Methodology Assessment Report: 
Baseline and Monitoring Methodology for Avoiding Planned Deforestation of Undrained Peat Swamp Forests

Baseline and Monitoring Methodology for Avoiding Planned Deforestation of Undrained Peat Swamp Forests

Version 7.0

- Methodology

Sectoral Scope(s): 14
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<td><strong>Report Version</strong></td>
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<td>VCS Standard v3.2 and associated documents as described in Section 1.3</td>
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<td>Terra Global Capital LLC</td>
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</tbody>
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Carly Green, Technical Expert  
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Summary:

This report documents the first assessment of the proposed VCS methodology “Baseline and Monitoring Methodology for Avoiding Planned Deforestation of Undrained Peat Swamp Forests,” developed by Terra Global Capital LLC. The methodology includes criteria for estimating baseline and project scenario emissions from avoided conversion of production peat swamp forests based on legally approved conversion rates or historical deforestation rates observed in a proxy area. It includes procedures for estimating emissions from peat burning, peat oxidation, peat drainage, rice production, agricultural intensification, and biomass removal, as well as carbon stock changes in the aboveground tree, aboveground non tree, belowground, dead woos, soil organic carbon, and long lived wood products pools. The assessment was carried out by Scientific Certification Systems and used the Verified Carbon Standard Version 3.2 and its supporting documents as criteria. SCS used document review and interviews with the methodology developers as a method for the assessment and issued findings in the form of new information requests, opportunities for improvement, and non-conformance reports during the assessment process. These findings were responded to by the methodology developer, which led to revisions in the methodology throughout the process. At this time, all findings have been adequately responded to, and it is the opinion of SCS that the methodology complies with all of the assessment criteria, and the assessment team has no restrictions or uncertainties with respect to the compliance of the methodology element with the assessment criteria.
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1 INTRODUCTION

1.1 Objective

- Assess conformance of the new methodology with VCS Standards.
- Evaluate the new methodology based on guidance given under the Verified Carbon Standard Program, including an assessment of VCS program requirements and the following: eligibility criteria, baseline approach, additionality, project boundary, emissions, leakage, monitoring, data and parameters, and adherence to the project-level principles of the VCS program.
- Determine the need for clarification or requests for change to the proposed new methodology.
- Determine approval status in the first independent assessment of the double approval process.

1.2 Scope and Criteria

The scope of this report encompasses an assessment for the new methodology against the following requirements of the Verified Carbon Standard (VCS):

- VCS Standard Version 3.2
- VCS AFOLU Requirements Version 3.2

The assessment was performed using the client-supplied new methodology and other supporting documentation.

The assessment process involved:

- Assessment of the conformance of the new methodology with VCS standards;
- Assessment of new methodology based on the VCS “Scope of Assessment of New Methodologies”;
- Assessment of the new methodology related to the determination of the baseline scenario;
- Evaluation of the new methodology related to the selection of relevant GHG sources, sinks, and reservoirs for monitoring or estimation;
- Evaluation of the new methodology related to the quantification of GHG emissions and/or removals;
- Evaluation of the new methodology related to the quantification of overall GHG emission reductions and removal enhancements;
- Assessment of the new methodology related to management systems and data handling;
- Assessment of the new methodology related to the determination of leakage and additionality; and
- Development of an Assessment Report.

1.3 Summary Description of the Methodology Element

The methodology applies to projects that seek to reduce deforestation and degradation on undrained peat swamp forests and falls under the combined AFOLU category of Reducing Emissions from Deforestation and Degradation (REDD) and Conservation of Undrained or Partially Drained Peatland (CUPP) i.e. REDD+CUPP. The methodology developer provides the following summary description of the methodology (taken from section 2 of the methodology document):

This methodology sets out the project conditions and carbon accounting procedures for activities aimed at reducing emissions from deforestation and forest degradation in peat swamp forests and avoiding planned peatland drainage, and therefore falls under the combined AFOLU category of
Reducing Emissions from Deforestation and Degradation (REDD) and Conservation of Undrained or Partially Drained Peatland (CUPP) i.e. REDD+CUPP. Only one other applicable methodology exists for REDD+CUPP projects. The proposed methodology differs in some key aspects which may limit the adoptability of the existing avoided planned peat swamp conversion methodology. More specifically, this methodology offers more flexibility in estimating the baseline deforestation rates, includes a procedure to apply hierarchical forest transition to model the conversion process, uses geostatistical techniques to interpolate peat depths between sampling points, and allows for some small-scale deforestation and forest to be present in the project area. Furthermore, this methodology is developed to be compatible with the new VCS PRC guidelines and uses an internationally accepted definition of peat i.e., containing minimum of 30% organic matters and depth of at least 30 cm (as defined by the Internal Peat Society). The main methodological aspects of the methodology are:

- The project area must be a production forest i.e. forest land designated for production purposes.
- Baseline emissions in the project area are calculated based on either legally approved conversion rates or empirically measured historical deforestation rates observed in a reference region similar to the project area.
- Emissions from non-peat carbon stock densities are quantified by subtracting carbon densities under the project and baseline scenario. Carbon densities for non-peat components are quantified on permanent sampling plots on forest lands or temporary sampling plots on non-forest lands. Emissions from peat carbon stock densities are quantified by measuring or extrapolating the difference in water table and peat subsidence between the project and baseline scenarios. The total net emission reductions are discounted based on the attained precision of biomass, water table, and peat subsidence measurements. If the emissions cannot be measured with sufficient precision, the project is not eligible.
- Potential emissions from primary leakage are monitored and quantified. If applicable, market-effect leakage must be accounted for within each PD, according to the rules set forward within the VCS guidance.
- While assisted reforestation is not allowed under the VCS AFOLU guidance for REDD projects, natural reforestation and regeneration must be included in the baseline and project scenarios. This is achieved by applying the empirically observed baseline regeneration and reforestation rates in the reference region to the project and baseline scenarios.
- Assisted natural regeneration activities are allowed as a community development activity, but only to the extent that it increases the baseline natural regeneration rate. The quantification of the GHG benefits from assisted natural regeneration follows a different and more detailed procedure than for the quantification of GHG benefits from areas without assisted natural regeneration.
- The methodology is not applicable to grouped projects. However, the project may contain multiple non-contiguous areas. The procedure to account for this is described in section 8.1.1. Describe Spatial Boundaries of the Discrete Project Area Parcels.

2 ASSESSMENT APPROACH

2.1 Method and Criteria

The methodology review process incorporated six parts: standards review, methodology review, comparison of the methodology to the standards, corrective action, technical review and opinion. The applicable standards listed in Section 1.2 of this report were thoroughly reviewed and compared to the new methodology. Upon comparison, corrective actions were issued to improve the methodology and
bring the methodology into conformance. Finally, the methodology was independently reviewed by an internal technical reviewer prior to issuing a validation opinion.

2.2 Document Review

The primary documents reviewed by the assessment team included the methodology document itself, the applicable standards listed in Section 1.2, responses by the methodology developer to findings issues by the assessment team (documented in Section 4), public comments received while the methodology was posted on the VCS website, responses to those comments, and relevant technical literature.

2.3 Interviews

The assessment team conducted an opening meeting with the methodology developer as well as several phone calls and email exchanges to discuss aspects of the methodology and responses to findings. Those interviewed were:

- Steven De Gryze, Managing Director, Terra Global Capital
- Mark Lambert, Principal, Terra Global Capital
- Benktesh Sharma, Principal, Terra Global Capital
- Leslie Durschinger, Managing Director, Terra Global Capital

2.4 Use of VCS-Approved Expert

Carly Green, VCS approved expert in AFOLU ALM, IFM, and PRC categories served as technical expert on the assessment team. However, no member of the assessment team appears on the VCS-approved experts list in the REDD project category.

2.5 Resolution of Any Material Discrepancy

In the cases of corrective actions, Non-Conformity Reports (NCR) were issued to the methodology developer. NCRs formally document how and why the new methodology failed to comply with the standards outlined in Section 1.4. In some cases, New Information Requests (NIR) were issued. NIRs are used to formally request information, such as: how equations were developed, the meanings of technical terms and abbreviations, referenced publications and supporting documentation, or additional components of the methodology. Yet in other cases, Opportunities for Improvement (OFI) were issued. OFIs are professional suggestions or observations that are not required under the standards outlined in Section 1.4, but might be useful to the methodology developer. The project developer was encouraged to respond to all NCRs, NIRs and OFIs during the course of the methodology review. While responses to NCRs and NIRs were mandatory prior to conclusion of the assessment process, responses to OFIs were optional.

2.6 Internal Quality Control

The last step of the assessment process included a final review of the methodology and submitted responses to findings and drafting of the assessment report. The draft report was presented to an internal SCS Technical Reviewer who determined the assessment opinion to be justified given the evidence presented. The assessment report was then presented to the methodology developer for review.
and comment. After the methodology developer approved this report, SCS finalized the report and presented it to the methodology developer.

3 ASSESSMENT FINDINGS

3.1 Applicability Conditions

The VCS standard requires that the methodology identify the project activities to which it applies and establish criteria that describe the conditions under which the methodology can (and cannot, if appropriate) be applied. The methodology conforms to this by providing detailed applicability conditions in Section 4. These include criteria related to pre-project and post-project land conditions and criteria to ensure the circumstances of individual projects meet assumptions inherent in the quantification techniques applied. The applicability conditions include criteria that describe required conditions on the land before project implementation, criteria related to conditions on the land after project implementation, and criteria designed to ensure that the project complies with VCS crediting requirements. The assessment team has determined that the current version of the methodology provides adequate applicability conditions to limit application of the methodology to projects for which its methods are appropriate. Further, the applicability conditions are sufficient to meet the current requirements of the VCS standard.

Conformance: Yes ☒ No ☐ N/A ☐
Non-Conformity Reports: None
Opportunities for Improvement: None

3.2 Project Boundary

The VCS standard requires that the methodology 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. The methodology includes a table indicating the greenhouse gas emissions sources and carbon pools that are to be included in the boundaries of projects that use the methodology. For each of these pools, and sources, the methodology provides procedures to quantify emissions. Projects that apply the methodology are to include the emissions sources listed in these tables unless they can be demonstrated to be insignificant using appropriate VCS tools. The project boundary includes accounting of emissions of CO2 and CH4 from burning of peat, CO2 from peat oxidation from drainage, CH4 from increased area of rice production systems in the project scenario, N20 from increased fertilizer use in the project scenario, and CO2 and CH4 from biomass burning in the project scenario. Changes in carbon stocks are accounted for in the aboveground tree biomass, above-ground non-tree biomass, below-ground biomass, dead wood, long-lived wood products, and soil organic carbon pools (including peat). The selected emissions sources and carbon pools are consistent with VCS requirements and are likely to result in conservative estimates of the net greenhouse gas benefits of projects that utilize the proposed methodology.

The procedure described for delineating spatial boundaries of projects that would utilize this methodology includes guidance for ensuring projects meet VCS requirements applicable to REDD projects on peat
swamp forests. A definition of leakage belts and a modeling procedure for selecting the area that is hydrologically connected to the project area is included in the methodology.

The methodology specifies project durations between 20 and 100 years.

The assessment team concludes that the current version of the methodology conforms with VCS guidance related to project boundaries.

**Conformance:** Yes ☒ No ☐ N/A ☐
**Non-Conformity Reports:** NCR2011.6
**New Information Requests:** None
**Opportunities for Improvement:** None

### 3.3 Procedure for Determining the Baseline Scenario

The methodology uses the VCS “VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities” to determine the baseline scenario. It conforms with VCS requirements for providing a detailed procedure for determining the baseline scenario by providing a step-wise approach to selecting the most plausible baseline from a list of alternative baselines, described in Section 7 of the methodology. The assessment team concludes that the current version of the methodology conforms to VCS guidance and the selected tool in determining baselines.

**Conformance:** Yes ☒ No ☐ N/A ☐
**Non-Conformity Reports:** None
**New Information Requests:** None
**Opportunities for Improvement:** None

### 3.4 Procedure for Demonstrating Additionality

The methodology satisfies VCS requirements for providing a procedure for demonstrating additionality by requiring that projects use the VCS “VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities” to demonstrate additionality. When combined with the detailed procedure for selecting the baseline described in Section 7 of the methodology, this constitutes a project test for the demonstration of additionality as described by section 4.6.1 of the VCS standard. The assessment team concludes that the current version of the methodology conforms to VCS guidance and the selected tool in demonstrating additionality.

**Conformance:** Yes ☒ No ☐ N/A ☐
**Non-Conformity Reports:** None
**New Information Requests:** None
**Opportunities for Improvement:** None
3.5 Baseline Emissions

The quantification of baseline emissions is at the heart of the methodology, and includes the following steps:

1. **Determining a baseline conversion rate** – The methodology determines baseline conversion rates in one of three ways: (a) application of a legally approved rate; (b) historical analysis of conversion rates from a reference region; and (c) conservative estimation of a conversion rate based on relevant literature. The assessment team concludes that the current version of the methodology provides adequate guidance for determining an appropriate and conservative baseline conversion rate.

2. **Determine emissions factors for land use transitions** – this step requires assessment of the carbon stocks of each of the land use/land cover classes that occur in the project area or would occur in the project area under the baseline scenario. The methods applied are similar to those used in existing approved methodologies, appropriately account for uncertainties resulting from sampling, and conform to the latest VCS guidance, including addressing the requirements for temporal modelling of emissions from belowground biomass, soil, and wood products pools.

3. **Determine Emissions from Peat Activity** – the methodology accounts for peat emissions from oxidation and burning based on the conversion rate of each stratum, a subsidence and peat burning rate that is conservatively estimated from literature or measured on site, and a spatially explicit map of peat depth, estimated using a combination of on-site measurements and kriging. The methodology accounts for uncertainty in field measurements and that introduced by the kriging interpolation and applies a conservative discount to literature based estimates where appropriate. The peat emissions are estimated as described in section 8.1.4.3 of the methodology, using a gridded model that is both spatially and temporally explicit. This model assigns areas to be converted each year by assuming that the areas without peat or those of smallest peat depth are converted first and calculates emissions from oxidation and burning each year that are likely to result from this conversion. The assessment team concludes that this model is likely to conservatively estimate emissions from peat activity.

The steps required in assessing baseline emissions were the topic of several findings, and were addressed in public comments as well. Please refer to Section 3.14 of this report for a discussion of changes to the methodology that resulted from public comments and Section 4 for details of the assessment team’s findings and the associated changes to the methodology that resulted from those findings.

**Conformance:** Yes ☒ No ☐ N/A ☐


**Opportunities for Improvement:** None
3.6 Project Emissions

Under the methodology, project developers are required to put into place legally binding agreements with participating communities or landowners to avoid conversion. In addition, projects that use this methodology may include activities such as development of management plans, providing alternative livelihoods, demarcating and patrolling forest boundaries, ecotourism, efforts to decrease fuel wood consumption, and assisted natural regeneration.

The methodology provides specific procedures to quantify the greenhouse gas consequences from the project activities that are likely to result in significant emissions or changes in biomass stocks. In particular, the methodology provides a means of quantifying the greenhouse gas consequences of removing woody biomass for fire prevention activities and quantifying carbon sequestered as a result of assisted natural regeneration. Each of these quantification procedures is derived from existing methodological frameworks: the procedure for quantifying emissions from fire prevention activities employs the emission ratio approach described in the IPCC Good Practice Guidelines for Land Use, Land Use Change, and Forestry (GPGLULUCF, 2003), while the assisted natural regeneration approach is adapted from CDM methodology AR-ACM0001 version 3. The assessment team has reviewed the approaches as described in the methodology document and has concluded that they are appropriate in the context in which they are described.

The methodology also allows for harvesting in the project scenario. The methodology includes procedures to ensure that GHG benefits are not credited beyond the long-term average carbon stock maintained in areas where harvest takes place, in compliance with VCS guidelines for projects with harvesting. The methods for quantifying emissions that result from harvest activities in the project scenario are assessed using procedures similar to those provided by existing methodologies. Emissions are calculated by multiplying the harvested area by an estimated biomass stock that results from an inventory, then further multiplying by harvest and damage coefficients that indicate the proportion of biomass removed. Burning of Fossil Fuels is accounted for by referencing approved VCS Module VMD0014 “Estimation of emissions from fossil fuel combustion (E-FFC).”

Finally, the methodology estimates emissions that result from community development activities, including increased use of fertilization, increased use of flooded rice production systems, and increased animal stocking. Each of these is quantified by referencing appropriate, already existing tools: the CDM tool “Estimation of direct nitrous oxide emission from nitrogen fertilization,” GPGLULUCF Section 5.5 “Methane Emissions From Rice Cultivation,” and CDM methodology AR-AM0006.

The assessment team concludes that the procedures for calculating project emissions are appropriate, adequate, and in compliance with VCS rules.

**Conformance:** Yes ☑ No ☐ N/A ☐

**Non-Conformity Reports:** NCR2011.18, NCR2011.23, NCR2011.24

**New Information Requests:** NIR2011.20, NIR2011.21, NIR2011.22, NIR2011.34

**Opportunities for Improvement:** None
3.7 Leakage

The methodology provides procedures for quantifying leakage emissions that may result from displacement of planned large scale conversion activities, as well as displacement of small scale use of forest products that may result from protections implemented by the project. The method used to quantify leakage that may result from displacement of planned conversion activities requires a demonstration that deforestation agents have not designated new lands for conversion or monitoring of new lands acquired by deforestation agents. When deforestation agents are unknown, the areas allotted for land conversion within the administrative level that has jurisdiction over land sanctioning or within the ownership/usage right of the same deforestation are monitored. Leakage that results from the displacement of forest products is quantified based on an assessment of the demand for forest products by local communities and the proportion of that demand that can be fulfilled from the project area in the baseline scenario. The methods described are appropriate and consistent with the VCS standard.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR2011.26, NCR2011.27

New Information Requests: NIR2011.25, NIR2011.28

Opportunities for Improvement: None

3.8 Quantification of Net GHG Emission Reductions and/or Removals

The methodology’s approach for calculating net GHG emission reductions and/or removals is described in Section 8 of the methodology document. This section describes equations for combining the individual components of the methodology, including from avoided peat emissions, assisted natural regeneration, emissions from deforestation from displacement of planned conversion activities (leakage), emissions from deforestation from displacement of forest good and service extraction (leakage), emissions from project implementation activities (such as fertilizer use, timber harvest, fuel use, or methane emissions), and changes in harvested wood products pools. These equations incorporate conservative uncertainty discount factors for classification and inventory sampling error. The assessment team concludes that the procedures described adequately and appropriately combine the individual components of the methodology to estimate the net GHG emission reductions and removals in compliance with VCS rules.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None


Opportunities for Improvement: None

3.9 Monitoring

The methodology provides a list of variables and parameters to be monitored in section 9.2 and a description of the requirements of a project-level monitoring plan in section 9.3. The monitoring approach includes monitoring of deforestation in the project area using remote sensing data, updating of biomass stock estimates and such that no biomass inventories older than five years are used to calculate emission
factors, monitoring of actually extracted timber volumes, monitoring of biomass change in areas of assisted natural regeneration, monitoring of natural disturbances, and a combination of social assessments and monitoring of specific agents of deforestation to assess leakage. The monitoring guidelines are adequate to allow a project developer to develop a project-specific monitoring plan, which can then be reviewed at project validation. The monitoring procedures are appropriate, adequate and in compliance with the VCS rules.

**Conformance:** Yes ☒ No ☐ N/A ☐

**Non-Conformity Reports:** None

**New Information Requests:** NIR2011.42, NIR2011.49

**Opportunities for Improvement:** None

### 3.10 Data and Parameters

The data and parameters applied in the methodology are listed in Sections 9.1 and 9.2. Each parameter is provided in a table with its units, description, the source of data to be used, and default values where appropriate. In conjunction with the review of each of the sections described above, these data and parameters were reviewed by the assessment team. The assessment team concludes that the data and parameters used are adequate, appropriate, and in conformance with VCS requirements.

**Conformance:** Yes ☒ No ☐ N/A ☐

**Non-Conformity Reports:** NCR2011.45, NCR2011.50


**Opportunities for Improvement:** None

### 3.11 Use of Tools/Modules

The methodology makes use of the following tools and modules:

- VCS Tool VT0001 “Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities”
- AR AM Tool 03 “Calculation of the number of sample plots for measurements within A/R CDM project activities”
- VCS Module VMD0014 “Estimation of emissions from fossil fuel combustion (E-FFC)”
- CDM tool “Estimation of direct nitrous oxide emission from nitrogen fertilization”
- GPGGLULUCF Section 5.5 “Methane Emissions From Rice Cultivation”
- CDM AR tool “Estimation of GHG emissions related to displacement of grazing activities in A/R CDM project activity”

The assessment team has determined that each these tools has been applied appropriately and are adequate in the context they are applied within the methodology.

