AFOLU Requirements Version 3;
III. REDD projects must meet additional criteria outlined in sections 4.3.16 and 4.3.17 of the VCS AFOLU Requirements Version 3.

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. However, se 3.4 above regarding findings related specifically to the identification of SSRs to be included when calculating emission reductions using BL-UP.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

4. Procedures for Demonstrating Additionality

4.1. The methodology shall establish a procedure for the demonstration and assessment of additionality based upon the requirements set out in the VCS Standard Version 3 section 4.6. Note that such requirements are for methodology development, and projects shall demonstrate and assess additionality in accordance with the requirements set out in the applied methodology. (VCS Standard 4.6)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

5. Procedures for Determining the Baseline Scenario:

5.1. The methodology shall establish criteria and procedures for identifying alternative baseline scenarios and determining the most plausible scenario, taking into account the following:

I. The identified GHG sources, sinks and reservoirs.
II. Existing and alternative project types, activities and technologies providing equivalent type and level of activity of products or services to the project.
III. Data availability, reliability and limitations.
IV. Other relevant information concerning present or future conditions, such as legislative, technical, economic, socio-cultural, environmental, geographic, site-specific and temporal assumptions or projections. (VCS Standard 4.5)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. However, see findings in 5.3 of this report regarding revisions to spatial location analysis in baseline deforestation projections.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

5.2. The determination and establishment of a baseline scenario shall follow an internationally accepted GHG inventory protocol, such as the *IPCC 2006 Guidelines for National GHG Inventories*. (VCS AFOLU Requirements 4.4.1)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. However, see findings in 5.3 of this report regarding revisions to spatial location analysis in baseline deforestation projections.			
Conformance	Yes ☒	No ☐	N/A ☐

NCR/OBS	No NCR/OBS raised

5.3. The methodology must all project type specific requirements detailed in section 4.4 of the VCS AFOLU Requirements Version 3. Specifically,

I. ARR projects have no specific baseline scenario requirements;
II. ALM projects must meet additional criteria outlined in sections 4.4.3 and 4.4.4 of the VCS AFOLU Requirements Version 3;
III. IFM projects must meet additional criteria outlined in section 4.4.5 of the VCS AFOLU Requirements Version 3;
IV. REDD projects must meet additional criteria outlined in sections 4.4.6 and 4.4.7 and additional relevant sub-project type requirements outlined in 4.4.8 of the VCS AFOLU Requirements Version 3.
V. PRC projects must meet additional criteria outlined in sections 4.4.9 – 4.4.12 of the VCS AFOLU Requirements Version 3.

Findings from Methodology Assessment

Section 4.4.8.2.a of the VCS AFOLU Requirements states that methodologies shall set out criteria and procedures to identify where deforestation would likely occur using spatial analysis and projections. Two of the proposed revisions impact the existing methodology's conformance with the VCS AFOLU Requirements. Below are findings related to these two issues:

Removal of the exclusion of the use of neural networks in step 3.1.1 of BL-UP

In step 3.1.1 of BL-UP v2.0, the methodology explicitly disallows the use of neural networks, recongnizing that these types of models can be used as "black box" models, where data processing is not transparent making verification of the application of models difficult. The revised version of the methodology removes the explicit exclusion of neural network models, and has added in the following text:

"To be transparent, the modeling system should be able to provide feedback on the relative contribution of explanatory variables and provide skill measurements through comparison with a validate data set."

Given the rationale for the exclusion of neural networks being the lack of transparency associated with the use of these models, it is not clear how the added text addressing this concern. Further, the methodology developer provided supporting literature references which confirm the applicability of neural networks for modelling complicated dynamics such as spatially projecting deforestation (see Docs 9, 13 and 15 which were reviewed and found to confirm the applicability of neural networks). However, the added text does not address the transparency concerns associated with the use of neural networks. Although VCS methodologies are non-precedence setting, examples of how other methodologies have addressed this issue can be seen in VM0015 which allows the use of neural network models, however the methodology includes specific requirements to ensure transparency (e.g. require calibration in section 4.2.3 p.62 and model justification on the bottom of p.57). Specifically what the revised methodology fails to address are necessary requirements to ensure transparent use of neural networks such as, but not limited to:

- Description of any supervised learning applied in model calibration to the project area and/or reference region;
- Required justification for the use of the applied methodology;
- Required listing of all assumptions applied when using the model; and,
- Required listing of all sources of independent parameters applied in modelling.