**Conformance:** Yes ☒ No ☐ N/A ☐

**Non-Conformity Reports:** None
3.12 Adherence to the Project Principles of the VCS Program

The assessment was guided by the principles of relevance, completeness, consistency, accuracy, transparency, and conservativeness as required by the VCS standard. The assessment team considered these principles in issuing findings and in coming to the conclusions described in each of the sections above. The assessment team concludes that the methodology adheres to these principles.

Conformance: Yes ☑️ No ☐ N/A ☐
Non-Conformity Reports: None
New Information Requests: None
Opportunities for Improvement: OFI2011.3

3.13 Relationship to Approved or Pending Methodologies

One existing methodology, “VM0004 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests” currently is approved for REDD projects that avoid planned deforestation on peat swamp forests. This methodology differs from the existing methodology is several ways. It uses different methods for estimating baseline deforestation rates, applies a geostatistical approach to estimating peat depths, allows logging in the project case and accounts for the carbon emissions that result from that logging, and is developed specifically to comply with current VCS guidance for peatland rewetting and conservation, which has been released since VM0004 was approved. The assessment team concludes that it is therefore reasonable to develop a new methodology in this context, rather than revise an existing methodology.

Conformance: Yes ☑️ No ☐ N/A ☐
Non-Conformity Reports: None
New Information Requests: None
Opportunities for Improvement: None

3.14 Stakeholder Comments

The proposed methodology received comments from Mr. Nick Mawdsley as described in Appendix B. Additionally, the methodology received comments from Dr. Sandra Brown as described in NIR2011.56, but these comments were received outside of the VCS public comment period and were thus considered to be outside the scope of the audit.

Conformance: Yes ☑️ No ☐ N/A ☐
Non-Conformity Reports: NCR2011.52
New Information Requests: NIR 2011.56
Opportunities for Improvement: None
4 RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

The corrective action requests, new information requests, and opportunities for improvement are documented in Appendix A.

5 ASSESSMENT CONCLUSION

Following completion of SCS’s duly-accredited assessment process, it is our opinion that Terra Global Capital, LLC’s proposed methodology, Baseline and Monitoring Methodology for Avoiding Planned Deforestation of Undrained Peat Swamp Forests, version DRAFT 7.0 dated August 30, 2012 (document file name “VCS APD Peat meth v7-0.docx”) conforms to the scope of the assessment as defined in Section 1.2 of this report, namely the VCS 3.2 Standard.

6 REPORT RECONCILIATION

THIS SECTION INTENTIONALLY LEFT BLANK UNTIL THE SECOND ASSESSMENT OF THE METHODOLOGY IS COMPLETE.

7 EVIDENCE OF FULFILMENT OF VVB ELIGIBILITY REQUIREMENTS

The following evidence of fulfilment of SCS’ eligibility requirements is presented in accordance with Section 4.2 of the VCS Methodology Approval Process.

SCS has completed ten project validations under sectoral scope 14 (AFOLU). A summary of the first ten project validations performed by SCS is as follows:
<table>
<thead>
<tr>
<th>Project and Project ID</th>
<th>Date Validation Report Issued</th>
<th>Date Project Registered</th>
<th>Name of GHG Program Under Which Project Registered</th>
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<tr>
<td>INFAPRO Rehabilitation of logged-over dipterocarp forest in Sabah, Malaysia (672)</td>
<td>8/31/2011</td>
<td>9/2/2011</td>
<td>Verified Carbon Standard</td>
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<tr>
<td>Rimba Raya Biodiversity Reserve Project (674)</td>
<td>8/31/2011</td>
<td>9/7/2011</td>
<td>Verified Carbon Standard</td>
</tr>
<tr>
<td>Reforestation Across the Lower Mississippi Valley (774)</td>
<td>4/20/2011</td>
<td>2/14/2012</td>
<td>Verified Carbon Standard</td>
</tr>
</tbody>
</table>

Note that the above is not necessarily an exhaustive list of all validations performed by SCS.

The identity and role of the VCS expert utilized in the course of the assessment are described in Section 2.4 of this report.
8 SIGNATURE

Signed for and on behalf of:

Name of entity: Scientific Certification Systems

Signature:

Name of signatory: Todd Frank

Date: August 31, 2012
APPENDIX A- LIST OF FINDINGS

ASSESSMENT UNDER THE VERIFIED CARBON STANDARD (VCS)

List of Findings

Reporter/Member: Terra Global Capital

Project: Baseline and Monitoring Methodology for Avoiding Planned Deforestation of Undrained Peat Swamp Forests

Reporting Period: N/A
OFI 2011.1 dated 06/03/2011

Standard Reference: NA

Document Reference: Throughout

Finding: The document has several typographical and formatting errors, including but not limited to, spelling errors, broken bookmarks in the table of contents, and broken references on pages 16 and 43.

Proponent Response: Spelling errors will be reviewed and broken bookmarks will be made intact. We would appreciate if you can point out which bookmark on pages 16 and 43 were found broken. However, we will revisit these errors before a new version is submitted to the validator.

Auditor Response: No response is required for opportunities for improvement. Most errors have been corrected in the most recent version of the document, except as noted in findings below. Some of the page numbers in the table of contents are currently out of date.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NIR 2011.2 dated 06/03/2011

Standard Reference: NA

Document Reference: Throughout

Finding: The following sources were referred to in the methodology, but not found in the references section:

- Hoover 2008 (p.17)
- Van Wagener 1968 (p.19)
- Harmon and Sexton 1996 (p.19)
- Couwenberg 2010 (p.22)
- Winjum 1998 (p.40)

The references section must be updated to include all sources cited in the methodology.

Proponent Response: The following sources were added to the reference list in the methodology:


- Winjum 1998 (p.40) was an error and was corrected as Winjum et al. 1998 and reference provided as below:


Auditor Response: The requested references have been added.

Closing Remarks: The Proponent's response adequately addresses the finding.
OFI 2011.3 dated 06/03/2011

**Standard Reference:** VCS Non-Permanence Risk Tool

**Document Reference:** Section 4 condition 4

**Finding:** Requiring evidence that land is legally protected from conversion to be provided at each verification, not only the first verification event would help ensure permanence of project benefits. Note that such legal protection is not required by the standard, and increased risk when legal protection is not guaranteed is accounted for in the risk rating assigned by the VCS non-permanence risk tool.

**Proponent Response:** The text is now changed to the following:

Project proponents must have legally secured the project area so that no conversion is allowed until the next verification. Evidence that the land is legally protected from conversion must be presented before each project verification event.

**Auditor Response:** The methodology goes beyond the requirements of the VCS standard, and no response is required for opportunities for improvement.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
NIR 2011.4 dated 06/03/2011

**Standard Reference:** VCS Version 3 section 4.7, VCS AFOLU requirements

**Document Reference:** Section 4 condition 7

**Finding:** Applicability condition 7 allows for sustainable extraction of timber in the project area if harvest emissions are duly accounted for and subtracted from the emissions reduction. The methodology must provide criteria for determining whether extraction of timber in the project area is sustainable. Additionally, clear procedures for accounting for emissions from this extraction must be provided by the methodology. As outlined in section 4.3.3 of the VCS AFOLU requirements, where machinery use for selective harvesting activities may be significant, emissions from that machinery use must be accounted for. Additionally, the methodology must provide a means for ensuring that projects that use the methodology meet the requirements of all relevant VCS AFOLU guidance, including but not limited to sections 3.1.8, 3.3.2, 3.6.1, and 4.2.12.

**Proponent Response:**

- To avoid the ambiguity introduced by the word “sustainable”, we simply removed the word from this text. It does not matter whether the extraction was sustainable or not, as long as the carbon associated with the timber that is extracted is accounted for.

- Procedures for accounting of extracted timber and emissions from fossil fuel used by harvest machinery are now included in the carbon accounting in section 8.2.5.

We went through the sections which assessor asked to review. Because the methodology is designed as a REDD AUDP project, most of these sections do not apply. Clause 3.1.8 and 3.3.2 are more relevant for IFM and/or ARR project types.

By quantifying the timber extraction in the baseline scenario and not allowing to harvest more than baseline harvest, the remaining carbon in the project at the end of 100 years will be more than what would remain in baseline. The REDD project is concerned over reducing the emissions from deforestation and/or degradation. Part of such reduction can be achieved by lowering the timber harvests during the project. Clause 3.6.1 is related to the non-permanence risk. This risk must be evaluated and substantiated in a PD. Therefore, no additional requirements are need at the level of the methodology development. A project undergoes comprehensive and sufficient non-permanence related risk quantification during verification and validation of the project.

**Auditor Response:** The intent of this finding was to ensure that, in the case that the project includes harvesting, it continues to meet VCS requirements for permanence and conservative issuance of credits. If the project includes harvesting, a combination of the IFM requirements is still relevant for ensuring these principals are upheld, regardless of the fact that the baseline represents conversion, rather than forest remaining as forest. In particular, 3.3.2 requires that the project crediting period be set to include at least one complete cutting cycle which is defined as the allowable re-entry period into the harvest area as determined by legal and regulatory requirements and common practice. 3.1.8 and 4.5.3 then require that projects not be issued credits above the long term average GHG benefit maintained over that crediting period. This ensures that projects cannot time their verification events to correspond to high points in the cycle of carbon stocks that result from harvest events. This is still relevant to a REDD project that
includes harvesting, as demonstrated below (excuse the crude sketched diagram and smartphone photo):

In this diagram, time is on the x axis and forest carbon stock on the Y axis. The bottom line represents the carbon stock change under a hypothetical deforestation baseline scenario, while the upper two lines represent the project scenario carbon stocks for a conservation scenario (steady state) and a limited harvest scenario. The dashed line represents the average over time for the harvest scenario. The intent of the VCS requirements appears to be that projects not be credited for carbon that is not maintained over time by crediting only up to the average sustained carbon benefit. I agree with the statement that “By quantifying the timber extraction in the baseline scenario and not allowing to harvest more than baseline harvest, the remaining carbon in the project at the end of 100 years will be more than what would remain in baseline.” However, this still does not ensure that a project cannot time verification events to coincide with carbon stock high points in the harvest cycle, and therefore be over credited. I think it is still important that the project not be issued credits above its long term GHG benefit (which is different than ensuring that the amount of carbon at the end of 100 years is more than in the baseline). The methodology, as written, allows a crediting period as short as 20 years, which may not be of sufficient length to assess fluctuation in project carbon stocks that result from harvest. Therefore, I believe that the rules regarding project crediting period from section 3.3.2 and the procedure for assessing the project’s long term GHG benefit and limiting crediting from sections 3.1.8 and 4.5.3 are still relevant.

I agree with the point that clause 3.6.1 can be addressed at project validation and verification and does not require specific methodological procedures.

NIR 4 remains open to address this issue.

**Proponent Response 2:** We have now included requirements to limit the GHG benefits from areas where harvesting takes place to the long-term average GHG benefits of the project. To do this, we have included a procedure to determine the number of years over which a long-term average shall be calculated depending on the harvest scenarios. This procedure ensures that the project crediting period is set to include at least one complete harvest/cutting cycle. The revised methodology separates the areas that undergo harvest activities from all other areas where harvest activities do not take place and limits the REDD GHG benefits from areas with harvest activities to the long-term average GHG benefits. Due to the inclusion of this new procedure, equation [42] (numbering from previous version) changed slightly as
We added the following narrative before section 8.2.5, “Estimate GHG Emissions from Harvesting”.

1.1.2 Estimate Changes in GHG Emissions from Harvesting

This methodology allows (limited) harvesting of timber from the project area. Allowing harvesting activities undoubtedly (1) increases the attractiveness of a REDD project to participating communities by providing employment and/or access to forest resources, (2) reduces activity-shifting and market leakage, and (3) ensures that harvesting occurs legally, controlled and in a sustainable fashion. An integrated forest management plan or a harvest plan must be developed and all harvesting activities must be carried out according to this plan. The plan must include boundary of areas within a REDD project where harvest activities take place, as well as details of the forest inventory, projected forest growth, projected removal and harvest schedules, harvest methods, and location of harvest activities. In addition, forest management as well as silvicultural activities that aim at enhancing the growth and vigor of the forests inside the harvested areas shall be described in the plan. The integrated forest management plan or harvest plan shall be submitted at validation and may be updated at a baseline update or re-assessment.

If the REDD project is also taking credits from ANR activities, then there should be no overlap of boundaries between ANR areas and harvest areas. In any year, claiming for GHG emissions reduction benefits only from areas where harvesting is taking place is not allowed under this methodology.

1.1.2.1 Quantification of GHG benefits

GHG benefits shall be calculated using a carbon stock that never exceeds the long-term average carbon stock in the areas where harvest activities take place. As a consequence, the long-term average carbon stock represents the maximum carbon stock that can be attained in harvesting areas. The long-term average shall be quantified based on an appropriate minimal time period which must include at least one full harvest/cutting cycle. The minimal time period must be established based on one of the following procedures:

a. If the harvest plan concentrates harvest activities in smaller blocks and continuously moves harvesting activities from one block to the next throughout the forest until all the areas are harvested within one harvesting cycle (as practiced in clear-cut or group-selection cut methods), the minimal time period shall end at the first year after the end of the crediting period at which all forest blocks have undergone a similar number of harvesting cycles. For example, if the crediting period is 30 years and the duration for all blocks to be harvested once is 12 years, then three cycles can start during the crediting period and the minimal time period shall be 36 years even though project crediting period is only 30 years.

If the harvest plan intends to target individual trees for harvest throughout the crediting period and the harvest can take place anywhere in the forest (as practiced in individual tree selection cut methods), then the established time period over which the long-term average is calculated must be the length of the project crediting period. For example, if the crediting period is 30 years and harvesting of individual trees are carried out throughout the forest during the project crediting period, then the long-term average must be estimated based on the project crediting period.
After determining the time period for estimating the long-term average, the long-term average GHG benefits must be calculated using Eq22.

\[
\text{LTAC}_{\text{Harvest}} = \frac{\sum_{t=0}^{\infty} \sum_{i=1}^{nStrata} C_{\text{Harvest}}(t,i) \cdot \text{discounting factor}}{T}
\]

Where:

\[
\text{LTAC}_{\text{Harvest}} = \text{Long-term average GHG stock contained in harvested areas. [tCO2e ha}\ ^{-1}] \\
nStrata = \text{Number of forest strata. [-]} \\
C_{\text{Harvest}}(t,i) = \text{Biomass carbon stock density during at time } t \text{ \ in stratum } i \text{ \ in harvested areas. [Mg C ha}^{-1}] \\
\text{discounting factor} = \text{Discounting factor for the uncertainty in biomass estimation in harvested areas. [tCO2 ha}^{-1}] \\
T = \text{Minimal time period for estimating long term average. [yr]}
\]

Ex-ante, LTAC_Harvest must be determined using estimates of carbon removals and harvest emissions through the end of crediting period. For this purpose, the future growth (both post-harvest and pre-harvest) must be estimating using growth models, tables or values from the literature. Future removal of biomass from the harvest areas must be estimated using a harvest management plan.

Ex-post, LTAC_Harvest must be estimated using monitoring data. Carbon stocks in harvested strata must come from sampling. It may be necessary to include additional plots in harvested strata for a precise estimation of carbon stocks. The value for LTAC_Harvest must be adjusted at each verification period based on actual monitoring data. The most recent u_\text{(inventory,harvest(t,i))} \text{ value must be used for discounting the estimate for future years.}

**Auditor Response 2:** The methodology now appropriately follows VCS guidelines for permanence in cases where harvesting occurs in the project area.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
NIR 2011.5 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.8

Document Reference: Section 4, condition 11

Finding: The meaning of the term significant as used in section 4, condition 11 is unclear.

Proponent Response: The VCS AFOLU requirements document contains a procedure to define and demonstrate the significance. Therefore, no added procedures are necessary in the methodology. The following is the relevant excerpt from the VCS AFOLU Requirements (Page 36):

4.5.18 The maximum quantity of GHG emission reductions that may be claimed by the project shall not exceed the net GHG benefit generated by the project 100 years after its start date. This limit is established because in peatlands remaining partially drained or not fully rewetted, or where drainage continues, the peat will continue to oxidize leading to GHG emissions and eventually complete depletion of the peat. To determine this long-term net GHG benefit, projects shall estimate the remaining peat carbon stock adjusted for any project emissions and leakage emissions in both the baseline and project scenarios at the 100-year mark, taking into account uncertainties in modelling and using verifiable assumptions. Projects unable to establish and demonstrate a significant difference in the net GHG benefit between the baseline and project for at least 100 years are not eligible.

Auditor Response: The methodology language has changed to directly quote VCS requirements. The response is adequate to clarify any ambiguous language.

Closing Remarks: The Proponent's response adequately addresses the finding.
NCR 2011.6 dated 06/03/2011

**Standard Reference**: VCS Version 3 section 3.11

**Document Reference**: Section 5.3

**Finding**: Page 12 of the methodology incorrectly references the portion of the VCS 3 standard in which project location description requirements are provided. The VCS 3 standard provides project location description requirements in section 3.11, page 15.

**Proponent Response**: The identified issue was corrected by modifying the second list in “Reporting requirements in the PD box” as following:

The project location description as required by the VCS Program Documents.

Additionally, second paragraph in Section 5.3 of the methodology was replaced with the following:

Project duration is fixed and must be a minimum of 20 years and a maximum of 100 years and is renewable at most four times with total project crediting period not exceeding 100 years as specified in the VCS Program Documents.

**Auditor Response**: The methodology now correctly references the VCS standard.

**Closing Remarks**: The Proponent’s response adequately addresses the finding.
NIR 2011.7 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 8.2.1.1

Finding: Option 8.2.1.1 describes a method of establishing a baseline deforestation rate through remote sensing analysis, and specifies that a minimal accuracy of 85% must be achieved in landcover classification. Additionally, several equations use a term \( u_{\text{classification}} \) or \( u_{\text{stratification}} \), which are defined on page 43 of the methodology, but not referenced in other sections, nor are equations provided for calculating these variables. The methodology must describe the metric by which the accuracy of classification and stratification will be evaluated. The metric used should adequately account for sample size and the possibility of chance agreement, such as the kappa coefficient of agreement or a similarly robust statistic.

Proponent Response: Accuracy determination is a standard procedure in remote sensing analysis. We have referred a publication for such procedure in the methodology for procedure instead of repeating the entire procedure in the methodology itself. However, essence of your concerns were concisely addressed as evident in the modified text below:

Our intention here is to state that when 85% accuracy is attained in image classification, then there would be no discounting. We have modified the text and added a table to ensure \( u_{\text{classification}} \) or \( u_{\text{stratification}} \) and how discounting will take place due to inherent inaccuracy in the image classification.

The accuracy assessment of the LULC classification and forest stratification process must follow the best practices for remote sensing (e.g., Congalton 1991). The LULC classes or forest strata for these reference locations must be identified using field observations, in-situ maps, remote sensing data, and other ground-truthing data. At least 50 reference locations per LULC class or forest stratum must be used. More specifically, the classification accuracy must be assessed by comparing the classes of the points from the validation dataset with the classes of the same locations on the classification products. A confusion matrix or error matrix will be produced together with different statistical measures of overall accuracy, producer's accuracy, user's accuracy and kappa statistics. Similarly, classification within the classes must be conducted to account for degradation i.e. multiple classless within the strata within a land cover classes. The obtained overall accuracy in classification is used for discounting purposes as described in Table 3.

Auditor Response: I think I understand your intent here, but the language is still not as clear as it could be, given that several different classifications (at different points in time) are likely and that many different accuracy metrics are calculated in a standard image classification accuracy assessment. Am I correct in assuming that \( u_{\text{classification}} \) is intended to be the kappa coefficient calculated for the overall accuracy from an accuracy assessment across all images classified (i.e. using a single confusion matrix regardless of separate dates and times for each classification)? If so, please state as much explicitly, and if another metric is to be used, please be clear about it. NIR 7 remains open for additional clarification.

Proponent Response 2: We are not using the kappa coefficient, but rather the overall accuracy which is determined from the ratio of number of pixel correctly classified to total number reference pixels used. This is the most commonly used accuracy assessment technique in classified images.
Accuracies are determined for each classified image. Every individual image shall meet the assigned accuracy threshold (of 70%). In addition, we specified that the discounting factor shall be based on the minimal accuracy across all images used. We have provided further guidance under “Table 4. Accuracy discounting factors for LULC classification”. We have now removed U_stratification.

The total amount of forest area and applicable peat areas must be multiplied with discounting factor whenever classification of remote sensing images is carried out. I re used each image.

**Auditor Response 2**: In the experience of the auditor, the use of a kappa coefficient is a more conservative and statistically robust metric of classification accuracy when compared to simple overall accuracy. However, the proponent is correct in stating that overall accuracy is commonly used, and is the accuracy metric applied in several existing and approved VCS methodologies that make use of thematic image classification. The results of a simple overall accuracy metric should approach the same results as the kappa coefficient as the number of sample points used for accuracy assessment becomes large. The methodology requires that a minimum of 50 reference locations per LULC class or forest stratum be assessed. This is consistent with published best practice in remote sensing. Further, page 19 of the methodology document (v3.0) indicates that “A confusion matrix or error matrix will be produced together with different statistical measures of overall accuracy, producer’s accuracy, user’s accuracy and kappa statistics for each classified image.” Examination of each of these individual statistics by a trained analyst should reveal any problems with the classification accuracy, regardless of the metric by which the ultimate discounting factor is calculated.

The ambiguity regarding which confusion matrices are to be used to produce discount factor has adequately clarified. The finding is therefore closed.

**Closing Remarks**: The Proponent’s response adequately addresses the finding.
Finding: Option c allows for the establishment of a baseline deforestation rate by selecting a conservative value. No criteria are provided for evaluating whether a selected deforestation rate is conservative. Further, the only criteria provided for determining whether the rate is applicable to the project are that it be from the same country as the project area and that it be not older than ten years. Many countries have regional variation in deforestation drivers and rates, so these criteria are not adequate to ensure an appropriate value is selected. In the absence of specific criteria for determining whether a rate is sufficiently conservative and applicable, validation of a selected rate by a validation and verification body is difficult, especially if the VVB does not have extensive experience in the country in which the project is implemented. The selected deforestation rate is of fundamental importance to quantifying the carbon benefits of the project. If the methodology is to allow for selection of a rate deemed conservative by the project proponents, it should provide specific criteria by which the validator can assess the selected rate.

Proponent Response: Section 8.1.2.3 was revised as following

If option (a) or option (b) are not applicable, a conversion rate obtained from the literature may be used on the condition that it can be demonstrated that (i) it is conservative, (ii) it is not older than 10 years and (iii) it is from the same country or province as the project area. It is up to the project proponent to demonstrate that the selected rate is valid and conservative. The validator will assess the conservativeness of the selected rate on the following basis:

• Applicable rates must be acquired from literature sources such as peer-reviewed literature, official land use change maps and reports. Project proponents must substantiate why a proposed rate is applicable. At least three different rates from three different and independent sources from within the past 10 years must be presented in the PD so that the auditor can assess the conservative nature of the selected values

• The most conservative rate (i.e., smallest of the available rates) must be used. The Project Design Documents must state available rates and the justification for the used value as most conservative.

• The rates used or proposed by project proponents must be cross-checked for conservativeness in scientific publication archives by the validator. Common scientific archives are ISI Web of Knowledge, Google Scholars, Agricola, PubMed or similar archives that index scientific publications.

However, even if all of the conditions above are met, an auditor has the authority to disapprove validation of a project when doubt remains on the conservative nature of the proposed conversion rate.

Auditor Response: Additional guidance has been provided for justifying a conversion rate from the literature. Further, the requirements of the methodology state that deforestation rates from the literature are only to be used when legally approved rates and historical conversion analysis are not applicable. In the case that directly applicable, recent studies exist in the peer reviewed or official technical literature, the auditor agrees that it is appropriate to use such rates, provided adequate justification is available.
The methodology leaves the specific nature of the justification open to interpretation by the project developer and validation body, which can consider agents and drivers of deforestation as well as economic, legal, and environmental constraining or facilitating factors as appropriate. The auditor believes this level of guidance is adequate, but notes that public comments were also received with regard to the appropriateness of literature-derived conversion rates and encourages a second opinion on the matter from the second validation body in the VCS double approval process. The finding is closed.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
NIR 2011.9 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 8.3.1

Finding: Section 8.3 references a land transition matrix. That term is not used elsewhere in the methodology. The methodology must describe the land transition matrix, including procedures for how it is constructed.

Proponent Response: The following description was added to the methodology:

This matrix represents a change from one LULC class or forest stratum into another LULC class or forest stratum. The main land transitions are deforestation, forest degradation, increased forest cover and regeneration. A list must be prepared of the transitions that are considered by the project proponents by analyzing a matrix combining all relevant LULC class and forest strata subject to deforestation, forest degradation, and increase forest cover and regeneration. By definition, degradation is a process that must have persisted for at least 3 years. In other words, forest land that transitions from a stratum with a larger carbon density stock to a stratum with smaller carbon density stock can only be degradation if it has persisted for 3 years.

(CONTINUED) 15. CORRECTIVE ACTION OR PREVENTIVE ACTION OR NEW INFORMATION PROVIDED

(Describe and provide objective evidence)

Table 3. Example LULC and forest strata transition matrix showing all possible transitions.

<table>
<thead>
<tr>
<th>From</th>
<th>Forest stratum</th>
<th>To</th>
<th>Non-forest LULC class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EG1</td>
<td>EG1</td>
<td>DGE21</td>
</tr>
<tr>
<td></td>
<td>EG2</td>
<td>EG2</td>
<td>RGE12</td>
</tr>
<tr>
<td></td>
<td>MX1</td>
<td>MX1</td>
<td>DGM21</td>
</tr>
<tr>
<td></td>
<td>MX2</td>
<td>MX2</td>
<td>RGM12</td>
</tr>
<tr>
<td></td>
<td>DGL</td>
<td>DGL</td>
<td>DFE1D</td>
</tr>
<tr>
<td></td>
<td>GRL</td>
<td>GRL</td>
<td>DFE2D</td>
</tr>
<tr>
<td></td>
<td>CRL</td>
<td>CRL</td>
<td>DFM1D</td>
</tr>
<tr>
<td></td>
<td>STL</td>
<td>STL</td>
<td>DFM2D</td>
</tr>
<tr>
<td></td>
<td>WTL</td>
<td>WTL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OTL</td>
<td>OTL</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Example LULC and forest strata transition matrix showing all possible transitions.
METHODOLOGY ELEMENT ASSESSMENT REPORT: VCS Version 3

Auditor Response: The land transition matrix has been adequately described.

Closing Remarks: The Proponent’s response adequately addresses the finding.

NIR 2011.10 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7


Finding: The t statistic used in equation [5] is not defined in the list of variables that appears below the equation.

Proponent Response: The variable was defined as below:

\[ t = \frac{\text{Value of } t \text{-statistics (i.e., from } t \text{-table) at 95\% confidence interval and } n-1 \text{ degree of freedom}}{\cdot} \]

Auditor Response: The t statistic has been adequately described.

Closing Remarks: The Proponent’s response adequately addresses the finding.
OFI 2011.11 dated 06/03/2011

**Standard Reference:** VCS Version 3 section 4.7

**Document Reference:** Throughout

**Finding:** The methodology would be more clear if references to the word "should" throughout the document are replaced with the word "must," or other language that removes ambiguity as to whether elements of the methodology are required or suggested.

**Proponent Response:** Followed the OFI where appropriate, i.e. where activities are binding. Alternate to "must" or existing should was retained in contexts where activities are not binding.

**Auditor Response:** No response is required for opportunities for improvement. The revisions to language used make the methodology document more clear.

**Closing Remarks:** The Proponent's response adequately addresses the finding.
NIR 2011.12 dated 06/03/2011

Standard Reference: VCS Version 3 section 2.3

Document Reference: Section 8.3.4

Finding: Section 8.3.4 states "The applicability of the allometric equation \( f_{\text{allometric}} \) used must be specifically verified according to the procedures of this methodology," but the methodology does not contain any procedures for validating allometric equations. Procedures for validation of allometric equations must be provided. Additionally, section 2.3 of the VCS standard requires that, where methodologies rely on models to estimate GHG emission reductions and or removals, the model shall have strict requirements for estimating uncertainty and all plausible sources of uncertainty shall be assessed. Consequently, the uncertainty due to the use of allometric models must be assessed in the methodology.

Proponent Response: We have provided the procedure as a new section (under Other Information) as described below:

Verification procedure of

must be verified every time new equation and must satisfy criteria (a) and (b) and additionally (c) or (d):

a. Selected equation must have an R2 value of greater than 0.5 (50%) and a p-value that is significant at 95% confidence level as reported in the source publications.

b. The equations were developed from trees where largest and smallest dbh of trees fall within the dbh range of trees in the project areas.

c. If the equations were derived from data solely from within the project locations then such equations can be used. If the equations were derived in similar landscape and have been published in peer-reviewed publication (i.e., journal or government issued papers) and similarity in climatic, edaphic, geographical and species composition must exist between the project location and the location from where the equations were derived. The source publication must include estimate of uncertainty or sufficient data to estimate the uncertainty and must be available as evidence. If this uncertainty is within \( \pm 15\% \) of the mean values reported in the source publication, and is not biased – or if biased towards the conservative side (i.e., equation underestimates of the project net anthropogenic removals by sinks), then mean values from the equation may be used.

d. For any other equations that do not satisfy criteria (c) or if new equations or equations which do not have estimate of uncertainty are to be used, then one of the following steps must be carried out:

- Destructive Sampling

- Selecting at least 5 trees covering the range of DBH existing in the project area, and felling and weighing the above-ground biomass to determine the total (green) weight of the stem an branch components

- Extracting and immediately weighing subsamples from each of the green stems and branch components,
followed by oven drying at 70°C to determine dry biomass.

- Determine the total dry weight of each tree from the green weights and the averaged ratios of wet and dry weights of the stem and branch components.

- OR Limited Measurements

- Select at least 10 trees per species distributed across the project area

- Calculate volume of tree from basal and top diameters and tree height. Multiply by species-specific density to gain biomass of bole. Add an additional 20 percentage of weight to approximately cover biomass of branches.

- If the biomass of the measured trees is within ±15% of the mean values predicted by the selected default allometric equation, and is not biased – or if biased towards the conservative side (i.e., equation underestimates of the project net anthropogenic removals by sinks), then mean values from the equation may be used.

**Auditor Response**: Criteria (a)-(c) in the revised section 10.4 provide adequate basis for evaluating the suitability of allometric equations. In the case that "emission factors must be further discounted with the relative average half-width of the confidence interval of the model," however, it is not completely clear how the discount is intended to be calculated given that uncertainty in allometric models represents an uncertainty in the predicted biomass of an individual tree, yet the emissions factors to be discounted are applied at a landscape scale and that many allometric equations, each applied in different proportions and with different uncertainties are likely to be used to derive a given emissions factor. Please provide more details regarding the intended methods for assessing the propagation of these uncertainties.

**Proponent Response 2**: It seems that the word "emissions factor" is causing the confusion. Our intention here is to discount the predicted biomass values. Therefore we have changed the sentence as below:

However, if the biomass of the measured trees is not within ±15% of the mean values predicted by the selected default allometric equation, all biomass values that are obtained using the allometric equation shall be decreased with the relative average half-width of the confidence interval of estimation.

**Auditor Response 2**: Biomass stock densities that may result from uncertain allometry may be used to estimation the carbon density of both the initial and final LULC classes in a land transition. In the initial LULC class, it is conservative to decrease the predicted biomass value as described; as such a decrease would be unlikely to overstate the decrease in carbon stock resulting from the LULC transition. However, in estimating the carbon density of the final LULC class, decreasing the estimating biomass by subtracting the uncertainty factor (i.e. the relative average half-width of the confidence interval of estimation) is likely to result in an overestimate of the carbon stock change resulting from the land use transition. The methodology should provide different rules for adjusting the carbon density factors used in calculating emissions factors based on whether the LULC class represents a before-transition or after-transition value to ensure conservativeness.

**Additional Auditor Response**: After discussions with the methodology developers, it was determined that the uncertainty accounting is appropriate as-is. The finding is closed.
Closing Remarks: The Proponent’s response adequately addresses the finding.

NCR 2011.13 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 8.3.5

Finding: In equation [8], the units of HWCI and Efbio are already tCO2e ha⁻¹. Multiplying by 44/12 and CF introduces errors into the equation.

Proponent Response: 44/12 and CF are removed to correct this error.

Auditor Response: The originally written finding contained an error, and should have referred to equation [9], rather than equation [8]. Equation [9] (in the first version of the document provided) included the unit errors; whereas equation [8] applied the correct units as described in the response. The equations applied in this section of the methodology have changed substantially between the first revision of the document and the current revision. The revised equations appear to apply correct and consistent units across all provided equations, and do not convert to Co2e twice. The finding is closed.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NCR 2011.14 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 8.3.5

Finding: Page 20 indicates that the inventory must be iteratively expanded until, for every transition, \( u_{\text{inventory}} \) is greater than 0.75. As equation [8] is written, \( u_{\text{inventory}} \) increases as uncertainty increases. Because the \( u_{\text{inventory}} \) parameter is applied elsewhere in the methodology as a multiplier, equation [8] must be revised such that \( u_{\text{inventory}} \) decreases as uncertainty increases. Additionally, this variable only makes sense in the context of other equations in which it appears if it is bounded in the range [0,1]. Revisions should ensure that the resulting discount factors are thus bounded. There is no guarantee that the combined uncertainty that results from sampling two strata is smaller than the difference in stocks between those strata.

Proponent Response: • The formula should have been \( 1-x \); this was corrected. Zero uncertainty will lead to an \( u_{\text{uncertainty}} \) of 1.

• Values for the uncertainty were explicitly bound between 0 and 1, by requiring:

\[
If \ the \ combined \ error \ is \ smaller \ is \ than \ 0.15, \ no \ deduction \ is \ applied \ and \ the \ discounting \ factor \ for \ uncertainty \ around \ biomass \ stock \ densities \ is \ set \ to \ 1 \ as:\n\]

\[
u_{\text{inventory}}(\text{classStratum1} - \text{classStratum2}) = 1
\]

\[
If \ the \ combined \ error \ is \ greater \ than \ 1, \ the \ discounting \ factor \ for \ uncertainty \ around \ biomass \ stock \ densities \ is \ set \ to \ 0 \ as:\n\]

\[
u_{\text{inventory}}(\text{classStratum1} - \text{classStratum2}) = 0
\]

Auditor Response: The revised equations correct the errors in the uncertainty metric applied. The resulting method provides a conservative estimate of uncertain quantities.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NIR 2011.15 dated 06/03/2011

**Standard Reference**: VCS Version 3 section 4.7

**Document Reference**: Section 8.3.5

**Finding**: The methodology is not clear regarding what is meant by "check that the difference in carbon density stock between forest strata is at least 10%," as this could be interpreted in several ways. (i.e. the difference could be 10% of the higher or lower stock, or 10% of the initial or final land use stock). Please clarify how differences in carbon stock density are to be assessed.

**Proponent Response**: Sentence was re-written as below:

More specifically, it must be checked that the carbon stock densities in two different strata differ at least by 10% of the carbon stock of strata with lower level of carbon stock. For example, if strata "A" has 50 Mg C ha-1, then strata "B" must have at least 55.1 Mg C ha-1.

**Auditor Response**: The uncertain quantity has been clarified.

**Closing Remarks**: The Proponent’s response adequately addresses the finding.
NCR 2011.16 dated 06/03/2011

Standard Reference: VCS 3 section 4.1

Document Reference: Section 8.4.2

Finding: The methodology must provide guidelines for determining sample size for peat depth sampling and more clearly explain what is meant by "Measurements of peat must be interpolated to create a map with minimal peat depths at an ex-ante selected confidence level (e.g., 95%)". The required precision and confidence level should be clearly specified in the methodology, rather than left up to the project proponent. Additionally, the methodology must account for uncertainty in the estimation of avoided peat emissions in accordance with the requirements of the VCS 3 standard section 4.1. This accounting should include the uncertainty introduced from the kriging procedure used to estimate peat depth, as well as any uncertainty in estimating bulk density, carbon content, or other parameters incorporated in equations 1-15. Notably, a $u_{\text{peat}}$ variable appears on page 43, but is not used in the equations on the preceding page and no method of calculating the value of the variable is provided.

Proponent Response:

• The methodology now provides guidelines for determining sample size for peat depth sampling. These are described at length in Section 8.1.4.2. However, do note that there is no closed-form and analytical solution available to determine the correct number of samples $n$ for a given precision and confidence level, as there is for biomass plots. Instead, project proponents shall sample peat depths in multiple phases and iteratively increase the number of sampling locations until the precision is reasonably close to 15%. Similarly as for biomass plots, the final precision may be different than 15% as long as samples are properly discounted.

• We have now explained "Measurements of peat must be interpolated to create a map with minimal peat depths at an ex-ante selected confidence level" in the beginning of Section 8.1.4.2:

Per VCS AFOLU PRC requirements, no GHG emissions reductions may be claimed for a given area of peatland for longer than the time it would have taken for the peat to be completely lost under baseline conditions. As a consequence, it is of great importance to know the peat depth at every location of the project area. Project proponents shall delineate the peat depth and create peat depth maps in a conservative fashion. The amount of credits than can be generated is proportional to the depth of the peat layer in the project area. As a consequence, peat layer maps that follow the principle of conservativeness shall not overestimate the depth of the peat layer. In practice, peat depth maps must indicate the minimal peat depth with 95% confidence.

• The methodology now specifies the minimal precision (85%) and the confidence level (95%).

Auditor Response: The required confidence level and sample size are more clearly specified and are consistent with VCS rules. Note that the VS guidelines use the word ‘uncertainty’ as the word precision is applied here. The methodology would be more clear if the terms used are consistent with VCS terminology. There remains some ambiguity throughout the methodology regarding exactly how uncertainty deductions are to be calculated (for example, if the half width of a 95% confidence interval is 17% of the estimated value, should the deduction applied be 17% or 17%-15% = 2%?). The methodology should be clarified throughout to remove this ambiguity. We suggest adding an equation to
section 10.2 of the methodology that clearly describes the procedure for deduction factors in a generic way and referencing this section in all parts of the methodology that apply confidence deductions.

Validator’s comment

The required confidence level and sample size are more clearly specified and are consistent with VCS rules. Note that the VS guidelines use the word ‘uncertainty’ as the word precision is applied here. The methodology would be more clear if the terms used are consistent with VCS terminology. There remains some ambiguity throughout the methodology regarding exactly how uncertainty deductions are to be calculated (for example, if the half width of a 95% confidence interval is 17% of the estimated value, should the deduction applied be 17% or 17%-15% = 2%?). The methodology should be clarified throughout to remove this ambiguity. We suggest adding an equation to section 10.2 of the methodology that clearly describes the procedure for deduction factors in a generic way and referencing this section in all parts of the methodology that apply confidence deductions.

Methodology Developer’s Response:

We have changed term “precision to “uncertainty” and modified section 8.1.4.2 as below:

Project proponents must either (1) demonstrate that the uncertainty for bulk density measurements is within 15% relative to the mean, in which the uncertainty is defined as the half-width of the confidence interval (HWCI) at a confidence level of 95% or (2) apply an uncertainty deduction that is proportional to the actual uncertainty, if the uncertainty is greater than 15%. In other words, if the uncertainty is 15%, no deduction is necessary, however, if the uncertainty is 16%, a deduction of 16% is needed.

Section 8.1.4.3 was specified as following

\[ \text{BDadj} = \text{Adjusted mean bulk density of peat stratum \at 95\% confidence level. The uncertainty in bulk density must be calculated and discounted using the HWCI, see equation through [EQ5] for guidance on how to calculate a HWCI. If the HWCI is less than 15\%, the value must be reduced proportionally to the HWCI. [Mg m}^{-3}\].} \]

Lastly, we changed the section on Conservative Approach and Uncertainties and now provide a detailed description for uncertainty estimation and discounting generically.

Conservative Approach and Uncertainties

General Principle

This methodology requires key components of the carbon accounting to be estimated within 15%
uncertainty, in which the uncertainty is defined as the half-width of the confidence interval (HWCI) at a confidence level of 95%. If the uncertainty exceeds 15%, a deduction proportional to the HWCI shall be applied. Specifically, the following procedures must be followed to account for uncertainty to each applicable parameter.

\[
\text{uncertainty} = \frac{t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}}{2}
\]

Eq. 3

Where,

- \( \text{uncertainty} \) = Uncertainty percentage of estimated mean [-]
- \( t_{\alpha/2} \) = t-value at 95% confidence level for \( \alpha \) observations [-]
- \( \bar{x} \) = Estimate mean value [unit]
- \( s \) = Estimated standard deviation on mean [unit]

If the uncertainty is less than 0.15, no deduction is required and the estimated value can be used directly. However, if the uncertainty is greater than 0.15, the estimated value must be adjusted (i.e. discounted) proportionally so that the resulting emission reductions remain conservative (i.e., are adjusted downward). Specifically, a parameter that is positively correlated with the net emission reductions shall be adjusted downwardly by multiplying the estimate by \( 1 - \text{uncertainty} \); a parameter that is negatively correlated with the net emission reductions shall be adjusted upwardly by \( 1 + \text{uncertainty} \).