Neural network models may be appropriate for the use in projecting spatial location of deforestation when applying BL-UP, however the methodology must include safeguards to ensure that the VCS principle of transparency is fully met. The revised methodology does not include sufficient guidance and requirements to ensure the transparent application of neural network models, as such this revision is not found to be in conformance with the VCS AFOLU Requirements. (**NCR 02/12**)

Removal of Figure of Merit thresholds from step 3.3 of BL-UP

In the previous version of the methodology, specific thresholds for frontier and mosaic configurations were given (40% and 80% respectively), based on citations from Brown et al. 2007 and Harris et al. 2008. The revised methodology has removed these thresholds (which it should be noted are used as a reference mark in other VCS methodologies such as VM0015) and replaced the requirement with a project specific FOM threshold. The revised methodology required the defined net observed change in the reference region for the "calibration period of the model" to be used as the threshold. This is based on a number of studies (see Docs 10-14 which were reviewed by the audit team) which conclude that the previously defined thresholds are unrealistic. Most notably, Pontius et al. 2008 concluded that the most significant relationship with model predictive accuracy was the amount of observed net change in the reference maps (e.g. the more observed net change the greater the model accuracy and

subsequent FOM). As such the revised methodology sets the minimum threshold of observed net change for the RR. Further, the revised methodology includes the following caveat:

"If the FOM value is below this threshold, project proponents should provide evidence that the FOM achieved is consistent with comparable studies given the nature of the project area and the data available."

This revision allows for greater flexibility in model use. The revision does not increase the conservatism of the methodology, however as the methodology developer highlights in their comments within Doc 4, the previous FOM thresholds were not realistically achievable for many projects, as noted in the referenced documents. The greatest challenge would be for those projects that have experienced little net observed change within the reference period, as Pontius et al. 2008 noted the challenges in obtaining a strong FOM in these situations. Following the review of the referenced documents the audit team has found the revised threshold which is determined on a project specific case to be appropriate. However, the term "calibration period" is not explicitly defined within BL-UP. As this term is critical to the quantification of the FOM threshold, the methodology must clearly define this period. For example, it is not clear if this period applies to the initial calibration of the model or the calibration of the model each time the baseline is re-evaluated. The revised methodology does not clearly define the "calibration period" within the current revised text. (**NCR 03/12**)

Conformance	Yes ☐	No ☒	N/A ☐
NCR/OBS	**NCR 02/12** **NCR 03/12**		

6. Baseline and Project Emissions/Removals:

6.1. Methodologies shall establish procedures to quantify the GHG emissions or removals for the project and baseline scenario. *The IPCC 2006 Guidelines for National GHG Inventories* or the *IPCC 2003 Good Practice Guidance for Land Use, Land-Use Change and Forestry* shall be used as guidance for quantifying increases or decreases in carbon stocks and GHG emissions. The IPCC Guidelines shall also be followed in terms of quality assurance/quality control (QA/QC) and uncertainty analysis. (VCS AFOLU Requirements 4.5.1)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's quantification of carbon stocks, as such this criterion is not applicable to the methodology revision. Note that modules related to carbon pool quantification (e.g. CP-AB, CP-D, CP-L, CP-S, and CP-W were not included in the revisions. It should be noted that in order to demonstrate conformance with the revised requirements of section 4.5.3 of VCS Version 3 AFOLU Requirements v3.2, the REDD-MF module has been revised to exclude carbon stocks in belowground live, deadwood, and soil carbon (see Table 1 in the revised REDD-MF module). By excluding these pools from accounting when applying the BL-UP module, the methodology conforms with the revised v3.2 requirements for carbon stock accounting.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