**Uncertainty of Key Components of Methodology**

The following is a list of the key components of the carbon accounting for which the uncertainty must be estimated and reported, and for which uncertainty deductions must be applied:

- For baseline deforestation rates using remote sensing classification, factors are selected based on the empirically observed accuracy of discerning forest/non-forest classes, and forest biomass classes, respectively, according to the procedures outlined in this methodology.
- Emission factors from tree biomass must be discounted with \( t_{\alpha/2} \), which equals the half-width of the confidence interval of the mean difference between the two carbon stock densities. Note that the minimum desired level of precision for sampling design of biomass inventory is 15%.
- Biomass stock densities calculated using allometric equations shall be discounted if the allometric equation is not accurate within 15% (see Section Error! Reference source not found.).
- ANR growth rates shall be discounted using the half-width of the confidence interval.
- For peat depth, the uncertainty deduction is applied indirectly, by limiting the total size of the peat area to the area for which the confidence that the required minimal peat depth is met is at least 95%. Uncertainty deductions can be avoided by increasing the sampling size of peat depth measurements.
Closing Remarks: The Proponent’s response adequately addresses the finding.

NIR 2011.17 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 8.4.3

Finding: An unnumbered equation appears below equation [9] on page 23. It is not clear what is being calculated in this equation, or how it feeds into the rest of the methodology.

Proponent Response: This was an error. This equation was deleted.

Auditor Response: The equation has been removed.

Closing Remarks: The Proponent’s response adequately addresses the finding.

NCR 2011.18 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Equation [14]


Proponent Response: This was an error. Variables separated as suggested.

Auditor Response: The equation error has been corrected.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NCR 2011.19 dated 06/03/2011

**Standard Reference:** VCS Version 3 section 4.7

**Document Reference:** Equation 13

**Finding:** The units of the CellSize variable are given as distance units (cm). In order for equations 13 and 14 to produce results in tCo2e/yr as indicated, these variables must be expressed in area units.

**Proponent Response:** The erroneous unit is changed to area units i.e., m² as pointed out.

**Auditor Response:** The equation units have been corrected.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.

---

NIR 2011.20 dated 06/03/2011

**Standard Reference:** VCS Version 3 section 4.7

**Document Reference:** Section 9.2.3 (initially incorrectly listed as Section 9.2.4)

**Finding:** The methodology requires that, if loss of carbon occurs from fire prevention activities, that carbon be accounted for, but does not provide procedures for doing so. The methodology must provide methods for accounting for the loss of carbon that may result from fire prevention activities.

**Proponent Response:**

The comment relates to section 9.2.3. In the revised methodology, we have provided the following approach to quantify the loss of carbon from fire prevention:

**9.2 Estimate GHG Emissions from Fire Prevention Activities**

The carbon loss occurring from the removal of woody biomass from fire prevention activities such as fire breaks must be accounted for. This includes the emissions from fire breaks cleared by cutting or controlled burning woody biomass. In case controlled burning is used to remove woody biomass, all CH₄ emissions related to the burning must be included. The emissions from fire breaks can be calculated by:

---

¹ Emissions from clearing herbaceous vegetation are insignificant.
Describe and provide objective evidence)

where:

\[
E_{fire\text{prevents}} = \sum_{i=1}^{\text{strata}} \left( \text{area}_{\text{fire\text{prevents}}} (i) \cdot C(i) \right) + \sum_{f=1}^{\text{strata}} \left( \text{area}_{\text{fire\text{massloss}}} (f) \cdot C(f) \cdot \frac{16}{12} \cdot \text{GWPF}_{\text{CH}_4} \cdot \text{ER}_{\text{CH}_4} \right)
\]

\[E_{fire\text{prevents}}\] = Annual GHG emissions from implementation of fire-preventing actions as REDD project activities. [tCO2-eq yr-1]

\[\text{area}_{\text{fire\text{massloss}}} (i)\] = Total annual area of forest stratum i that was cleared. [ha yr-1]

\[C(i)\] = Carbon content in forest stratum i. It is conservatively assumed that all biomass is removed. [Mg C ha-1 yr-1].

\[\text{area}_{\text{fire\text{massloss}}} (f)\] = Annual area of forest stratum f that was cleared by controlled burning. [ha yr-1]

\[\text{GWPF}_{\text{CH}_4}\] = Global Warming Potential for CH₄ (IPCC default value = 21 for the first commitment period). [-]

\[\text{ER}_{\text{CH}_4}\] = Emission ratio for CH₄ (IPCC default value = 0.012). See Table 3A.1.15 in IPCC GPG-LULUCF (2003). [-]

\[\text{strata}\] = Number of forest strata. [-]

**Auditor Response:** An appropriate method for accounting for emissions from fire prevention activities has been provided.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
### NIR 2011.21 dated 06/03/2011

**Standard Reference**: VCS Version 3 section 4.7  
**Document Reference**: Section 9.2.6  

**Finding**: With reference to decreasing the consumption of fuelwood, section 9.2.6 states "The following table outlines the procedure to quantify the maximal effectiveness of this driver." No table followed that statement.  

**Proponent Response**: We did not intend to put a table in that place. The sentence that indicated the existence of table is removed in the revised version of the methodology.  

**Auditor Response**: The statement has been removed.  

**Closing Remarks**: The Proponent’s response adequately addresses the finding.

### NIR 2011.22 dated 06/03/2011

**Standard Reference**: VCS Version 3 section 4.7  
**Document Reference**: Section 9.3.2  

**Finding**: Page 29 instructs the project developer to "Report the difference $\Delta C_{ANR}(t) - \Delta C_{(ANR,BSL)}(t)$ in column [6]." It is not clear what column [6] refers to.  

**Proponent Response**: It was an error. The Column[6] is referring to component 3 of equation to estimate NER. Text “Column[6]” was replaced with the appropriate reference.  

**Auditor Response**: The unclear reference has been corrected.  

**Closing Remarks**: The Proponent’s response adequately addresses the finding.
Finding: The uncertainty resulting from biomass sampling in ANR areas must be incorporated in the final estimate of project benefits. Project scenario GHG benefits from assisted natural regeneration in part [3] of equation [28] do not incorporate uncertainty due to sampling error. Additionally, guidelines should be provided to ensure that the net annual increment parameter is conservatively estimated, or the uncertainty in that parameter should be assessed in project accounting.

Proponent Response:

• We added an uncertainty deduction to the ANR calculations, based on the empirically measured uncertainty, similar as for changes in biomass stock density from deforestation:

\[
\text{Section 8.2.4.2 explains how to calculate } U_{\text{inventory, ANR}}(t,i)
\]

• Regarding your concern on "Additionally, guidelines should be provided to ensure that the net annual increment parameter is conservatively estimated, or the uncertainty in that parameter should be assessed in project accounting", We now have added the following in Section 8.1.3.2 to maintain conservativeness or use discounting as suggested.

For any values used other than the ones given in GPG-LULUCF Table 3A.1.5, the estimated values must be proportionally discounted if the uncertainty (percentage of mean) exceeds 15%.

Auditor Response: Methods have now been provided for accounting for uncertainty in these quantities. The methods used parallel those applied elsewhere in the methodology and are appropriate to the context in which they are applied.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NCR 2011.24 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 9.3.2.3

Finding: No procedure is provided to quantify $E_{\text{fertilization}}$, $ANR(t)$.

Proponent Response: The N2O from the use of fertilizer must be quantified using CDM tool “Estimation of direct nitrous oxide emission from nitrogen fertilization”. The variable within this tool is equivalent to within this methodology.

Auditor Response: An appropriate tool has been references to estimate the emissions from fertilizer use.

Closing Remarks: The Proponent’s response adequately addresses the finding.

NIR 2011.25 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 10; Section 10.3

Finding: Section 10 indicates that project proponents must incorporate measures to minimize leakage, while section 10.3 indicates that implementation of potential leakage prevention activities is optional. Please clarify the requirement.

Proponent Response: The related sentence in Section 10 was modified as following:

It is a good practice to incorporate measures to minimize leakage (see section 9.1).

Auditor Response: This is consistent with section 3.5 of the VCS AFOLU requirements, which states that activities to mitigate leakage are encouraged. The AFOLU guidelines make no requirement to implement leakage prevention measures, however.

Closing Remarks: The Proponent’s response adequately addresses the finding.
Finding: The method provided for accounting for leakage when a specific agent of deforestation cannot be identified is not suitable for the following reasons:

- the specified time range of 2000-2005 may not be relevant for all projects

- The t-test is likely to be conducted with very small sample sizes and is consequently unlikely to have sufficient statistical power to detect whether the area allotted for land conversion has significantly changed unless that change is very large. If a statistical test is to be used, the sample size must be large enough that it has sufficient power to detect changes that are relevant when compared to the size of the project area.

- the amount of land an administration allots for conversion may be substantially larger than the project area. In this case, even if leakage occurs that results in conversion of an area of equal size to the project area, the area allotted may not increase by more than 15%.

Proponent Response: the specified time range of 2000-2005 may not be relevant for all projects

The requirements were changed to the 10 years preceding the start of the project to make it consistent with the baseline estimation methods. The leakage will be assessed for the past 10 years at every baseline update.

- The t-test is likely to be conducted with very small sample sizes and is consequently unlikely to have sufficient statistical power to detect whether the area allotted for land conversion has significantly changed unless that change is very large. If a statistical test is to be used, the sample size must be large enough that it has sufficient power to detect changes that are relevant when compared to the size of the project area.

In the revised version, the power of the statistical test must be checked. Increases in leakage area can only be found insignificant if the increase is significantly smaller than 15% of the project area AND this test has at least 80% power. We have included an r script as a calculation example to the validator.

- the amount of land an administration allots for conversion may be substantially larger than the project area. In this case, even if leakage occurs that results in conversion of an area of equal size to the project area, the area allotted may not increase by more than 15%.

This is now fixed. Leakage cannot happen if the area

The new leakage procedures now are:

(1) Determine which administration has jurisdiction over the land sanctioning for the identified conversion
scenarios in the area in which the project is located.

(2) Acquire all available data on historical areas of conversion for land sanctioned for conversion for each
of the conversion strata found in the project area representing for a period of 10 years before the start of
the crediting period. All available data shall be used. The source of the data shall be made available to
the auditor so that it can be verified that all of the available data is effectively included. Note that it is
acceptable to have gaps in the available data.

(3) Calculate the average annual amount of area allotted for the specific conversion using all of the
available data collected in the previous step.

(4) During monitoring, the size of the area that has been sanctioned for the identified conversion
scenario(s) by the relevant administrative jurisdiction must be acquired. Calculate the average and
standard deviation of the difference of the conversion area with each conversion rate before the project.
Using a one-sided t-test, determine whether the actual area allotted for land conversion is not more than
15% of the project area with 95% confidence. Verify that the power of the t-test is at least 80%.

a. If the statistical power is at least 0.80 and the result of the t-test shows that the increase in the area
allotted for conversion is smaller than 15% of the project area, leakage is assumed to be insignificant.

b. If the statistical power is inadequate or the t-test indicates that the increase in the area allotted for
conversion is greater than 15% of the project area, the leakage area is equal to the average difference
between the monitored conversion and the pre-project conversion unless it can be justified that the
observed increase in conversion is unrelated to the project. Justification can be provided by
i. Increases in conversion of similar native forest systems far away from the project area and reference
region or even globally.

ii. Analysis of the actual driver of the increase in conversion.

iii. Peer-reviewed literature and independent sources indicating the causes of the increase in
deforestation.

In addition, a flow diagram and an example are added for clarification.

Example 1

(1) Only data on conversion for 5 out of the 10 years preceding the start of the crediting period are
available. The areas are: 40620, 41200, 41025, 40200, and 40650 ha.

(2) The project area is 5000 ha

(3) The area that was converted after the start of the project is 41050

The average increase in deforestation rate is 311 ha, and the standard deviation is 390 ha. A 15% of the
project area equals 750. The zero hypothesis of the t-test is: the true increase in deforestation (estimated
as 311 ha) is greater or equal than 15% of the project area (i.e., 750 ha). The alternative hypothesis is:
the true increase in deforestation is less than 15% of the project area. The p-value of this t-test is 3%,
indicating that the alternative hypothesis is true and that leakage is potentially insignificant. However, a test of the power of the test indicates that the power is only 67%. Therefore, the t-test has insufficient power to conclude anything and leakage has to be assumed to be 311 ha.

Example 2

(1) Data on conversion for 7 out of the 10 years preceding the start of the crediting period are available. The areas are: 40620, 41200, 41025, 40200, and 40650 ha.

(2) Same project area as in case 1: 5000 ha

(3) Same area that was converted after the start of the project as in case 1: 41050

Now the p-value of the same t-test is 0.005, and the power is 95%. As a consequence, the alternative hypothesis (“the true increase in deforestation is less than 15% of the project area”) can be adopted and leakage can be considered insignificant.

Auditor Response: In principle, the t-test application procedure described is sound - provided that a t-test has sufficient statistical power to detect meaningful differences, it is reasonable to believe that a small increase in the area deforested by a specific agent is a result of year to year variation in land conversion practices, rather than activity shifting. In practice, the auditor has concerns about the usefulness of the procedure. The sample data in the example provided by the methodology developer has a coefficient of variation (standard deviation divided by mean) of only 0.007, indicating that there is very little variation in the year to year amount of land cleared by this hypothetical agent (+/- only about 500 hectares for an agent that converts 50,000+ hectares annually, less than 1% variability). Real world scenarios are likely to have much more variability, and thus much larger sample sizes are likely to be required for statistical tests of adequate power. In practice, obtaining adequate data to perform these tests may be difficult.

Nonetheless, the approach outlined in the methodology is conservative in the case that a statistical test of sufficient power cannot be performed, as it assumes the leakage area is equal to the average difference between the monitored conversion and the pre-project conversion.

At this time, however, the finding remains open because the example provided in the methodology contains an error (page 52, VCS APD Peat meth v3-0). Identical data are provided for example 1 and example 2 (5 data points), whereas the text indicates that 7 data points should be included in example 2.

Proponent Response 2: [though an additional formal response was not received, the methodology developer revised the example with the correct data]

Auditor Response 2: The example has been revised.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NCR 2011.27 dated 06/03/2011

**Standard Reference:** VCS Version 3 section 4.7

**Document Reference:** Section 10.2

**Finding:** Section 10.2 refers to a delta_area_leakage,communities(t,i) parameter in equation [29], but no such parameter was found in that equation.

**Proponent Response:** It might be possible that equation numbering was not good. But this parameter appears as 5th component of said equation. None, the parameter is in equation [29]. The equation number however has changed.

**Auditor Response:** Equation and section numbering and descriptions have changed throughout the methodology since this finding was issued. At this time, the auditor is not aware of any undescribed parameters in equations.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
Finding: The method of accounting for leakage as a result of the displacement of forest products is described in insufficient detail. The methodology should provide more detailed procedures for determining the locations of appropriate leakage belts, ensuring these areas are of appropriate size to adequately account for leakage from the project area, and ensuring that the belt is representative of areas to which activities are likely to shift. Additionally, the methodology must describe the procedure by which the future extraction rate of forest products from the project area in the baseline and project cases is to be projected. Finally, the methodology must describe the procedure by which the effect on surrounding forest cover is calculated from the difference between project and baseline extraction rates (section 10.2, step 5), and how that area is converted to an estimate of the carbon emissions from leakage.

Proponent Response:

- Regarding appropriate leakage belts.

  o More detailed procedures are provided in Section 8.3.2:

    a. Using historical maps, expert opinion, household surveys, participative rural appraisals (PRA), literature and/or other verifiable sources of information, list all relevant criteria that facilitate (at least one criterion) and constrain (at least one criterion) the extraction of each forest product for the main deforestation agents. Criteria that must be included are (1) the overall suitability of the land for the extraction of forest products/services and (2) the accessibility and mobility of the location from the neighbouring communities of the agents of deforestation. During social assessment which also includes participatory rural appraisal (PRA), it must be determined how far each forest user is willing to travel to acquire the forest good or service.

    b. For each criterion, generate a map where positive values indicate locations that facilitate the extraction and negative values indicate locations that constrain the extraction. All areas that are inaccessible to the agents of deforestation, must be excluded by assigning a very small suitability to such areas.

    c. Combine individual criteria into one overall suitability map for each forest product by assigning justifiable weights to each criterion. All assumptions shall by duly noted by project proponents in a Project Document.

In addition, this section explains how to delineate the leakage area based on the overall suitability map.

The areas are of appropriate size to adequately account for leakage from the project area since they take into account the production of forest goods. This point was elaborated upon in Section 8.3.2:

4. Subtract the amount of forest products that are allowed to be extracted from the project area under the project scenario and the total amount of forest products that are needed under the project scenario. This value represents the extraction of forest products that may cause leakage. Using the overall suitability map, determine the boundary of the non-project area that is needed to supply the increase in forest
products that may cause leakage. This analysis must be done in a conservative fashion. As a consequence, the size of the leakage belts must be sufficient so that the leakage belt can contain all of the potential leakage that is occurring throughout the next baseline update period.

The leakage belt is representative of areas to which activities are likely to shift since a suitability map is produced that takes into account all criteria that constraint or facilitate the extraction of forest products. See point 1a of Section 8.3.2 (quoted above).

The revised methodology now describes the procedure by which the future extraction rate of forest products from the project area in the baseline and project cases are to be projected.

2. Project the future extraction rates of forest products from the project area in the baseline scenario by multiplying the extraction rate at the start of the crediting period (see Section 8.1.4.1) according to a proportion that reflects increases in population. Note that, at every baseline update, the extraction rate must be re-evaluated using household surveys and PRAs.

3. Predict \( \Delta D_{\text{goods-services,project}}(i,t) \), the difference in demand of forest products and services due to project and leakage prevention activities described in Section 8.2.2. Additionally, include the effect of substitute goods provided by the project. For example, fuel-efficient stoves and solar cookers may reduce the demand for fuel-wood under the project scenario.

The parameter \( \Delta \text{Area}_{\text{leakage,communities}}(t,i) \) is converted to an estimate of the carbon emissions from leakage by multiplying with an emission factor (see big equation [EQXX]).

\[
\sum_{i=2} \left( \text{Habitat fraction} \cdot \left( \frac{0}{\Delta \text{Area}_{\text{leakage,communities}}(t,i)} \right) \cdot \text{Inventory}(i) \cdot EF(i) \right)
\]

This equation describes how the effect on surrounding forest cover is calculated from the difference between project and baseline extraction rates.

**Auditor Response:** Though a previous response provided the information requested in this NIR, the latest version of the methodology has removed all accounting for leakage resulting from displacement of forest products, instead replacing it with the sentence "Leakage as a result of the displacement of forest products such as timber and fuelwood is considered insignificant as the displacement of forest products would have happened under the baseline scenario (conversion of the project area) as well."

The auditor does not agree that this is always a true statement. The methodology is designed to account for a dual threat by planned conversion by corporate entities as well as small scale deforestation.

In the case that an entire project area would have been converted immediately in the absence of the project, it may be true that displacement of forest products, fuel wood, or other biomass losses is the same in the baseline and project scenarios and therefore such leakage is insignificant. However, baseline scenarios are likely to account for conversion over time, rather than immediate conversion of entire project areas. In the baseline, then, it is possible that until the conversion takes place by large-scale agents, the small-scale agents would have continued to use land within a project area to provide, for
example, wood products or fuelwood. If project activities prevent carbon stock loss from the activities of small scale agents, there is the potential for leakage up until the point that the conversion would have occurred. Further, the conversion itself may supply some demand for these products in the baseline case that is not supplied in the project case, depending on local land conversion practices. In the project case, that demand may shift to another area outside of the project area as a result of the project (and in the absence of effective leakage prevention activities).

The methodology states “This methodology takes into consideration that peat swamp forests may be under a dual threat by (1) planned conversion by corporate entities, but also (2) small-scale deforestation from e.g., settlements, conversion for subsistence farming, rubber tapping, and small-scale logging. This methodology provides guidance and procedures to manage such small scale deforestation drivers.” As it currently stands, however, leakage potentially resulting from activity shifting is only accounted for in the first case. The methodology must account for any significant leakage resulting from either case (1) or case (2).

Also of note is:

- Applicability condition 9 and many parts of the methodology still refer to monitoring of leakage belts, despite the removal of the description of these belts from section 8.3.2.

- The table of reporting requirements in section 8.3.2 lists many parameters that are no longer described in the methodology.

Please update the leakage accounting procedures in the methodology to account for potential activity shifting by either type of identified driver or provide further justification for exclusion of activity shifting that may result from small scale drivers. Additionally, please ensure the methodology document does not refer to content that has been removed from the methodology.