6.2. The *IPCC 2006 Guidelines for National GHG Inventories* may be referenced to establish procedures for quantifying GHG emissions/removals associated with the following carbon pools including:

I. Litter;
II. Dead wood;
III. Soil (methodologies may follow the IPCC guidelines for the inclusion of soil carbon, including the guidelines that are in sections not related to forest lands); and
IV. Belowground biomass (estimated using species-dependent root-to-shoot ratios, the Mokany et al.[2] ratios and equations, or the Cairns equations). (VCS AFOLU Requirements 4.5.2)

Findings from Methodology Assessment
The revised methodology does not result in a material change in the pre-existing methodology's quantification of carbon stocks, as such this criterion is not applicable to the methodology revision. Note that modules related to carbon pool quantification (e.g. CP-AB, CP-D, CP-L, CP-S, and CP-W were not included in the revisions.

[2] Mokany, K., Raison, R. J., and Prokushkin, A. S. 2006. *Critical analysis of root:shoot ratios in terrestrial biomes*. Global Change Biology 12: 84-96

It should be noted that in order to demonstrate conformance with the revised requirements of section 4.5.3 of VCS Version 3 AFOLU Requirements v3.2, the REDD-MF module has been revised to exclude carbon stocks in belowground live, deadwood, and soil carbon (see Table 1 in the revised REDD-MF module). By excluding these pools from accounting when applying the BL-UP module, the methodology conforms with the revised v3.2 requirements for carbon stock accounting.

Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

6.3. Where ARR or IFM projects include harvesting, the loss of carbon due to harvesting shall be included in the quantification of project emissions. The maximum number of GHG credits available to projects shall not exceed the long-term average GHG benefit. The GHG benefit of a project is the difference between the project scenario and the baseline scenario of carbon stocks stored in the selected carbon pools and adjusted for any project emissions of N2O, CH4 and fossil-derived CO2, and leakage emissions. The long-term average GHG benefit shall be calculated using the procedure outlined in section 4.5.3 of the VCS AFOLU Requirements Version 3. (VCS AFOLU Requirements 4.5.3)

Findings from Methodology Assessment			
Modules are only applicable for REDD projects.			
Conformance	Yes ☐	No ☐	N/A ☒
NCR/OBS	Not applicable		

6.4. IFM projects only: Procedures for quantifying GHG emissions/removals in selected carbon pools may reference the *IPCC 2006 Guidelines for National GHG Inventories* section on *forests remaining as forests*. (VCS AFOLU Requirements 4.5.9)

Findings from Methodology Assessment			
Modules are only applicable for REDD projects.			
Conformance	Yes ☐	No ☐	N/A ☒
NCR/OBS	Not applicable		

6.5. IFM projects only: Procedures for quantifying GHG emissions/removals in wood products may reference Skog et al. 2004 or other sources published in scientific peer-reviewed literature. (VCS AFOLU Requirements 4.5.10)

Findings from Methodology Assessment			
Modules are only applicable for REDD projects.			
Conformance	Yes ☐	No ☐	N/A ☒
NCR/OBS	Not applicable		

6.6. **IFM projects only:** Where biomass is burned as part of the slash removal after harvesting, or nitrogen fertilizer is used, methodologies may reference *IPCC 2006 Guidelines for National GHG Inventories* for the quantification of such GHG emissions. (VCS AFOLU Requirements 4.5.11)

Findings from Methodology Assessment			
Modules are only applicable for REDD projects.			
Conformance	Yes ☐	No ☐	N/A ☒
NCR/OBS	Not applicable		

6.7. **IFM projects only:** Where IFM projects include harvesting, the loss of carbon due to harvesting shall be included in the quantification of project emissions. The maximum number of GHG credits available to projects shall not exceed the long-term average GHG benefit, as set out in Section 4.5.3. (VCS AFOLU Requirements 4.5.12)

Findings from Methodology Assessment

Modules are only applicable for REDD projects.			
Conformance	Yes ☐	No ☐	N/A ☒
NCR/OBS	Not applicable		

6.8. **REDD projects only:** Procedures for quantifying GHG emissions/removals in all selected carbon pools may reference *IPCC 2006 Guidelines for National GHG Inventories* sections on *conversion of forest to non-forest* (for deforestation) and *forests remaining as forest* (for degradation). (VCS AFOLU Requirements 4.5.13)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note that modules related to carbon pool quantification (e.g. CP-AB, CP-D, CP-L, CP-S, and CP-W were not included in the revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

6.9. **REDD projects only:** Procedures for quantifying GHG emissions/removals in long-lived wood products (e.g., wood products lasting longer than five years) may reference published scientific peer-reviewed literature (such as Skog et al. 2004). (VCS AFOLU Requirements 4.5.14)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note CP-W was not included in revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

7. Leakage

The methodology shall contain an approach for calculating leakage that is appropriate and adequate.

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

I. Market leakage occurs when projects significantly reduce the production of a commodity causing a change in the supply and market demand equilibrium that results in a shift of production elsewhere to make up for the lost supply.
II. Activity shifting leakage occurs when the actual agent of deforestation and/or degradation moves to an area outside of the project boundary and continues their deforesting activities elsewhere.
III. Ecological leakage occurs in PRC projects where a project activity causes changes in GHG emissions or fluxes of GHG emissions from ecosystems that are hydrologically connected to the project area. (VCS AFOLU Requirements 4.6.1)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

7.2. Leakage that is determined, in accordance with Section 4.3.3 of the VCS AFOLU Requirements Version 3, to be below *de minimis* (ie, insignificant) does not need to be included in the GHG emissions accounting. The significance of leakage may also be determined using the CDM A/R methodological tool *Tool for testing significance of GHG Emissions in A/R CDM Project Activities*. (VCS AFOLU Requirements 4.6.2)

Findings from Methodology Assessment
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion,

as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

7.3. GHG emissions from leakage may be determined either directly from monitoring, or indirectly when leakage is difficult to monitor directly but where scientific knowledge provides credible estimates of likely impacts. The GHG credit calculation table provided in Section 4.7 of the VCS AFOLU Requirements Version 3 includes an example of indirect leakage accounting. (VCS AFOLU Requirements 4.6.3)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

7.4. Projects shall account for market leakage where the production of a commodity (eg, timber) is significantly affected by the project. The significance of timber production is determined as set out in Section 4.3.3 of the VCS AFOLU Requirements Version 3 or as set out in Section 4.6.15 of the VCS AFOLU Requirements Version 3. (VCS AFOLU Requirements 4.6.4)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

7.5. Leakage occurring outside the host country (international leakage) does not need to be quantified. (VCS AFOLU Requirements 4.6.5)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

7.6. Where leakage mitigation measures include tree planting, agricultural intensification, fertilization, fodder production, and/or other measures to enhance cropland and/or grazing land areas, then any significant increase in GHG emissions associated with these activities shall be accounted for, unless deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4). (VCS AFOLU Requirements 4.6.6)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

7.7. Projects shall not account for positive leakage (ie, where GHG emissions decrease or removals increase outside the project area due to project activities). (VCS AFOLU Requirements 4.6.7)

Findings from Methodology Assessment

The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

7.8. Additional project type specific requirements relevant to leakage calculations must be met.

I. ARR projects must meet requirements outlined in sections 4.6.8 and 4.6.9 of the VCS AFOLU Requirements Version 3.
II. IFM Projects must meet requirements outlined in sections 4.6.13 and 4.6.14.
III. REDD projects must meet requirements outlined in sections 4.6.15 and 4.6.16.