**Proponent Response 2:** We have modified leakage section. The section now includes procedures to account for leakage due to (1) displacement of planned conversion activities, and (2) displacement of small scale forest products extraction activities. The leakage as a result of the displacement of forest products have been modified to accommodate valuators’ concerns.

Leakage as a result of the displacement of forest products

In addition to the threat of large-scale conversion, the project area may also be at risk of small-scale deforestation and/or degradation activities carried out by the local communities. Small-scale deforestation or degradation activities are carried out either to meet the demand for land, i.e. to create settlements or to convert forests into small-scale agriculture, or to extract timber and non-timber forest products.

Obviously, once the project area is converted to non-forest under the baseline scenario, the threat from small-scale deforestation and/or degradation becomes obsolete. Likewise, once the project area is protected by REDD project activities under the project scenario, the communities’ access to the project area is likely severely restricted. As a consequence, the displacement of deforestation activities caused by the communities’ demand for land is equal under the baseline and project scenarios, and no net activity-shifting leakage will occur. However, the displacement of deforestation and degradation activities
carried out to meet the demand for forest products such as timber and fuelwood may induce activity-
shifting leakage when the baseline conversion rate is slower than the rate of protection under the project
scenario. This occurs when the project area is only converted gradually under the baseline scenario but
protected immediately under the project scenario.

As explained above, once the project area is converted to a non-forest use under the baseline scenario,
communities will no longer have access to the forest resources. In other words, activity-shifting leakage
will occur from the start of the project and until the time when the project area is completely devoid of the
forest cover under the baseline scenario.

As a consequence, if 100% of the planned conversion has taken place by the second year of the project
under the baseline scenario, no net emissions from activity-shifting leakage will occur because the
communities would have shifted their activities even in absence of the REDD project. If the conversion
rate varies over among the conversion strata, a strata-specific leakage must be estimated.

The following steps must be followed to estimate activity-shifting leakage:

1. Identify the communities that are dependent on the project area for forest products or land. There may be
more than one community relying on various forest patches/strata of the project area. The PD must
provide details of communities that depend (wholly or partially) on the project area for different products.
Note that if the surrounding communities do not rely on the forest products from the project area, then
there is no activity shifting leakage from these communities. The identification of communities that are
dependent on the project area can be done using local experts, focus group discussions, etc.

2. Estimate the annual demand from communities for different forest products \( D_{(c,p,t)} \) in [EQ38] and the
proportion of the demand that is met by the project area \( P_{(c,p,t)} \) in [EQ38] under the baseline scenario.
Social survey instruments such as participatory rural appraisal, household surveys or regularly published
statistical records from government sources can be used to estimate the historical demand and the
proportion of the demand that is met by the project area. The demand for forest products in the future is
to be set to the historical demand. The proportion of the demand that is met by the project area is to be
set to the historical proportion multiplied with the remaining forest cover under the baseline scenario at
time \( t \).

3. Estimate annual quantity of different forest products that are supplied through project activities and
that are agreed in an integrated management plan \( S_{(i,p,t)} \) in [EQ38] under the project scenario. This
value is “0” if no such plan exists or if the supply of products is not mentioned in PD.

4. Estimate annual quantity of different forest products or alternative goods that can substitute the demand
for forest products that are expected to be produced and supplied as part of leakage prevention
measures and/or community support under a REDD project \( LP_{(l,p,t)} \) in [EQ38]. If no leakage
prevention measures are in effect or if leakage prevention measures are not supplying any of the
products, then this value must be set to “0”.

5. Estimate total number of years that would be required to complete the conversion of project area under
the baseline. GHG emissions from activity shifting leakages from communities must be estimated for all
the years while the planned conversion is progressing in the baseline scenario. If the planned conversion
activity completes within the first two years, then leakage from activity shifting can be considered "0".

Finally, use the [EQ38] to estimate leakage.

If the total forest area within the project boundary in baseline is > 0, then:

\[ E_{\text{ALRT}} = \sum_{t=1}^{\text{activity complete}} \sum_{p=1}^{\text{PT}} D_{p,t} \cdot P_{p,t} - \sum_{t=1}^{\text{activity complete}} \sum_{p=1}^{\text{PT}} S_{p,t} - \sum_{t=1}^{\text{activity complete}} \sum_{p=1}^{\text{PT}} LP_{p,t} \]

If this quantity is negative, set the quantity to 0. Note that this quantity becomes 0 when the total forest area within the project boundary under the baseline scenario at point t is 0. If the planned conversion is complete within the first two years then:

\[ E_{\text{ALRT}} = 0 \]

Where,

\[ E_{\text{ALRT}} \quad = \quad \text{GHG emissions from activity shifting leakage in year t. [tCO}_2\text{e-]} \]

\[ CF \quad = \quad \text{Carbon fraction [-].} \]

\[ D_{p,t} \quad = \quad \text{Demand for forest product type p in forest dependent communities in year t. [Mg DM].} \]

\[ P_{p,t} \quad = \quad \text{Proportion of forest product type p that is fulfilled from the project area in forest dependent communities in year t under the baseline scenario.} \]

\[ S_{p,t} \quad = \quad \text{Supply of forest product type p from forest strata s in year t as agreed in forest management plan. [Mg DM].} \]

\[ LP_{p,t} \quad = \quad \text{Supply of forest product type p from leakage prevention activity s in year t. [Mg DM].} \]

\[ 2 \text{ For example, if 60% of the demand is met by the project area and at time t only 50% of the project area is converted under the baseline scenario, } P_{p,t} \text{ is 30%.} \]
With addition of these new sections, changes were also made in monitoring section (i.e. Section 9) of the methodology. We also updated data and parameter section as implication to the changes made in previous section. Following changes were made in section 9.1.3 (Description of the monitoring plan):

GHG emissions from deforestation due to the displacement of forest good extraction. Social assessments must be conducted among the communities that were using the project area to extract goods and services before the start of the project. Using the social assessments, the project proponents must monitor (1) the likely size of the population that is dependent on forest resources of the project area, (2) the communities’ demand for wood products and the proportion of the demand that is met from the project area ($D_{(c,p,t)}$), (3) the supply of wood products from the project area ($S_{(i,p,t)}$), and (4) the supply of wood products from leakage prevention activities taking into account any activities that may have reduced the demand ($\left\lbrack LP \right\rbrack_{(l,p,t)}$). Monitoring of activity shifting leakage is not needed if baseline planned conversion completes within the first two years or when all the forest are converted under the baseline scenario.

The applicability condition 9 has been changed to correctly describe the current procedure to account for activity shifting leakage due for forest products as shown below:

The magnitude of activity-shifting leakage by communities present within the project area or using the project area is quantified through a rigorous monitoring plan consisting of rural appraisals, remote sensing analysis and biomass inventories in the project area. The exact procedures for doing so are included in this methodology.

The leakage section clearly explains the conditions for ability to exclude leakage (see the section 8.3.2) described earlier. The table of reporting requirements in section 8.3.2 was revised to ensure that the information contained in this table is current.

PD Reporting requirements

- Description of all applicable agents of conversion. If the agents were not identified in the baseline, then description of most likely agents must be provided with assumptions and justification.

- Description of all available data on historical area of conversion for each of the conversion strata found in the project area representing for a period of 10 years before the start of the crediting period. The description must indicate the source of that data. The average and standard deviation of the annual amount of area allotted for the specific conversion must also be reported. Additionally, the description of the one-sided t-test as well as the power of the t-test must also be provided. A table with estimated leakage applicable for different conversion strata for the duration of the project crediting periods must be included in the PD.

- Description and demographic information of the communities that are dependent on the project area must be provided. The communities’ demand of different wood products that is met by the project area (wholly or partially) must also be described. If the project activities intend to supply some or all of the wood products’ demand, then, the estimated quantity must be reported. If the leakage prevention activities supply some of the forest products then this quantity must be included. If the leakage prevention activities can supply alternative products that can reduce the demand of wood products then such
activities must be described.

A table with values for $\Delta_{\text{LPP}}$, $\Sigma_{\text{LPP}}$, $L_{\text{P,LPP}}$, and $E_{\text{LPP}}$ must be provided.

Auditor Response 2: The methodology now contains appropriate methods for estimating effects of leakage due to the displacement of forest products. The finding is closed.

Closing Remarks: The Proponent’s response adequately addresses the finding.

NIR 2011.29 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 10.3

Finding: Section 10.3 states that “If an emission source is found to be insignificant, it shall be omitted.” The VCS AFOLU Requirements section 4.3.3 allows GHG sources to be omitted 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. Conceivably, several emissions sources could be individually insignificant, but taken together significant. Please clarify in the methodology that the all omitted emissions sources must together be insignificant, rather than the individual sources.

Proponent Response:

Test the significance of increase in GHG emission from project activities using CDM A/R methodological tool “Tool for testing significance of GHG emissions in A/R CDM project activities” and omit insignificant emissions from NER calculation.

Auditor Response: The methodology document now references the CDM A/R tool in a way that is consistent with the VCS standard.

Closing Remarks: The Proponent’s response adequately addresses the finding.
Finding: The PD reporting requirements listed on page 8 refers to several variables that are not discussed elsewhere in the methodology. It is not clear how these variables are calculated or used in the overall quantification of net GHG benefits for the project. Similarly, the variable "GHG_otherLeakageSources(t)" that appears on page 44 does not appear to be discussed elsewhere in the methodology. Each of the variables included in the leakage analysis must be clearly identified, with consistent notation used in the main text of the methodology and in the sections describing PD reporting requirements. The methodology must provide a procedure for calculating each term.

Proponent Response:

• We assume the reference to p8 was regarding variables x, y, and t. These variables were removed from the methodology since they are not relevant anymore because the VCS definition of degradation is followed

• GHG_otherLeakageSources(t) was removed from the list

• Each of the variables included in the leakage analysis is now clearly identified, with consistent notation and procedures to calculate each term.

Auditor Response: The missing variables have been removed from the methodology document.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NIR 2011.31 dated 06/03/2011

**Standard Reference:** VCS Version 3 section 4.7

**Document Reference:** Section 11.1.1

**Finding:** Section 11.1.1 requires that uncertainty around volumes extracted be reported as the half width of a confidence interval, but the confidence level to be used for this interval is not provided. Additionally, please provide an equation for adjusting $C_{\text{HWP,project}}$ and $C_{\text{HWP,baseline}}$ to remove any ambiguity over exactly how the adjustment should be applied.

**Proponent Response:** Concerns were addressed by supplying the following information in the methodology:

In case the uncertainty, quantified by the half-width of the 95% confidence interval, is smaller than 15% of the volume of timber extracted, no adjustment for uncertainty must be applied. If however, the uncertainty is greater than 15% of the volume of timber extracted, $C_{\text{HWP,project}}$ must be adjusted upwards with its associated uncertainty and $C_{\text{HWP,baseline}}$ must be adjusted downwards with its associated uncertainty using following equation.

\[
C_{\text{HWP,project}} = C_{\text{HWP,project}} \cdot (1 - \text{Uncertainty}_{\text{project}})
\]

\[
C_{\text{HWP,baseline}} = C_{\text{HWP,project}} \cdot (1 + \text{Uncertainty}_{\text{baseline}})
\]

\[
\text{Uncertainty}_{\text{baseline}} = \text{Uncertainty}_{\text{project}}
\]

All other parameters are as defined previously

**Auditor Response:** Adequate guidance for making uncertainty adjustments has been provided.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
NIR 2011.32 dated 06/03/2011

Standard Reference: VCS Version 3 section 4.7

Document Reference: Section 11.1.2

Finding: Present the derivation of the factors given in Table three from the data reported in Winjum 1998.

Proponent Response: Table 2 of Winjum et al. (1998) presents annual oxidation fractions of wood commodities that burn or decay each year within three major forest regions of the world. We applied the following exponential decay function:

\[ N(t) = N(0).e^{-\lambda t} \]

Where \( N(t) \) is Carbon in year \( t \), \( N(0) \) is carbon in year 0, \( \lambda \) is annual oxidation fraction (from Winjum et al (1998)'s table) and \( t \) is 100 years (i.e. to estimate remaining carbon fraction on Year 100). To remain conservative, we have rounded the values to nearest lower integer.

Since this is a simple derivation of value, we do not think it is necessary to provide this derivation in the methodology. We have provided the derivation to the assessor for clarification.

Auditor Response: I checked these calculations and did not reproduce the same results as described in the response. For example, Winjum et al report an annual oxidation fraction of 0.005 for boreal sawnwood. Applying the standard exponential decay function as discussed in the response yields:

\[ N(100) = \text{Exp}(-0.005 \times 100) = .61 \]

If the oxidized fraction is calculated as 1 - [remaining fraction], the oxidized fraction = 0.39, not 0.36 as reported in Table 8 of the methodology. I can replicate the oxidation fractions given in the methodology (within rounding error) if I use 95 years, rather than 100. It is not clear to me, however, based on the Winjum et al paper, whether a 100 year time interval or a 95 year time interval is appropriate. Long lived products are considered those persisting five years or more, but I could not tell if the proportion of carbon entering that pool already considers oxidation of products in the long term class that occurs in the initial five years. Please explain which value is more appropriate (or conservative) and apply that justified value.

Proponent Response 2: The oxidation fraction used in the equation to estimate amount of C stock contained in long lived wood products applies only for the portion of wood that goes into long lived wood product category. The long-lived wood product category is assumed to emit C during year 5 and 100. Thus, the effective number of years in which decay occurs is 95 years. Therefore, we have to project values for 95 years instead of 100 years. However, we also noticed that some of values are not exact in Table 8 and therefore we have modified the table 8 as below:

<table>
<thead>
<tr>
<th>Wood product category</th>
<th>Forest region</th>
</tr>
</thead>
</table>

Boreal Temperate Tropical

Sawnwood 0.378 0.613 0.850

Wood base panel 0.613 0.850 0.977

Other industrial round wood 0.850 0.977 0.999

Paper and paperboard 0.378 0.613 0.999

**Auditor Response 2**: The justification provided for using a 95 year oxidation period is adequate. The calculated values are consistent with calculations made by the auditor.

**Closing Remarks**: The Proponent’s response adequately addresses the finding.

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**NIR 2011.33 dated 06/03/2011**

**Standard Reference**: VCS Version 3 section 3.4

**Document Reference**: NA

**Finding**: Please clarify whether the methodology is applicable to grouped projects. If project grouping is allowed, please specify how the methodology accounts for multiple project areas.

**Proponent Response**: The methodology is not applicable to grouped projects. However, the project may contain multiple non-contiguous areas. The procedure to account for this is described in section 8.1.1. Describe Spatial Boundaries of the Discrete Project Area Parcels.

The procedure follows approach used in approved VCS methodology VM0006.

**Auditor Response**: The clarification is adequate.

**Closing Remarks**: The Proponent’s response adequately addresses the finding.
Finding: Section 3.4.3 of the AFOLU requirements requires projects that conserve peatlands to address hydrological connectivity to adjacent areas, establish buffer zones around the project area, and account for any greenhouse gas emissions in the buffer zone. Please provide a method for establishing this zone and accounting for emissions in this zone.

Proponent Response: Applicability condition 7 now specifies the buffer zone requirement.

If the area that is hydrologically connected to the project area in which peat is present extends beyond the project area boundary, it is required to establish a buffer zone around the project area with peat. It must be ensured that no draining occurs in this buffer zone. It is allowed that the buffer zone extends beyond the project area boundary if agreements are put in place with land owners of the land outside the project area to ensure that no draining occurs in the buffer zone. However, if such agreements cannot be established, the buffer zone must be established inside the project boundary. The width of the buffer zone must be established using the procedures in Section 5.3.

Section 5.3 contains procedures on how to delineate the buffer area.

A map indicating the extent of the area that is hydrologically connected to the project area in which peat is present shall be presented at validation. This map must contain the extent of the buffer zone as specified in applicability condition 7. The area that is hydrologically connected to the project area shall be determined using a hydrological model to simulate the water table depth under known hydrological conditions according to the following flow diagram. […]

Auditor Response: The revised text meets the intention of the PRC guidelines. However, please specify that agreements with landholders in the buffer zone must be binding, and indicate the means for accounting for any emissions as a result of a violation of those agreements.

Additionally, if the width of the buffer zone is to be estimated using a hydrologic model, it is important that that model be calibrated using site-specific data (for example, bulk density). Please include a requirement that project proponents calibrate hydrological models using data measured at the project site.

Proponent Response 2: Agreed. Drainage in the buffer zone resulting in increased emissions in the project area under the project scenario will be evident in the monitoring data (i.e. water table depth and peat emissions). No additional monitoring procedures are necessary to detect a violation. We included the following adjustments to the text to integrate the comment:

If the area that is hydrologically connected to the project area in which peat is present extends beyond the project area boundary, it is required to establish a buffer zone around the project area with peat. It must be ensured that no draining occurs in this buffer zone. It is allowed that the buffer zone extends beyond the project area boundary if legally binding agreements are put in place with land owners of the land outside the project area to ensure that no draining occurs in the buffer zone. However, if such
agreements cannot be established, the buffer zone must be established inside the project boundary. In the event of when the land owners in the buffer zone violate the agreement and begin drainage activities in the buffer zone, the buffer zone shall be immediately redrawn inside the project boundary and credits shall be calculated using the updated buffer zone from the moment the violation occurs and impacts emissions in the project area. The width of the buffer zone must be established using the procedures in Section 5.3.

In addition, we have included a requirement to use site-specific data for using hydrological model as in text below:

The area that is hydrologically connected to the project area shall be determined using a hydrological model using bulk density and peat depth data measured at project site to simulate the water table depth under known hydrological conditions according to the following flow diagram.

**Auditor Response 2**: The response provides adequate guidance regarding agreements with landholders, emissions accounting, and model calibration.

**Closing Remarks**: The Proponent's response adequately addresses the finding.
NIR 2011.35 dated 06/03/2011

Standard Reference: AFOLU Requirements section 4.4.10

Document Reference: NA

Finding: AFOLU Requirements section 4.4.10 specifies that in PRC projects for which baseline burning of peat occurs, the methodology is required to provide criteria and procedures to demonstrate with fire maps and historical databases that the project area is currently and in the future would be under risk of anthropogenic fires. Please provide these procedures.

Proponent Response: The following was added to 8.1.4.1:

For every conversion stratum that is identified in the baseline scenario and for which subsidence from fire is included, project proponents shall demonstrate that the fire threat is real and anthropogenic. The threat of fire must be demonstrated with fire maps and historical databases on fires on areas within the reference region that are undergoing the specific conversion. The exact rate of peat subsidence from burning must be set in the PD and justified using (1) measurements by project proponents, or (2) literature values such as Couwenberg et al. (2010).

Auditor Response: Using literature values or site specific measurements is appropriate for estimating the rate of peat subsidence from burning (and similarly oxidation). However, the methodology should require consideration of the uncertainty in these variables, especially when they are not based on site-specific data. The requirement that the project proponent use fire maps and historical data to substantiate the risk of anthropogenic fires is adequate and can be examined during project validation.

Proponent Response 2: In order to accommodate your comments on requiring consideration of the uncertainty in estimation, we have added the following:

Whenever a value from literature is used for subsidence from burning or oxidation, the selected value must be reduced proportionally to the uncertainty if the uncertainty exceeds 15%.

The above sentence was further augmented with the following example in the footnote.

If the average subsistence rate from literature is 30 cm year\(^{-1}\) with a reported uncertainty is 20%, project proponents must use 30\(^*\)\((1-20\%)\) or 24 cm year\(^{-1}\). On the other hand, if the uncertainty reported is <15%, then 30 cm year\(^{-1}\) shall be used.

Auditor Response 2: The methodology adequately accounts for uncertainty in selection of literature parameters.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NIR 2011.36 dated 06/03/2011

**Standard Reference:** AFOLU Requirements sections 4.4.8 and 4.4.11

**Document Reference:** Section 6

**Finding:** VCS AFOLU guidance requires that methodologies provide criteria and procedures for identifying baseline scenarios. Relevant sections of the AFOLU guidance for the project types applicable to this methodology are 4.4.8 and 4.4.11. Please update section 6 to explicitly provide criteria and procedures for projects to address these projects address these requirements.

**Proponent Response:** Approved VCS tool VT0001 contains procedures to identify baseline scenarios. As indicated in the tool and other approved methodologies, referring to this tool is sufficient to meet the requirements regarding selecting the most likely baseline scenario. We refer to VT0001 in Section 6 of the methodology.

The most current version of the VCS “VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities” must be used to determine the most likely baseline scenario.

**Auditor Response:** The referenced tool states “The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity.” Additionally, section 2.2.3 of the Tool indicates that “The baseline methodology that would use this tool shall provide for a stepwise approach justifying the selection and determination of the most plausible baseline scenario.” Consequently, it is not adequate to simply refer to the tool in establishing the most plausible baseline. It is unfortunate that other methodologies have been approved that reference this tool without providing criteria for justifying the selection of the most likely baseline scenario, as the tool explicitly requires methodologies to provide this guidance. Please provide a stepwise approach for justifying the determination of the most plausible baseline scenario.