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

8. Quantification of Net GHG Emission Reductions and Removals

8.1. The methodology shall establish criteria and procedures for quantifying GHG emissions and/or removals for the selected GHG sources, sinks and/or reservoirs, separately for the project (including leakage) and baseline scenarios. (VCS Standard 4.7)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the leakage modules were not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

8.2. Methodologies shall establish procedures for quantifying net GHG emission reductions and removals (the net GHG benefit), which shall be quantified as the difference between the GHG emissions and/or removals from GHG sources, sinks and carbon pools in the baseline scenario and the project scenario. The GHG emissions and/or removals in the project scenario shall be adjusted for emissions resulting from project activities and leakage. Methodologies shall also establish procedures for quantifying the net change in carbon stocks, so that the number of buffer credits withheld in the AFOLU pooled buffer account and market leakage emissions may be quantified for the project. (VCS AFOLU Requirements 4.7.1)

Findings from Methodology Assessment			
Step 5 of the REDD-MF module was not altered from the previous version of the module. Revisions with this module did not impact the methodology's conformance with this criterion.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

8.3. The number of GHG credits issued to projects is determined by subtracting out the buffer credits from the net GHG emission reductions or removals (including leakage) associated with the project. The buffer credits are calculated by multiplying the non-permanence risk rating (as determined by the *AFOLU Non-Permanence Risk Tool*) times the change in carbon stocks only. The full rules and procedures with respect to assignment of buffer credits are set out in the VCS document *Registration and Issuance Process*. This calculation process is illustrated in the example in section 4.7.2 of the VCS AFOLU Requirements Version 3. (VCS AFOLU Requirements 4.7.2)

Findings from Methodology Assessment

Step 5.a of the REDD-MF module was not altered from the previous version of the module. Revisions with this module did not impact the methodology's conformance with this criterion.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

9. Monitoring

9.1. The methodology shall establish criteria and procedures for monitoring, and specify the data and parameters to be monitored, as set out in the VCS Standard. At a minimum the methodology shall establish criteria and procedures for monitoring which shall cover the following (as required by section 4.8.2 of the VCS Standard Version 3):

I. Purpose of monitoring.
II. Monitoring procedures, including estimation, modeling, measurement or calculation approaches.
III. Procedures for managing data quality.
IV. Monitoring frequency and measurement procedures. (VCS Standard 4.8.2)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the monitoring module was not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

9.2. Leakage shall be monitored as set out in Section 4.6 of the VCS AFOLU Requirements Version 3. (VCS AFOLU Requirements 4.8.2)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Note the monitoring module was not included in the proposed revisions.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

Note: The monitoring methodology and results will determine the ex-post emissions estimation for the baseline, project emissions and leakage which are assessed in the sections above.

10. Data and parameters

10.1. The methodology shall describe the data and parameters to be reported, including sources of data and units of measurement.

Standards and factors used to derive GHG emission data shall meet the following requirements (as outlined in section 4.8.1 of the VCS Standard Version 3):

I. Be publically available from a reputable and recognized source (e.g., IPCC, published government data, etc.)
II. Be reviewed as part of its publication by recognized competent organization.
III. Be appropriate for the GHG source or sink concerned.
IV. Be current at the time of quantification. (VCS Standard 4.8.1)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

10.2. When highly uncertain data and information are relied upon, conservative values shall be selected that ensure that the quantification does not lead to an overestimation of net GHG emission reductions or removals. (VCS Standard 4.8.1)

Findings from Methodology Assessment
Three modules were revised as part of the methodology revision (REDD-MF, BL-UP, and X-UNC). All three modules included revisions to the methodological process for how uncertainty is quantified throughout the GHG quantification process. In previous versions of the methodology, uncertainty was calculated as a cumulative total based on each step of the GHG quantification. The previous version of the methodology required project developers to use the lower bounds of the 95% confidence interval to increase conservativeness of uncertain data. The revised methodology modules utilize an alternative approach where uncertainty is applied to the "total net GHG emission reductions" at a specific time point, rather than the cumulative uncertainty for the time period. Below are findings related to these revisions: Introduced typographical errors in revised text/equations: • REDD-MF VM0007 V2.0 p.20: In the paragraph immediately above equation 10, the word "The" is missing from the line "adjusted value for $C_{REDD,t}$ to account for uncertainty shall be calculated as:" • X-UNC VMD0017 V2.0 p.4: Equation 2: Subscript labels are included within the equation, however the labels are not included as actual subscripts. Further, the dependent variable, $Uncertainty_{BSL,RATE,t}$ is included twice. • X-UNC VMD0017 V2.0 p.6: Equation 3 has been revised to include the subscript "t" in each parameter to reflect the time specific calculation of each parameter. However, not all of the parameter descriptions immediately following equation 3 have not been updated to reflect the addition of the "t" subscript (see $U_{BSL,SS,i}$ and $E_{BSL,SS,i}$). Further in the numerator, the commas in the subscripts of the second $E_{BSL,SS,i}$ parameter appear to incorrect, see: $$\text{Uncertainty}_{BSL,SS,t,i} = \frac{\sqrt{\left(U_{BSL,SS1,t,i} * E_{BSL,SS1,t,i}\right)^2 + \left(U_{BSL,SS2,t,i} * E_{BSL,SS2,,ti}\right)^2 + ... + \left(U_{BSL,SSn,t,i} * E_{BSL,SSn,t,i}\right)^2}}{E_{BSL,SS1,t,i} + E_{BSL,SS2,t,i} + ... + E_{BSL,SSn,t,i}}.$$ • X-UNC VMD0017 V2.0 p.6. Equation 4, the subscript "i" is used to denote strata, however in the last parameter within the numerator of the equation, the subscript "i" is not included, see "$Uncertainty_{BSL,\mathbf{SSM},t}$". • X-UNC VMD0017 V2.0 p.6: Equation 4, the dependent variable $Uncertainty_{BSL,SS,t}$ includes in extra space between the "t" and the "y" in the word Uncertainty. • X-UNC VMD0017 V2.0 p.7: Equation 5, the parameter description for $Uncertainty_{BSL,t}$ includes a backslash that appears to be a typo. Further, it is not clear how strata are included within this equation as referenced in the parameter description. • X-UNC VMD0017 V2.0 p.10: Equation 6, the parameter description for $Uncertainty_{P.i,t}$ includes a backslash (or incorrectly italicized capital "I") that appears to be a typo. Additionally, it appears the subscripts in the parameter descriptions include a capital "I" in place of the lower case "i" that represents strata. This may be an autocorrect issue with Microsoft Word. • X-UNC VMD0017 v2.0 p.14: Parameter r^2, this parameter is no longer applied as Eqn 1 has been revised, and no longer includes this parameter. As such it is not clear why this parameter table is included in the revised module. The revised methodology includes multiple minor typographical errors that create confusion when applying equation logic. The methodology must be presented free of typographical errors. (**NCR 04/12**) Calculation of uncertainty for time intervals: In response to the first validators concerns regarding the period of time which uncertainty is calculated, the methodology developer has added clarifying text to p.4 of X-UNC where it now states: *"Note: throughout this module,* ***uncertainty is assessed at time t, which represents uncertainty of emissions taking place in the monitoring period*** *T = t2-t1, as used in module REDD-MF equation 8."* This text directly contradicts the text included within the parameter descriptions where "t" is included in equations. For example, in Equation 2 of the revised X-UNC module, the parameter description for "t" states the following: "1,2,3…t years elapsed since the **start of the REDD VCS project activity**."