**Proponent Response 2:** We have modified the section as below:

The most current version of the VCS “VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities” must be used to determine the most likely baseline scenario. The procedures described in VCS tool VT0001 must be followed to identify and analyze the alternative baselines. The most plausible baseline must be selected from the list of available alternative baselines using the step-wise approach below. The selected baseline shall be planned conversion to a non-forest land use. The areas or strata where the most plausible baseline scenario is not the planned conversion of forest to non-forest land-use shall be excluded from the project area. The following steps must be repeated for each of the strata of the project area to justify the selected baseline scenario:

a. Demonstrate that the project area is suitable for selected alternative non-forest land-use. Suitability of conversion to non-forest land-use must be described by providing a detailed account of accessibility to
relevant markets for the goods and services derived from project area, and suitability of soils, topography and climate for intended conversion. Exclude any areas that were found to be unsuitable for non-forest land-uses from the project.

b. For all the areas that were found to be suitable for conversion to non-forest land-use, enumerate and describe all the possible agents of planned forest deforestation in the region. An agent of the planned deforestation can be either the land-owner, or the right holder.

- If a specific agent of deforestation can be identified, it must be demonstrated that this specific agent of planned deforestation is likely to proceed with conversion within the project credit period in absence of AFOLU project. The likelihood of deforestation by the specific agent of deforestation must be demonstrated by providing documentary evidence that demonstrates legally approved conversion by the identified agent of deforestation. The evidence used may be one or more of the following:
  - Valid forest conversion license owned by agent of deforestation.
  - Documentation that a request for approval for forest conversion has been filed with the tenure holder and relevant government department, if applicable.
  - Documentation that provides evidence of landowner investment to establish suitability of project lands to proposed post-deforestation land use.
  - Record of planned deforestation activities of agents in the past 10 years in the country.
  - Purchase offer of the project area by an entity to convert the land to non-forest land-use
  - Bid for conversion announced by the land-owner.
- If no specific agent of deforestation can be identified, the likelihood of deforestation must be demonstrated through the existence of three conversion permits on other areas within the union of a 250-km buffer around the project area and the jurisdiction with decision-making authority on concession permitting.

The justification of selection of a baseline scenario is strong when more than one of the criteria mentioned above holds true or when more than three conversion permits are presented. When multiple deforestation agents are identified, the most plausible agents for that spatial unit must be selected.

c. Provide a description of the planned conversion activities of the most plausible agent of planned deforestation in areas similar to the project area. If the most likely agent can be specifically identified but has never converted areas similar to project area, then project proponents must demonstrate that it is indeed likely that such conversion may take place in absence of the project activity. The propensity of conversion can be demonstrated by providing a verifiable description of conversions taking place within the jurisdictions such as province, state or region within the past 10 years. The descriptions could be augmented with relevant documents, images and maps, if available. Verifiable historic account of such conversion may come from several sources including scientific publications based on primary data using
social assessment, government records, remote sensing assessments and management plans.

**Auditor Response 2**: The methodology now provides an appropriate stepwise approach for justification of the most plausible baseline scenario.

**Closing Remarks**: The Proponent’s response adequately addresses the finding.
NIR 2011.37 dated 06/03/2011

Standard Reference: AFOLU Requirements section 4.5.15

Document Reference: Section 8.4.3

Finding: AFOLU requirements stipulate that the methodology determine the peat depletion time and ensure that no GHG emission are claimed for longer than the time it would have taken for the peat to be lost under baseline conditions. Please modify the algorithm discussed in section 8.4.3 to ensure the peat depletion time is explicitly considered and reported and that no emissions from a given area of peatland are claimed beyond the peat depletion time.

Proponent Response: The algorithm in section 8.4.3 already included that there are no emissions from peatland beyond the peat depletion time. More specifically, peat subsidence from burning, as well as peat subsidence from oxidation is bound by the remaining peat depth:

\[
\Delta \text{depth}_{\text{burning}}(j, t_{\text{model}}) = \min(\text{subidence}_{\text{burning}}(j, t_{\text{model}} - \text{conversion}(t) + 1) \cdot \text{depth}(j, t_{\text{model}}), \text{drainage}(j, t_{\text{model}} - \text{conversion}(t) - 40))
\]

\[
\Delta \text{depth}_{\text{oxidation}}(j, t_{\text{model}}) = \min(\text{subidence}_{\text{oxidation}}(j, t_{\text{model}} - \text{conversion}(t) + 1) \cdot \text{depth}(j, t_{\text{model}}))
\]

However, since this was apparently not sufficiently clear, we elaborated on this in the revised revision of the methodology.

For each of the cells that were converted in the current time step or before, calculate the annual subsidence for every grid cell.

\[
\Delta \text{depth}_{\text{burning}}(j, t_{\text{model}}) \text{ shall be set to the smallest of the following three values:}
\]

\[
(1) \quad \text{subidence}_{\text{burning}}(j, t_{\text{model}} - \text{conversion}(t) + 1)
\]

\[
(2) \quad \text{depth}(j, t_{\text{model}})
\]

\[
(3) \quad \text{drainage}(j, t_{\text{model}} - \text{conversion}(t) - 40)
\]
If the drainage level is less than 40 cm, \( x \) must be set to 0.

Per (1), the subsidence cannot be greater than the typical subsidence for a given time after conversion as specified in section 8.1.5.1. Per (2), the subsidence cannot be greater than the depth of the remaining peat. Per (3) the actual burn depth is restricted by the depth of the peat layer that is at least 40 cm above the water table. The latter is necessary since it must be considered that only dry peat can burn. As a consequence, if the drainage level is less than 40 cm, no burning can occur and \( x \) must be set to 0.

Likewise, \( y \) shall be set to the smallest of the following two values

\[
\begin{align*}
(1) & \quad \text{sub} \text{idence}_{\text{model}}(t, t_{\text{model}}) - \text{conversion}(t) + 1 \\
(2) & \quad \text{depth}(t, t_{\text{model}})
\end{align*}
\]

As a consequence, peat subsidence will follow the common pattern after conversion as specified in section 8.1.5.1, and no peat subsidence can happen after the end of the peat depletion time.

**Auditor Response:** The new language more clearly explains the process applied in the peat model. The peat depletion time is adequately considered. The finding is closed.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
**NIR 2011.38 dated 06/03/2011**

**Standard Reference:** AFOLU Requirements section 4.5.18

**Document Reference:** Section 4

**Finding:** AFOLU Guidance requires that, for peat conservation projects, the maximum quantity of GHG emission reductions claimed by a project shall not exceed the net GHG benefit generated by the project 100 years after its start date. Applicability condition 11 requires a similar demonstration, but the methodology is not clear regarding how the project is to demonstrate this difference. The methodology must provide a specific method of assessing the estimated peat stock at the 100 year mark. As stipulated by AFOLU guidance section 4.5.18, this must be accomplished by providing a method to estimate the remaining peat carbon stock in both the project and baseline scenarios, adjusted for any project emissions and leakage emissions, while taking into account uncertainties in modelling and using verifiable assumptions.

**Proponent Response:** The following applicability criterion was added:

The maximum quantity of GHG emission reduction claimed by the implemented project from peat component shall not exceed the net GHG benefits generated by the project 100 years after the start date. This condition must be verified using the procedures in Section 8.4.4.

Section 8.4.4 details:

Use Equation [EQ29] to estimate the ex-ante NERs for a 100-year period following the start of the crediting period. Similar as to section 8.4.4, prepare a table with all the individual terms of Equation [EQ29], for the 100-year period. If any assumptions have to be made in order to extrapolate the estimates to 100 year, they shall be reported in the PD. Verify that:

\[
\sum_{f=1}^{\text{Project Related}} \text{NER}_f(t) \leq \sum_{f=1}^{\text{Baseline Related}} \text{NER}_f(t)
\]

**Auditor Response:** An appropriate method has now been provided to demonstrate that the maximum quantity of GHG emission reductions claimed by a project shall not exceed the net GHG benefit generated by the project 100 years after its start date.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
NIR 2011.39 dated 06/17/2011

Standard Reference:

Document Reference: Section 8.4 Equation 14

Finding: Equation 14 appears to be incomplete as it only includes parameters for N2O, however the parameter list (on page 26) also includes CH4. The equation should be corrected to include emissions from CO2, CH4 and N2O.

Proponent Response: Thanks for pointing that out. The equation is corrected as below:

\[
E_{\text{peat burning}}(t, t_{\text{end}}) = \left( \frac{44}{28} \cdot \frac{\text{GWP}_{\text{CH}_{4}} \cdot \text{ER}_{\text{CH}_{4}}}{y} + \frac{16}{12} \cdot \frac{\text{GWP}_{\text{N}_{2}O} \cdot \text{ER}_{\text{N}_{2}O}}{y} \right) \cdot \Delta \text{depth}_{\text{burning}}(t, t_{\text{end}}) \cdot BD(0) \cdot \frac{CF}{100}
\]

Please note the same issue was raised in NCR 18.

Auditor Response: This equation appears to have been derived from equation 3.2.19 in the IPCC Good Practice Guidelines for Land Use, Land Use Change and Forestry (2003). The method appears to be sound and has been adapted reasonably from the IPCC guidance to the context of this methodology. However, it is not clear if the parameters (emission ratios) given by the IPCC guidance are relevant for peat burning. We note that the paper cited by the IPCC to derive the default emission ratios is a study of burning in savannah systems. We’re conducting some additional research here. If you have additional information supporting the suitability of these default values for peatlands, please pass it on the audit team.

Update: We were unable to locate evidence that the provided emission ratios are appropriate for peat burning. Please provide evidence that the ratios provided are appropriate for peat, or utilize a method of quantification developed for peat.

Proponent Response 2: Proponent’s Response

We discussed this issue over phone and we believe that the approach used in this methodology is conservative as emissions from CH4 and N2O is higher for peat-soil than other biomass. Our elaborated response that was provided on April 6, 2012 to the validator (which was ultimately considered sufficient) is included below:
There are three parameters on “ratio”. The first being $r_p$, C:N ratio and C:N ratio of soil will still be conservative because the ratio is lower for peat soil because of potentially higher N concentration in peat. And we believe this is the issue with this NIR.

The other emission ratio used here is ER of N2O and ER of CH4. These ratios respectively represent the amount of N2O and CH4 in relation to amount of C in the peat. Once we know amount of C contained in peat, the ratio of nitrogen can be estimated from C:N and the CH4 is estimated from C that is transformed to methane during the burn.

The emissions ratio of CH4 were well-documented in Muraleedharan et al. (2000). The default value used in the methodology is in conformance with the range provided by Muraleedharan et al. (2000). Muraleedharan (2000) cites Ward and Hardy 1984 to confirm these emissions ratio. We however did not look at Ward and Hardy (1984). Similarly, Levine (1999) suggested an emission ration of 1.04% based on their study of peat soil burning.

Saharjo et al. 2010 have concluded that the N2O emissions from peat grass are higher than emissions from peat soil because of higher concentration of N in grass. Their study, however, did not calculate the ratio but report the figure in terms of “ppm” and therefore, direct comparison for emissions ratio could not be made. However, the conclusion of their assessment is that the N2O emissions reduction from grassland is higher than that of peat soil.

All of these literatures suggest that the emission from CH4 and N2O is higher from peat burning compared to biomass burning and therefore, using ratio of biomass burning is conservative when data from peat burning is not available. Supporting our conclusion, Raison et al. (2011) based on review of literatures, suggests using the emissions factors for biomass (the default values from IPCC) for peat burning. These values are respectively 6.8 for CH4 and 0.2 for N2O in kg/kg of peat for estimating emissions from Non CO2 GHG from burning peat. These factors if converted based on the actual concentration of carbon in peat soil (i.e., 30-50%) will be similar to the one used in our methodology and still conservative. The default value provided in the methodology is most conservative. However, the methodology allows for using other emissions ratios that are higher than the suggested default value, provided that such values can be justified. We have included literatures referenced in our assessment.

Auditor Response 2: The methodology developers provided adequate literature-based evidence that the selected parameters are conservative. The finding has been closed.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NIR 2011.40 dated 06/17/2011

Standard Reference: NA

Document Reference: Methodology Document Section 8.4, page 23

Finding: Please provide more explanation of purpose and source of the figures presented in the Table on page 23.

Proponent Response: This table was put in the document as to provide an aid to the user of this methodology. The data contained in this table does not reflect the actual subsidence happening in any place. A new title is now included for this table implying that the table is an example (for illustration). By making such a table, it will be easier to the user to understand how to model the net emission in the successive steps. The table is provided with the following caption:

Table 6. Example of peat subsidence rates during the project crediting period.

Auditor Response: The table has been appropriately clarified.

Closing Remarks: The Proponent’s response adequately addresses the finding.

OFI 2011.41 dated 06/17/2011

Standard Reference: NA

Document Reference: Methodology Document General

Finding: All tables in the methodology should have titles and numbers to aid the referencing of portions of the methodology.

Proponent Response: Titles and numbers were added to tables that were missing titles and numbers.

Auditor Response: No response is required for OFIs. The tables have been clearly titled and numbered.

Closing Remarks: The Proponent’s response adequately addresses the finding.
### NIR 2011.42 dated 06/17/2011

**Standard Reference:** NA

**Document Reference:** Methodology Document Section 8.4.2

**Finding:** Please clarify if sampling of key peat parameters such as peat depth and bulk density is required to generate ex-ante estimates. The current text states that “sampling information must be available for validation and/or verification.” This statement does not provide a clear requirement to provide sampling data in the ex-ante case. Is this intentional?

**Proponent Response:** The methodology now requires measuring peat depth (in both ex-ante and ex-post) through sampling so that the uncertainty is less than 15% at 95% confidence. The sentence - The details of the sampling procedure must be available for validation and/or verification - was deleted for clarity and new details were added as below:

Peat samples must be taken at various points in the project area. The sample size must be selected so that the precision is less than 15% with 95% confidence. Samples from the entire peat profile i.e., from the surface to the mineral soil level or the maximum subsidence depth (if the latter can be substantiated), must be collected and analyzed. The maximum subsidence value must be obtained from scientific literature based on research undertaken in areas similar to project area. In the peat samples, bulk density must be determined empirically. The concentration of carbon can be obtained either by laboratory analysis or by a literature review. The peat depth measurements must be interpolated using kriging. The minimal peat depth at 95% confidence must be used to calculate emissions and emission reductions.

Please also look at our response to “VCS_TGC_NIR-2011.48_Sampling Requirements_061711.doc” for related issue.

**Auditor Response:** The field sampling requirements have been clarified and are adequate.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
NCR 2011.43 dated 06/17/2011

Standard Reference: NA

Document Reference: Methodology Document Section 8.4.2

Finding: The text of this section does not provide the project developer with adequate guidance on the requirements for key project parameters, in particular the sampling requirements. Specifically this section suggests that a literature review would be adequate to provide estimates of peat depth in the project area. Such an approach would be difficult for a third party to evaluate conformance to the required confidence interval at validation.

Proponent Response: We have elaborated on this aspect. The specific paragraph is now:

• Procedures to determine peat depth. A peat depth map shall be created by empirically measuring peat depth at various locations throughout the project area. Peat depth must be measured from the surface of the peat layer to the top to the mineral soil level or at least to the maximum subsidence. Peat samples must be taken throughout the peat profile and analyzed for bulk density and carbon content. It is allowed to use literature values for bulk density and carbon content if it can be demonstrated that their use is conservative. Project proponents must either (1) demonstrate that the precision for bulk density measurements is smaller than 15% at the 95% confidence level or (2) if the precision is greater than 15%, apply an uncertainty deduction that is proportional to the actual precision. The exact procedures used to measure peat depth and analyze peat samples must be duly recorded in a Standard Operations Procedure (SOP) that must be made available to an auditor at validation of the Project Document.

Auditor Response: The methodology now requires that peat depth be assessed using measurements made on the project site. Further the methodology now requires bulk density and carbon content be measured on site and the uncertainty in these parameters accounted for.

Closing Remarks: The Proponent’s response adequately addresses the finding.
Finding: Please explain the following requirement stated in this section: ‘Create a table showing the amount of land present in each peat 10-cm depth intervals for every peat conversion stratum”. Why does peat depth need to be recorded in 10cm increments and how does this relate to the accuracy of the fieldwork?

Proponent Response: This section in the methodology was significantly expanded and elaborated upon. The only purpose of this table is to provide an overview of the peat presence in the project area. This is now clarified:

Finally, project proponents shall create a table showing the amount of land present in 10-cm intervals of minimum peat depth with 95% confidence for every peat conversion stratum (see Table 7). The goal of this table is to provide an overview of how much peat is present in the project area.

Auditor Response: The purpose of the table has been sufficiently clarified.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NCR 2011.45 dated 06/17/2011

Standard Reference: NA

Document Reference: Methodology Document Section 8.4.2

Finding: Peat depth should be established from sampling to the mineral soil. The text of Section 8.4.2 indicates that peat depth to 30cm must at least be taken, indicating that 30cm would be sufficient. This text should be clarified to ensure that the full peat profile is established, or at least to a depth beyond the maximum for subsidence.

Proponent Response: We have edited the relevant sentence as below:

Soil samples must be collected and analyzed for the entire peat profile i.e., from the soil surface to the mineral soil or at least to the maximum subsidence. The value of maximum subsidence must be obtained from scientific literature based on research carried out in areas similar to project area.

Auditor Response: Please revise the language in this section of the methodology to indicate that the value of maximum subsidence for the project life must be calculated from annual subsidence rates taken from scientific literature based on research carried out in areas similar to project area. Otherwise, the response is sufficient

Proponent Response 2: We have edited the relevant sentences as below (in current section of 8.1.4.2)

Soil samples must be collected and analyzed for the entire peat profile i.e., from the soil surface to the mineral soil or at least to the maximum subsidence for the project life. The value of maximum subsidence for the project life must be calculated from the annual subsistence rates as determined in section 8.1.4.1.

Auditor Response 2: The requested revisions have been made.

Closing Remarks: The Proponent's response adequately addresses the finding.
Finding: The methodology states that samples must be taken, however it is not clear what samples must be taken and what parameters can be sourced from the literature. Please clarify what samples must be taken in the field.

Proponent Response: Peat depth must be measured in the field, bulk density and carbon content may be measured in the field, but may also be derived from literature values. The text in Section 8.1.4.2 has been revised as following:

• Procedures to determine peat depth. A peat depth map shall be created by empirically measuring peat depth at various locations throughout the project area. Peat depth must be measured from the surface of the peat layer to the top to the mineral soil level or at least to the maximum subsidence. Peat samples must be taken throughout the peat profile and analyzed for bulk density and carbon content. It is allowed to use literature values for bulk density and carbon content if it can be demonstrated that their use is conservative. Project proponents must either (1) demonstrate that the precision for bulk density measurements is smaller than 15% at the 95% confidence level or (2) if the precision is greater than 15%, apply an uncertainty deduction that is proportional to the actual precision. The exact procedures used to measure peat depth and analyze peat samples must be duly recorded in a Standard Operations Procedure (SOP) that must be made available to an auditor at validation of the Project Document.

• Required number of peat depth sampling locations. It is impossible to measure peat depth at every location of the project area. Therefore, it is sufficient to measure peat depth at key locations within the project area and interpolate the peat depth in between the measured locations using an interpolating technique such as kriging (see “Interpolating measurements of peat depth”). Similar as to the sampling design for biomass stock densities, the determination of the sample size (number of peat depth sampling locations) required is dependent on (1) the required precision of 15% at 95% confidence level and (2) the variability of the peat depth across the project area. Since peat depth is a continuous variable across the project area, the precision is quantified using the estimation standard deviation, divided by the mean peat depth:

\[ Y_{modeled}(i) = \sqrt{\frac{\sum(X_{modeled} - X_{measured})^2}{n}} \] [EQ12]

\( Y_{modeled}(i) \) must be estimated using leave-one-out cross-validation, as is described further in this section (“Cross-validation of peat depth measurements”).

While the exact number and locations of peat depth sampling is not prescribed within this methodology, project proponents must demonstrate that the resulting peat map is conservative. Unfortunately, there is no closed-form and analytical solution available to determine the correct number of samples \( n \) for a given precision and confidence level, as there is for biomass plots. Instead, project proponents shall sample peat depths in multiple phases and iteratively increase the number of sampling locations until the precision is reasonably close to 15%. Note that it is not required to have the precision exactly 15% since
the peat depth map that is used for crediting is discounted for uncertainty and indicates the minimal peat depth with 95% confidence. The number of sampling locations and the geographic coordinates of the sampling locations shall be included in the SOP. It is allowed to gradually expand the number of locations where peat depth was sampled during the project crediting period so that costs can be spread over time.