The revised text within the X-UNC module creates further confusion over how time is represented within the X-UNC module. (**NCR 05/12**)

Omission of required use of lower confidence bounds:

In the previous version of the methodology, when using the population driver alternate approach detailed in BL-UP the project developer was required to use the lower bound of the 95% interval for multiple parameters. The revised methodology has removed these requirements in relation to DP_i in section 2.1.1, model results from Step 2.1.2.2 (Dynamic analysis), and model results from Step 2.1.2.3 (Static analysis). The rationale for the removal of these requirements is provided in Doc 4 where the methodology developer describes the double counting of uncertainty in the baseline rate calculation when using the alternate population driver approach. In order to illustrate the function of the revised approach, the methodology developer provided an example quantification of uncertainty when applying the population driver approach. The logic and quantification was explained by the methodology developer during an interview on 05 April 2012. Specifically, the revised approach includes quantification logic for the propagation of errors when applying multiple regression models from RRD subsets. The revise approach was found to be an appropriate estimate of uncertainty.

Review of this approach found that as uncertainty is calculated through the use of the X-UNC strata, this approach is appropriate given that modelled DP must be qualitatively evaluated through local expert opinion or reference to literature values. As such the revised removal of this requirement is found to be appropriate.

Conformance	Yes ☐	No ☒	N/A ☐
NCR/OBS	**NCR 04/12** **NCR 05/12**		

10.3. Metric tonnes shall be used as the unit of measure and the quantity of each type of GHG shall be converted to tonnes of CO2e. Consistent with UNFCCC accounting, the six Kyoto Protocol greenhouse gases shall be converted using 100 year global warming potentials derived from the IPCC's Second Assessment Report (which are also available and reprinted in the Fourth Assessment Report). Ozone-depleting substances shall be converted using 100 year global warming potentials from the Fourth Assessment Report, which provides a full set of factors relevant to ODS methodologies and projects. (VCS Standard 4.8.1)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

10.4. The methodology shall present equations in a clear, consistent, mathematically correct format which allows data to be traced through them. (Relevant to the VCS principles of transparency and accuracy)

Findings from Methodology Assessment			
The revised methodology does not result in a material change in the pre-existing methodology's conformance with this criterion, as such this criterion is not applicable to the methodology revision. Although the revisions to the three modules included several altercations to the equations, the revised equations maintain a clear, consistent and mathematically correct format. However see findings in 10.3 above specific to minor typographical errors that must be corrected.			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised		

10.5. Quality management procedures to manage data and information shall be applied and established. Where applicable, procedures to account for uncertainty in data and parameters shall be applied in accordance with the requirements set out in the methodology (as outlined in section 3.17.1 of the VCS Standard Version 3).

Findings from Methodology Assessment
See findings in 10.2 above regarding revisions to the uncertainty calculations within the revised modules.

Conformance	Yes ☐	No ☒	N/A ☐
NCR/OBS	See NCRs related to uncertainty in section 10.2 above.		

10.6. Methodologies shall clearly state the assumptions, parameters and procedures that have significant uncertainty, and describe how such uncertainty shall be addressed. Where applicable, methodology elements shall provide a means to estimate a 95 percent confidence interval. Where the width of the confidence interval exceeds 30% of the estimated value, an appropriate confidence deduction shall be applied. Methods used for estimating uncertainty shall be based on recognized statistical approaches such as those described in the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Confidence deductions shall be applied using conservative factors such as those specified in the CDM Meth Panel guidance on addressing uncertainty in its Thirty Second Meeting Report, Annex 14. (VCS standard 4.1)

Findings from Methodology Assessment			
See findings in 10.2 above regarding revisions to the uncertainty calculations within the revised modules.			
Conformance	Yes ☐	No ☒	N/A ☐
NCR/OBS	See NCRs related to uncertainty in section 10.2 above.		

11. Adherence to the project-level principles of the VCS Program:

The methodology shall adhere to the project-level principles of the VCS Program (VCS Standard Version 3; Section 2.4), for a list of the full principals see section 1.2 of this report.

11.1. The methodology shall be compatible with the VCS project level principles, as explained in more detail in section 1.3 of this report. These principles are relevancy, completeness, consistency, accuracy, transparency and conservativeness.

Findings from Methodology Assessment			
As noted in findings above, several nonconformances related to transparency in the modelling of spatial location of predicted deforestation must be addressed prior to the approval of the revised methodology.			
Conformance	Yes ☐	No ☒	N/A ☐
NCR/OBS	See NCRs identified above.		

12. Relationship to approved or pending methodologies

12.1. The methodology developer shall list all approved or pending methodologies, under the VCS or an approved GHG program, that fall under the same sectoral scope or same AFOLU project category 4 or combination of sectoral scopes or AFOLU project categories, as applicable. The list shall include, at a minimum, all such methodologies that are available sixty days before the proposed methodology is submitted to the VCSA for public consultation. Such list of methodologies ("listed methodologies") shall contain the methodology name and reference number, and the GHG program under which it is approved or pending. (VCS Methodology Approval 5.2.1.1)

Findings from Methodology Assessment			
On 03 April 2012, the VCSA provided clarification that sections 5.2.1.1 and 5.2.1.2 of the VCS MAP are not applicable to methodology revisions. As such it is not required for the revised modules to address these criteria. Further, the VCS clarified the scope of the revision is restricted to the BL-UP and X-UNC modules. The REDD-MF module was also revised, however this was revised to ensure conformance of the revisions of X-UNC with the module framework, and as such it is not within the scope of the evaluation to assess REDD-MF in full against the VCS Version 3 standard (e.g. section 5.2.1.1 of the MAP). As such the revisions to BL-UP and X-UNC are not applicable to this criterion.			
Conformance	Yes ☐	No ☐	N/A ☒
NCR/OBS	Not applicable		

12.2. The methodology developer shall state whether, and explain how, the proposed methodology uses, includes, refers to or relies upon all or part of any of the listed methodologies. Where it does, the methodology developer shall demonstrate that none of the identified methodologies ("similar methodologies") could have been

reasonably revised (ie, developed as a methodology revision) to meet the objective of the proposed methodology. The onus is upon the methodology developer to demonstrate that a methodology revision would not have been more appropriate, failing which the proposed methodology shall not receive a positive assessment from the validation/verification body. Examples are provided in the VCS Methodology Approval Process document. (VCS Methodology Approval 5.2.1.2)

New methodologies shall not be developed where an existing methodology could reasonably be revised (developed as a methodology revision) to meet the objective of the proposed methodology, as set out in VCS document *Methodology Approval Process*. (VCS Standard 4.1)

Findings from Methodology Assessment			
See findings in 12.1 above.			
Conformance	Yes ☐	No ☐	N/A ☒
NCR/OBS	Not applicable.		

12.3. The methodology developer shall document the above in the relevant section of the methodology document, such document being subject to public consultation and independent assessment by two validation/verification bodies. Where either of the validation/verification bodies is unable to conclude that any approved or pending methodology under the VCS Program or an approved program could not have been reasonably revised to meet the objective of the proposed methodology, in accordance with the procedure set out above, it shall not grant the methodology element a positive assessment. (VCS Methodology Approval 5.2.1.2)

Findings from Methodology Assessment			
See findings in 12.1 above.			
Conformance	Yes ☐	No ☐	N/A ☒
NCR/OBS	Not applicable.		

13. Stakeholder Comments

13.1. The Methodology shall be posted for public comment in accordance with VCS guidelines. The methodology developer shall demonstrate how it has taken due account of all and any such comments.

Comment	Meth Reference	Project Proponent Response	Rainforest Alliance Response
No comments received	N/A	N/A	N/A

Findings from Methodology Assessment			
The public consultation period was completed during 06 March tp April 4th, 2012. During the public comment period, the VCSA has confirmed that no public comments were received. This was confirmed by reviewing the VCSA website where VMD0017 was posted for public comment (http://www.v-c-s.org/methodologies/revision-redd-methodology-module-vmd0017), and where VMD0007 was posted for public comment (http://www.v-c-s.org/methodologies/revisions-redd-methodology-modules-vmd0007-and-vmd0017).			
Conformance	Yes ☒	No ☐	N/A ☐
NCR/OBS	No NCR/OBS raised.		