Locations of peat depth sampling. It is most optimal to measure peat depth in locations where the uncertainty around the expected depth of the peat layer is greatest, such as in areas where the depth of a peat dome changes rapidly or where dendritic peat is present. If project proponents are using an adaptive sampling approach, the standard error of an interpolated (e.g., kriged) surface can be used to determine where the uncertainty around the expected peat depth is greatest. If no other information is available, a random location of peat sampling depth will be statistically most valid. However, a complete random location of peat sampling is often practically challenging due to the time it may take to reach a specific location within a dense peat swamp forest. Therefore, it is recommended to use a combination of transects and random locations to select peat depth measuring locations.

Interpolating measurements of peat depth. Although project proponents are allowed to use any technique to interpolate peat depth in between empirical measurements if it can be demonstrated that the technique is conservative, kriging is a robust technique. Kriging refers to a set of special interpolating techniques from geostatistics. Kriging techniques analyze the variance of the difference between measurements, and its relationship to the distance between the sampling locations. The approximation of this relationship by a model curve provides the variogram, which allows the estimation of the three components for all of the points around the measurements: (1) the general trend in the data, (2) the spatially correlated variation and (3) the spatially uncorrelated noise. The predicted surface produced by kriging remains an estimate, for which a standard error can be calculated. Even though ordinary kriging has shown the best results for interpolating peat depth surfaces, project proponents may use block kriging or co-kriging with ancillary data such as elevation, biomass, inundation, distance to streams, etc. if so desired.

Cross-validation of peat depth measurements. One particular feature of some interpolating techniques, including kriging, is that at the locations where empirical measurements are available, the modelled value is the same as the empirical value. Therefore, to calculate a truly unbiased estimation variance and calculate the difference (Y measured (i) - Y modeled (i) ), one must use leave-one-out cross-validation (LOOCV). Leave-one-out cross-validation involves using a single observation from the original sample as the validation data, and the remaining observations as the training data. This is repeated such that each observation in the sample is used once as the validation data. In other words, one has to conduct a separate interpolating analysis for every sampling location, but always with the value of that particular sampling location left out of the input dataset. The resulting interpolated value is then truly unbiased and can be compared to the empirical measurement by taking the difference (Y measured (i) - Y modeled (i) ).

Auditor Response: It is the opinion of the audit team that, if a hydrological model is to be used in project accounting (including delineation of a buffer area), it must be calibrated using site specific bulk density estimates. See NIR 44 – this response is not consistent with other responses that require bulk density to be measured in the field.

The discussion of sampling location in section 8.1.4.3 is not consistent with that in section 8.1.3.3, which requires that plots be located on a systematic grid. We have some concerns that sampling peat on a systematic grid may not be practical and suggest modifying the methodology to relax this requirement for
peat sampling while still maintaining statistical validity.

Finally, we are concerned that the kriging procedure alone may not be adequate to account for rapid changes in peat depth as the profile of peat is impacted by natural boundaries such as the edges of peat domes and rivers. The methodology must provide a means to model the peat depth that considers these factors.

**Proponent Response 2:** 1. The concern on using site specific bulk density estimates was responded by requiring empirical peat bulk densities (see response on NIR 44).

2. There are two different sampling design sections that are unrelated. Section 8.1.3.3 concerns the sampling design of aboveground biomass and section 8.1.4.2 is related to the sampling design for peat. In other words, the sampling of peat may follow a different sampling design than the sampling of aboveground biomass. This was obviously not clear from the text, so we added a clarifying sentence in the beginning of section 8.1.3.3:

This section relates to determining the sampling design for biomass plots. The sampling design for peat depth locations is explained in Section 8.1.4.2. The sampling of peat may follow a different sampling design than the sampling of aboveground biomass.

In addition, the term "sampling plot" in section 8.1.3.3 was replaced by "biomass sampling plot" in section 8.1.4.2.

3. It is true that kriging may not be able to account for abrupt changes in peat depth along natural boundaries such as rivers. However, the issue of not being able to detect abrupt changes in peat depth is endemic for most interpolation techniques, including linear interpolation. Simply, if one does not measure exactly where the abrupt change happens, one will not be able to predict the exact shape of the peat dome. However, out of all interpolation techniques, we selected kriging since, in most cases, kriging will outperform other techniques. In addition, kriging produces also an estimate of the uncertainty of the predicted surface. So, if a significant amount of abrupt changes in peat depth are present, the measured peat depth will be variable over short distances (even if one does not completely know where the abrupt change occurred). This increase in variability will lead to an increase in the uncertainty of the interpolated surface, which will lead in turn to a reduced minimal peat depth with 95% confidence. In conclusion, the included methodology is partially robust against abrupt changes in depth of the peat layer. However, to accommodate the concern on uncertainty around peat depth along natural boundaries, we have included the followed requirements in the selection of the peat sampling design (section 8.1.4.2).

Peat depth samples must be taken to cover both elevated areas (anticline) and depressed areas (i.e. syncline) within a dome. A transect across the peat dome is recommended. Additionally, great care must be taken so that sampling intensity is high where sudden changes in peat depth are expected. Therefore, it is recommended that the sampling locations of peat depth are taken perpendicular to natural boundaries such as rivers as well as the most likely shape of the peat dome.

**Auditor Response 2:** The methodology now requires that adequate local parameters be used in model calibration. The allowance for differing sampling designs for peat and biomass samples makes peat measurements more practical. Finally, we agree that, given the methodology’s requirement that peat depth be determined based on a lower bound of a confidence interval determined by kriging, a
Conservative peat depth is likely to result from the applied procedures if adequate sampling is performed in areas of likely rapid change. In order to assess this procedure adequately, validation and verification bodies must carefully assess the adequacy of sampling density, as rapid changes may not be reflected in the kriged surface if sufficient representative sampling has not been carried out.

Closing Remarks: The Proponent’s response adequately addresses the finding.

NCR 2011.47 dated 06/17/2011

Standard Reference: NA

Document Reference: Methodology Document Section 8.4.3

Finding: Please provide a reference for the 40cm depth restriction listed on page 25.

Proponent Response: This is a similar approach to the approved VCS methodology VM0004. The following footnote was added to section 8.1.5.3:

This requirement is analogous to the approved VCS methodology VM0004. The rationale is that the layer of peat 40 cm directly above the lowered water table is too wet to burn due to capillary rise of water in the pore spaces of the peat. Research from temperate peat soils indicates that peat layers remain sufficiently moist up to 40cm above the water table for averagely decomposed peat material (Gnatowski et al., 2002)

The full reference to Gnatowski et al., 2002 is:


This reference was added to the reference list of the methodology. In addition, the paper can be downloaded from http://www.ipan.lublin.pl/artykuly/international_agrophysics/IntAgr_2002_16_2_97.pdf

Auditor Response: The provided reference is adequate.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NCR 2011.48 dated 06/17/2011

**Standard Reference:** NA

**Document Reference:** Methodology Document Section 12

**Finding:** The sampling requirements specified in Section 8.4 of the methodology should be included in the ‘Parameters’ table.

**Proponent Response:** We have added the following parameter table.

<table>
<thead>
<tr>
<th>Data Unit / Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample design</td>
<td>Number of sample plots and design for biomass inventory and peat depth measurements per LULC class or forest strata.</td>
</tr>
</tbody>
</table>

**Source of data:**

Justification of choice of data or description of measurement methods and procedures applied:

Any comment: Sample size must be determined at 95% confidence level and at 15% precision. The design and layout must be documented in standard operation procedures.

A separate sample design must be made for areas on which ANR treatments are planned.

A separate sample design must be made for peat depth, water table and bulk density measurements

**Auditor Response:** The sampling requirements are now adequately described in the table.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
NIR 2011.49 dated 06/17/2011

**Standard Reference:** NA

**Document Reference:** Methodology Document Section 14

**Finding:** In Section 14 the only peat parameter $E_{peat(i,t)}$ monitored is. How is this monitored?

**Proponent Response:** $E_{peat(i,t)}$ is estimated measured from relationship of depth and bulk density. This parameter is removed from the list of parameter.

**Auditor Response:** The procedures for estimating $E_{peat(l,t)}$ have been clarified.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
Finding: The methodology should present an approach to estimating and reporting uncertainty. The parameters for which uncertainty should be reported/estimated need to be defined. Finally, there should be a clear distinction of what the methodology is defining as a default value, a literature value and a site specific value and how uncertainty is addressed in each instance.

Proponent Response: Section 10.2 in the methodology summarizes all uncertainty deduction and explains the approach to estimating and reporting uncertainty. The following is an excerpt from this section.

This methodology requires key components of the carbon accounting to be estimated with 15% precision at a 95% confidence level. If the precision exceeds 15%, a proportional deduction must be applied. Mechanics on how to apply these deduction factors have been prescribed for land-cover classification, forest inventory, and the ANR growth rate. However, for peat depth, this approach cannot be applied. For peat depth, the uncertainty deduction is applied indirectly, by limiting the total size of the peat area to the area for which the confidence that the required minimal peat depth is met is at least 95%. Uncertainty deductions can be avoided by increasing the sampling size of biomass inventories or peat depth measurements. The following is a list of the key components of the carbon accounting for which the uncertainty must be estimated and reported, and for which uncertainty deductions may be applied:

Each of the data/parameter boxes now specifies if it is a default value, a literature value or a site specific value.

Auditor Response: The methodology now includes appropriate methodologies for estimating and accounting for uncertainty.

Closing Remarks: The Proponent's response adequately addresses the finding.
NCR 2011.51 dated 02/07/2012

Standard Reference: AFOLU Requirements V3.2 Section 4.5.3

Document Reference: Methodology Document Section 8.1.3

Finding: Revisions to the VCS AFOLU Requirements released on February 1, 2012 and effective immediately require that the soil carbon, belowground biomass, wood products, and dead wood biomass pools apply decay models for estimating the pattern of carbon loss from these pools over time, rather than assuming that emissions from these pools occur instantaneously. While the methodology accounts for the pattern of carbon loss from peat over time, it does not apply decay models to the belowground biomass, dead wood biomass, and wood products pools as required by the new revisions to the VCS AFOLU requirements. Please revise the methodology to include the required decay models.

Proponent Response: The belowground emission factor is now treated separately in the revised version of the methodology. A temporal component was added to the belowground plant emission factor. The general equation includes the time-dependent component of the belowground biomass.

The following adjustment were made to section 8.1.3.5:

The total belowground biomass emission factor must be spread over time by a temporal component. Project proponents may propose their own temporal component (e.g., an exponential equation) if the conservative nature of the temporal component can be demonstrated using peer-reviewed literature or measurements conducted by the project proponents. If no temporal component is proposed by the project proponents, the default temporal component from the VCS shall be used using the following formula:

$$EF_{Plant \_eq}(\text{classStratum1} - \text{classStratum2}, t) = \frac{TEF_{Plant \_eq}(\text{classStratum1} - \text{classStratum2})}{10}$$

For \( t > 10 \):

$$EF_{Plant \_eq}(\text{classStratum1} - \text{classStratum2}, t) = 0$$

Auditor Response: The approach taken for the belowground emission factor is now consistent with the revised VCS requirements. However, the methodology does not apply a decay model to the dead wood biomass pool or wood products pool as required by the revised VCS requirements (please see the specific requirements in section 4.5.3 of the AFOLU Requirements v3.2).

Proponent Response 2: It was an oversight that we did not have temporal component for dead wood carbon pool. We have now added a procedure to estimate emissions factors for dead wood. Additionally, for areas that do not contain peat soil, temporal component is also needed for estimating GHG emissions from soil organic matter. We have included temporal component for non-peat soil as well. Approaches for non-peat soil and dead-wood follow the same principal that was implemented in accounting for carbon in
below-ground pool in principal i.e., emissions from these pools were linearly distributed over time. For soil, we have used IPCC default approach and for deadwood we have used VCS’s default approach. In order to accommodate these changes, we had to modify section 8.1.3.4 (measure carbon stock densities), section 8.1.3.5 (calculate emission factor) and section 8.4.3 (Calculate Ex-ante NERs) as well as data monitoring sections (section 9.1 - 9.3) of the methodology.

Additionally, we have revised section 8.4.1 i.e. procedure to account for carbon emissions from harvested wood products pool. With this revision some changes were also made in section related to monitoring in section 9.

As the revision made to address this concern spanned over multiple sections, we request auditor to look at the recent methodology version of the document. The tracked change version of the document clearly shows these changes.

Auditor Response 2: The revised document now contains adequate methods for incorporating decay models that are consistent with the revised VCS requirements.

Closing Remarks: The Proponent’s response adequately addresses the finding.
**Finding:** Public comments expressed concern over the use of reference regions to determine baseline conversion rates. The reference region approach has been employed in most existing approved VCS REDD methodologies, therefore the auditor does not believe there is grounds to disallow its use in the current context. However, the concerns of the commenter are relevant – reference regions that differ significantly from the project area in terms of, for example, access, topography, or biophysical factors may indeed have differing conversion rates, even if both the reference and project regions have been assigned concessions. As a result, the methodology developer is asked to develop additional criteria for selecting reference regions to ensure conversion rates observed in reference regions are representative of those expected in the project region, considering these factors.

**Proponent Response:** We have revised the section 8.1.2.2 to include the following criteria for selecting a reference region.

- Lies within 250 km distance from the project boundary and is located within the jurisdiction of the project area.
- The deforestation agents or group of agents in the reference region are similar to the deforestation agents or groups of agents in the project area.
- Forest in the reference region is similar to the project area. For example the presence of species or species group must be similar or the both areas must have similar dominant forest types or species group
- The slope at the 85% quantile of the distribution of slopes of the project area must be smaller than the maximal slope of the reference region.
- The ecological factors and micro-climate in the reference region must be suitable to support the land use that is expected to be the post-conversion land use in the project area. For example, if the baseline is conversion to oil palm plantation then the reference region must be suitable for oil palm plantations. The suitability may be demonstrated by evidence of historical conversion leading to oil palm plantation.
- The reference region must be comparable with respect to rainfall, length of rainy season, distribution of rainfall over different months and mean annual temperature.
- The land zoning or sanctioning status must be same as that of the project area.

**Auditor Response:** Appropriate criteria for selecting a reference region are now included in the methodology.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
NCR 2011.53 dated 04/17/2012

Standard Reference: NA

Document Reference: Section 8.1.4.1

Finding: Section 8.1.4.1 suggests that the "maximal peat subsidence scenario" is developed from peat burn and peat oxidation rates but only guidance on how peat burn factors is provided. Guidance on peat annual peat subsidence rates should be provided.

Proponent Response: The revised text now clearly explains that the maximal peat subsidence scenario is developed from oxidation and burning. The revised text provides guidance for estimating annual subsidence from oxidation and burning. The revised text with new changes underlined is shown below:

In addition, for every conversion stratum, a "maximal peat subsidence scenario" must be developed. The maximal peat subsidence scenario details how much peat can maximally be lost due to peat oxidation and burning (in cm yr^{-1}) for every year after the conversion. This rate is maximal in the sense that the peat layer never gets depleted beyond this. Separate the maximal peat subsidence rate into the maximal subsidence rate from oxidation and the maximal subsidence rate from burning. The rate of subsidence from oxidation for a specific stratum must be justified given the corresponding drainage level for that stratum. For every conversion stratum that is identified in the baseline scenario and for which subsidence from fire is included, project proponents shall demonstrate that the fire threat is real and anthropogenic. The threat of fire must be demonstrated with fire maps and historical databases on fires on areas within the reference region that are undergoing the specific conversion. The approximate annual rate of peat subsidence from oxidation and burning must be set in the PD and justified using (1) measurements by project proponents, or (2) literature values such as the ones found in Couwenberg et al. (2010). Whenever a value from literature is used for subsidence from burning or oxidation, the selected value must be reduced proportionally to the uncertainty if the uncertainty exceeds 15%. The relevance of the use of any value from literature shall be justified by taking into account climate, peat type, and other relevant factors.

One of the issues that came during our call with validator that the modelling algorithm is not easier to follow and it was recommended that we attempt to simplify the steps. In response, we have now revised the modelling algorithm in section 8.1.4.3. Especially we disintegrated step 2 into two steps. Step 2 describes the procedure to account for emissions from burning while step 3 describes the procedures to account for emissions from oxidation. The revised section looks like:

Calculate Emissions Related to Peat under the Baseline Conditions

*Calculate the emissions related to peat under the baseline conditions using the algorithm described below. This algorithm must be used separately for each of the conversion strata identified. Note that, to remain conservative, the land that is converted every year is allocated first in the peat strata with lower peat depth.*

*Create a data-structure in which all the grid cells developed during kriging have the following data elements:*
- \( \text{PeatDepth}(i,t) \) = remaining peat depth for grid cell \( i \)
- \( \text{conversion}(t) \) = year during the crediting period that the grid cell is converted.
  - Set to 0 at the beginning of the project period.

Sort the grid cells from smallest (or no) peat depth to greatest peat depth, and set \( t_{\text{model}} \), the current year of the peat emission model to 1.

Cycle through the following steps for each year of a 100-year period following the project start date:

1. Mark a number of cells for conversion during year \( t_{\text{model}} \), so that (1) the total sum of the area of the cells marked for conversion equals the annual conversion rate, (2) the cells are marked from smallest peat depth to greater peat depths, (3) the cells have not been converted yet. Mark cells for conversion by setting \( \text{conversion}(t) \) to \( t_{\text{model}} \), the current year of the crediting period.

2. For each of the cells that were converted in the current time step or before, calculate the annual subsidence from burning, \( \Delta \text{PeatDepth}_{\text{burning}}(i,t_{\text{model}}) \), as following:

\[
\Delta \text{PeatDepth}_{\text{burning}}(i,t_{\text{model}}) \text{ shall be set to the smallest of the following three values:}
\]

\[
\begin{align*}
(1) & \quad \text{subsidence}_{\text{burning}}(i,t_{\text{model}}) - \text{conversion}(t) + 1 \\
(2) & \quad \text{PeatDepth}(i,t_{\text{model}}) \\
(3) & \quad \text{drainage}(i,t_{\text{model}}) - \text{conversion}(t) - 40
\end{align*}
\]

If the drainage level is less than 40 cm, \( \Delta \text{PeatDepth}_{\text{burning}}(i,t_{\text{model}}) \) must be set to 0.

Per (1), the subsidence cannot be greater than the typical subsidence from burning for a given time after conversion as specified in section \text{Error! Reference source not found.}. Per (2), the subsidence cannot be greater than the depth of the remaining peat. Per (3) the actual burn depth is restricted by the depth of the peat layer that is at least 40 cm above the water table. The latter is
necessary since it must be considered that only dry peat can burn\(^3\). As a consequence, if the drainage level is less than 40 cm, no burning can occur and \(\Delta \text{PeatDepth}_{\text{burning}}(t_{\text{model}})\) must be set to 0.

3. Once the annual subsidence from burning is calculated, the subsidence from oxidation is calculated next. For each of the cells that were converted in the current time step or before, calculate the annual subsidence from oxidation, \(\Delta \text{PeatDepth}_{\text{oxidation}}(t_{\text{model}})\), as following:

\[
\Delta \text{PeatDepth}_{\text{oxidation}}(t_{\text{model}}) \text{ shall be set to the smallest of the following two values:}
\]

\[
\begin{align*}
(1) & \quad \text{subsidence}_{\text{oxidation}}(t_{\text{model}}) - \text{conversion}(i) + 1 \\
(2) & \quad \text{PeatDepth}(t_{\text{model}}) - \Delta \text{PeatDepth}_{\text{burning}}(t_{\text{model}})
\end{align*}
\]

\[\text{[EQ6]}\]

Per (1), the subsidence cannot be greater than the typical subsidence from oxidation for a given time after conversion as specified in section Error! Reference source not found.. Per (2), the subsidence cannot be greater than the depth of the remaining peat after the subsidence from burning was factored in.

As a consequence, peat subsidence will follow the common pattern after conversion as specified in section, and no peat subsidence can happen after the end of the peat depletion time, as required by the VCS AFOLU Requirements.

4. Calculate the new peat depths for the following time period as:

\[\text{---}
\]

\(^3\) This requirement is analogous to the approved VCS methodology VM0004. The rationale is that the layer of peat 40 cm directly above the lowered water table is too wet to burn due to capillary rise of water in the pore spaces of the peat. Research from temperate peat soils indicates that peat layers remain sufficiently moist up to 40cm above the watertable for averagely decomposed peat material (Gnatowski et al., 2002)
5. Calculate the emissions from peat oxidation and burning as:

\[
E_{\text{peat}}(t, t_{\text{model}}) = E_{\text{peat, oxidation}}(t, t_{\text{model}}) + E_{\text{peat, burning}}(t, t_{\text{model}})
\]

\[
E_{\text{peat, oxidation}}(t, t_{\text{model}}) = \frac{44}{12} \cdot \Delta \text{depth}_{\text{oxidation}}(t, t_{\text{model}}) \cdot BD(t) \cdot \text{CellSize} \cdot \frac{CF}{100}
\]

\[
E_{\text{peat, burning}}(t, t_{\text{model}}) = \left( \frac{44}{38} \cdot \frac{GWP_{CH_4} \cdot ER_{CH_4}}{12} + \frac{16}{12} \cdot \frac{GWP_{CH_4} \cdot ER_{CH_4}}{12} \right) \cdot \Delta \text{depth}_{\text{burning}}(t, t_{\text{model}}) \cdot \text{CellSize} \cdot \frac{CF}{100}
\]

Note that for non-plantation landscapes, the peat emission factor will be very specific to the landscape in question and may be based on past logging history, land use and water management practices, existing drainage infrastructure, and the existence of drainage canals. If it is determined that these factors will significantly impact the peat emission factor, project proponents shall re-stratify the area according to these factors so that the emission factor can be assumed to be homogeneous within one stratum.

6. Increase \( t_{\text{model}} \) by one and repeat the previous steps until \( t_{\text{model}} \) equals the end of the 100-year modeling period.

Calculate the total emissions from peat for year \( t \) of the crediting period as:
\[ E_{\text{peat}}(t) = \sum_{j=1}^{n_{\text{strata}}} E_{\text{peat}}(j, t) \]

Where:

- \( n_{\text{strata}} \) = Number of peat strata [-]
- \( n_{\text{conversions}} \) = Number of conversion types [-]
- \( d_{\text{drainage}}(j, t) \) = Drainage level of conversion type \( j \) at time \( t \) [cm]
- \( d_{\text{depth}}(j, t) \) = Minimal depth of peat for peat stratum \( j \) [cm]
- \( BD(j) \) = Adjusted mean bulk density of peat stratum \( j \) at 95% confidence level The uncertainty in bulk density must be calculated and discounted using the HWCI, see equations [EQ2] through [EQ5] for guidance on how to calculate the HWCI. If the HWCI is less than 15% of the average bulk density in the stratum, no adjustment is necessary. If the HWCI is greater than 15%, the value must be reduced proportionally to the HWCI. [Mg m\(^{-3}\)].
- \( \text{CellSize} \) = Size of square shaped cell [m\(^2\)]
- \( CF \) = Carbon fraction in peat mass
- \( \gamma_9 \) = Carbon-to-nitrogen (C:N) ratio in peat [-]
- \( \text{GWP}_{N_2O} \) = Global warming potential of N\(_2\)O [-]
- \( \text{ER}_{N_2O} \) = Emission ratio of N\(_2\)O [-]
- \( \text{GWP}_{CH_4} \) = Global warming potential of CH\(_4\) [-]
- \( \text{ER}_{CH_4} \) = Emission ratio of CH\(_4\) [-]
- \( E_{\text{peat}}(j, t) \) = Emission from peat from peat stratum \( j \) at time \( t \) [tCO\(_2\)e]
- \( E_{\text{peat}}(t) \) = Emission from peat at time \( t \) [tCO\(_2\)e]
<table>
<thead>
<tr>
<th>Auditor Response</th>
<th>The revised text is now clear about the estimation of annual subsidence from oxidation and burning. The revisions have additionally made the model described in the methodology easier to understand.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closing Remarks</td>
<td>The Proponent’s response adequately addresses the finding.</td>
</tr>
</tbody>
</table>
Finding: The figures presented in Table 6 should be consistent with Couwenberg et al. (2010) to improve its value and avoid confusion as to the intended use of the figures presented.

Proponent Response: We have provided a general guidance for using this table by including the following text:

Table 6 demonstrates examples of estimating subsidence from oxidation and burning for three different conversion scenarios. Drainage activities have been assumed in all of these scenarios. In the first scenario, it is assumed those existing biomasses are burnt by inducing fire. In the second scenario, no fire was assumed. In the third scenario, repeated fire is assumed at alternative years. It was assumed that the fire causes depletion of peat by 34 cm annually (an average loss in tropical peat fire). In Table 6, the subsidence of peat was assumed to take place at the rate of 4.5 cm per year.

And Table 6 was revised and now contains only real values (see below).

Table 6. Example of peat subsidence rates during the project crediting period.

<table>
<thead>
<tr>
<th>Year</th>
<th>Oxidation</th>
<th>Burning</th>
<th>Oxidation</th>
<th>Burning</th>
<th>Oxidation</th>
<th>Burning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.5⁴</td>
<td>34²</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>34</td>
</tr>
<tr>
<td>4</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>34</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>0</td>
<td>4.5</td>
<td>0</td>
</tr>
</tbody>
</table>

⁴ Note that 4.5 cm per year is only an example and represents a subsidence rate when the drainage level is at least 50 cm (Couwenburg et al., 2010).

⁵ Likewise, the 34 cm per year is only an example and is cited by Couwenburg et al. (2010).
* This table serves as an example of subsidence rates for 3 hypothetical conversion scenarios in which, for example, fire is used to convert forest to oil palm plantation (case 1), or the fire recurrence period is every two years after severe degradation (case 3).

**Auditor Response:** The additional language has more clearly described the intent of the table. In particular, it is now clear that the table presents an example, rather than a set of default values.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.

---

**OFI 2011.55 dated 04/17/2012**

**Standard Reference:** NA

**Document Reference:** 8.1.4.3

**Finding:** The steps presented in Section 8.1.4.3 (in particular from Step 2) are not easily followed through to the end estimation of total emissions. Improving clarity of the stepwise process is recommended.

**Proponent Response:** [See finding 53]

**Auditor Response:** Subsequent revisions of the methodology have improved the clarity of these steps.

**Closing Remarks:** The Proponent’s response adequately addresses the finding.
Finding: The methodology received comments from Sandra Brown. Please provide an itemized response to each of these comments, revising the methodology where appropriate.

Proponent Response: We communicated with VCS regarding this. We have been informed by the VCS that the comment by Sandra Brown was posted significantly after the closing of the public commenting period, so that there is no strict requirement from our side to officially respond to the comments and have the responses publically available. However, we are, of course, very much interested in the feedback of an expert such as Dr. Brown, and would be willing to informally revise the methodology and respond to comments if a critical issue would be raised. We added the email communication with the VCS regarding this public comment and that it was not necessary to publically address this comment. We will forward this email to you electronically. Note that the comments from Dr. Brown do not exist anymore on the VCS’ website at the time of writing this response. We carefully looked at the comments from Dr. Brown and concluded that most of the comments were obsolete since they were already taken care of during the revision of the methodology. The other comments were related to a request for justification of why we did not use a specific procedure or an existing methodology. Simply put, we reviewed existing methodologies and procedures but did not feel that they were sufficiently compatible in terms of context and perspective to be used within our methodology. We strongly believe that a healthy and slightly competitive ecosystem of different procedures and methodologies spurs innovation and critical thinking. In the end, it will be the projects themselves and the application of these methodologies that will provide the true test of which methodology or procedure is best to use.

Auditor Response: The methodology developer provided evidence that the comments were received outside of the VCS comment period and that VCS rules do not require a public response. The auditor agrees that the substantive issues raised in the comments have been addressed in revisions made to the methodology since it was first published on the VCS website.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NCR 2011.57 dated 07/06/2012

Standard Reference: NA

Document Reference: NA

Finding: The methodology contains a broken equation reference on page 24. Please correct the reference and search the methodology for any similar errors.

Proponent Response: We corrected that equation. The corrected text appears as below:

\[ EQ7 \] and \[ EQ8 \] are used in estimating the combined……

Additionally, we verified that the document did not contain any other broken references.

Auditor Response: The equation has been corrected.

Closing Remarks: The Proponent’s response adequately addresses the finding.
NIR 2011.58 dated 07/06/2012

Standard Reference: AFOLU Guidelines section 4.7.2

Document Reference: Equation 54

Finding: Section 4.7.2 of the VCS AFOLU Requirements requires “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.” It appears that the non-permanence risk rating is being multiplied by a value that is comprised of quantities other than the change in carbon stocks. In particular, equation 54 includes (7), which refers to the result of equation 52, used to calculate emissions from methane, nitrous oxide, and fuel due to project activities and assisted natural regeneration. Please clarify whether and how the methodology conforms to the requirement of section 4.7.2 of the AFOLU guidelines. If the methodology does not conform to this requirement, please modify the methodology to correct the non-conformance.

Proponent Response: This was an oversight. We have corrected the equation by including the correct components (1, 2, 3, 4 and 8) for estimating the VCUs. The components 1,2,3,4 and 8 respectively refer to: GHG benefits from avoided deforestation excluding areas subject to harvesting, GHG benefits related to avoided peat emissions, GHG benefits related to ANR in forests, GHG benefits related to avoided deforestation in harvest areas subject to long-term average limit on credits and GHG emissions from changes in carbon stored in long-lived wood products.

Auditor Response: The equation now addresses the calculating of buffer credits in compliance with VCS rules.

Closing Remarks: The Proponent's response adequately addresses the finding.
### APPENDIX B - RESPONSES TO COMMENTS

<table>
<thead>
<tr>
<th>Document Ref</th>
<th>Document Text</th>
<th>Comment</th>
<th>TGC’s Response</th>
<th>Auditor Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary p.4</td>
<td>Project area is in a production forest.</td>
<td>In Indonesia, there are three classes of production forest: (i) limited production forest, (ii) fixed production forest and (iii) production for conversion. Within (i) and (ii), only (a) harvesting of timber or (b) establishment of timber plantation is allowed with very different implications for baseline emissions, in particular from peat. For (iii) conversion to non-forest land is allowed. This has implications for the baseline / REL. See later comments.</td>
<td>We thank the commenter for the extensive useful suggestions. The methodology is intended to be applicable in a range of countries, and should be robust against regulations of individual countries, even though examples from Indonesia are provided. We have updated our examples using the information provided.</td>
<td>Response is adequate.</td>
</tr>
<tr>
<td>Summary p.4</td>
<td>Baseline emissions – legally approved conversion rates or empirically measured historical deforestation rates observed in a reference region similar to the project area.</td>
<td>1. For natural forest management, actual conversion rates under a legally approved logging regime will be dependent on the standing stock of commercial timber. Peat swamp forest is known to have limited commercial stocks compared to dry land forest in the region. Furthermore, the actual off-take will depend on (a) past history of logging of the forest that may have removed commercial species and (b) logistics that are influenced by flooding and other factors that affect the over costs and therefore commercial potential of logging. In sum, a legally approved logging regime may</td>
<td>We strongly believe legally approved logging rates are still more appropriate than commercial audits: (1) In most cases legally allowed rates will be smaller than commercial rates, and will therefore lead to conservative estimates. (2) There is a greater chance that commercial audits can be manipulated. Legally approved rates can still be gamed, but this would be corruption, and would be a very severe infringement that is beyond the scope of a</td>
<td>The auditor agrees with the project developer that if documented evidence of a legally approved conversion rate is available for a specific agent of deforestation, that rate provides the most appropriate means of quantifying the baseline scenario. The response is adequate.</td>
</tr>
<tr>
<td></td>
<td>inadequately reflect the likely potential future harvest and therefore REL. A commercial audit would better serve this purpose.</td>
<td>(3) If an approved management plan exists that specifies of the conversion rates, then that is the most likely conversion rate and not the past conversion rate.</td>
<td></td>
<td></td>
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<td>---</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. Historical deforestation rates in general in Indonesia have fallen in the last five years due to government action against illegal logging. If historical deforestation rates are to be used, this period should be included.</td>
<td>We believe the commenter may have misinterpreted the methodology. The methodology does not use total historical deforestation rates, but only deforestation rates on areas that were already assigned concessions. Therefore, the impact of illegal logging will be mostly eliminated from the calculated rates because it is likely that the conversion rate once a concession is approved has not changed concomitantly with the government action against illegal logging. Indonesia is certainly a valuable case to test the mechanics of the methodology, which are developed so that they are robust across a range of countries. However, we are very hesitant to specify binding dates relevant to one specific country in the methodology.</td>
<td>The auditor agrees that a methodology that is not region-specific should not include binding dates related to specific deforestation trends in a particular country. The response is adequate.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3. At the project level it can be difficult to apply a deforestation rate from a reference region as deforestation is influenced by factors such as access, differences in population densities and other factors. A remote, difficult to access project site is likely to have a low deforestation rate and if access is higher in the reference region, then the baseline will be inflated. The approach of using a reference region is not considered appropriate.

**Proposed approach:** The actual level of historical deforestation in the project area must be considered central to a historical baseline. This could then be adjusted to a future deforestation REL by (a) consideration of commercial value of the forest and likely harvesting rates for forest under natural forest management, (b) changes to access of the area as a result of planned roads and settlements and (c) potential impacts of land use change as a result of legal licensing.

### We would like to reiterate that the conversion rates can only come from areas that were assigned concessions and are not total conversion rates. This makes a significant difference. The reference region approach, has some limitations but has also been considered appropriate under a range of circumstances in determining the baseline scenario for REDD projects.

The proposed approach requires the use of adjustment factors that are extremely difficult to calibrate, are subjective, difficult to monitor and verify, and open the door for gaming. There is simply very little data available to calibrate such factors adequately. These limitations are much less relevant if a provincial or jurisdictional baseline is developed. However, we believe the proposed approach is not feasible for project-specific baselines.

### The reference region approach has been employed in most existing approved VCS REDD methodologies; therefore the auditor does not believe there is grounds to disallow its use in the current context. However, the concerns of the commenter are noted – reference regions that differ significantly from the project area in terms of e.g. access, topography, or biological factors may indeed have differing conversion rates, even if both the reference and project regions have been assigned concessions. As a result, the methodology developer is asked to develop additional criteria for selecting reference regions to ensure conversion rates in reference regions are similar to those expected in the project region, considering these factors.

NCR 52 was issued in response to this comment.
<table>
<thead>
<tr>
<th>Other Definitions p.8</th>
<th>Peat is organic soil with at least 30% organic matter and a minimum thickness of 30 cm.</th>
<th>A standard definition based on US and Indonesian Soil Taxonomy</th>
<th>We have used a definition recommended by International Peat Society which we believe is more applicable for methodology because this definition reflects an accepted scientific agreement from a well-respected international organization. This approach is in full compliance with the VCS requirements in which peatland is defined as an area with a layer of naturally accumulated organic material (peat) that meets an internationally accepted threshold (e.g., host-country, FAO or IPCC) for the depth of the peat layer and the percentage of organic material composition.</th>
<th>The auditor agrees that the peat definition applied is in conformance with VCS requirements. Response is adequate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicability Conditions – p.8</td>
<td>Criteria before project implementation include four drivers of deforestation/degradation.</td>
<td>Past use for commercial forestry is not included – this should be considered for inclusion. Less than 5 percent of the former peat swamp forest in Sumatra and Kalimantan is considered primary (Miettinen &amp; Liew 2010) and past commercial use of production forest in the 1980s and 1990s has been a significant cause of degradation of peat swamp forest.</td>
<td>Valid point. Commercial timber harvesting is now added as a driver for deforestation that may have caused the current state of partial degradation.</td>
<td>The methodology has been changed appropriately to include this driver. Response is adequate.</td>
</tr>
</tbody>
</table>
### Applicability

The project area is (2) effectively at threat of conversion as demonstrated by either (2a) a legally valid conversion permit on the project area by an identified agent of deforestation or (2b) the existence of three conversion permits on other areas within the project area.

### Conditions

The conditions for being legally designated must be specified. In Indonesia, this requires congruence between (i) the forest land use plan (kawasan hutan) and (ii) national and regional spatial plans. Where no congruence exists, the legal designation of the forest cannot be verified with certainty, although in practice the Department of Forestry still executes its authority over the national forest estate. In most Indonesian provinces, regional spatial plans are in the process of being completed and the legal designation of forest remains contested legally. For absolute clarity, legal designation must be clear as verified through congruence of (i) the legal forest land use plan and (ii) final legal revision of the regional spatial plan as mandated by Law No 26/2007 and contained in a Regional Regulation (Peraturan Daerah).

We agree with the commenter that it is important to include all relevant levels for determining conditions for being legally designated. This sentence was revised as:

> The project area is (1) legally designated as forest that can be converted to non-forest or production forest with lower biomass than the original forest by all relevant regional and national authorities.

The additional language more completely encompasses the variety of potentially applicable legal requirements and represents an adequate response to the commenter’s concerns, given that the methodology is not specific to Indonesia and legal designation will vary across locations the methodology may be applied.

The auditor agrees that this language is sufficient for a methodology. The specifics of legal permissibility of conversion are likely to vary from project to project and country to country and are better assessed in a project validation than in a methodology.
<table>
<thead>
<tr>
<th>Union of a 250-km buffer around the project area and the jurisdiction with decision-making authority on concession permitting.</th>
<th>Location permits exist in land that is not legally available for a specific use purpose and do not confer the right to develop. At the present time, the government is reviewing location permits and existence of a location permit is not considered sufficiently robust for the purposes of this methodology. At a minimum, if a location permit is considered appropriate for this methodology, then this must be in accordance with the legal status of the land. For non-forest use, this will require a minimum of legal coherence between the legally defined forest land use zoning and regional spatial plans, while for forest use, this will require congruence with the legally defined forest land use zoning. The applicability condition of (2b) and its basis is unclear.</th>
<th>Permit exist but the land is not legally available, this cannot be considered a “sufficient permit to legally convert the project area” We are confident that this new phrasing will work across multiple countries with different regulations. Note that, even though we acknowledge that the concern is valid, even partial permits will indicate the threat of conversion and demonstrate that the area may be in the verge of conversion. Indication of possibility of such conversions can be demonstrated when there are conversion permits being issued in the surrounding areas. It may be just a matter of time when conversion permits are issued for the project area.</th>
<th>Revised language is adequate.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applicability Conditions</strong> – p.9 and 8.2.1 Option (a) The baseline rate of conversion: (a) If the project proponent can produce documentary evidence that demonstrates a legally approved conversion rate by an identified agent of deforestation, this rate must be used in the carbon accounting for the project. The document used must have all necessary legal approvals and permits. Reference to “a document” or “management plan or map” is not considered sufficiently specific. The legality of any such documents can only be made on the basis of (a) clear legal status of the land based on legal forest land use zoning and regional spatial plan zoning and (b) legal status of licenses.</td>
<td>We unfortunately do not understand this comment. It is clearly stated in the same paragraph as the quote that “The document used must have all necessary legal approvals and permits.” This implies without any doubt that both the clear legal status of the land and the legal status of licenses are required. If either of these two aspects are not in place, the document does not have all necessary legal approvals and permits and this applicability</td>
<td>The auditor agrees that the methodology makes adequate reference to legal requirements. The methodology document clearly states that such documents must be legally approved.</td>
<td></td>
</tr>
<tr>
<td>Applicability Conditions – p.9 and 8.2.1.1 Option (b)</td>
<td>the most likely deforestation agent can be determined based on the historical conversion rate by this most-likely deforestation agent in an area similar to the project area (—reference region). The reference region must consist of at least three areas under the same conversion stratum as the project area within the union of a 250-km buffer around the project area and the jurisdiction with decision-making authority on concession permitting.</td>
<td></td>
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<td></td>
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<td>□ For production forest zones (HP/HPT), define a likely commercial logging offtake based on the current condition of the forest, legal and biophysical constraints. □ For production forest for conversion (HPK), a reference region may be applicable but it should be noted that in 2009 the Ministry of Agriculture introduced a new regulation for oil palm on peat land that specifically prohibits the development of certain areas. Thus historical practices in a reference region before 2009 may not reflect practices following the issuance of the new regulation. □ For local use strata, a historical rate of conversion based on the last five years can be defined to ensure that current rates of deforestation and degradation are included.</td>
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<td>criterion is not met.</td>
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| Point 1: see our response to comment nr 2.  
Point 2: Agreed. We added the following to section 8.1.2.2:  
*The quantification of the conversion rate shall only be based on the land that is legally allowed to be converted using current legal restrictions, even if such restrictions were not into force at the time the historical conversion occurred. Land that has been converted but is not allowed to be convert according to current legal restrictions shall be excluded from the conversion rate calculation.*  
Point 3: As indicated before, the conversion rate is only to be quantified on concession land. In previous methodologies, a duration of 10 years has been |
The proposed use of satellite images from (a) 0-5 years and (b) 5-15 years before project start is considered not applicable as this will create baseline conversion rates that may include the period 1997-2005 when forest loss was extremely high, thereby inflating baseline conversion rates.

The conversion rates used are relative to the area on which concessions are granted, and not simply total conversion rates. The conversion rates calculated will be a lot more robust as indicators for the effective conversion than is suggested, as we believe that the 1997-2005 period, during which forest loss was extremely high, was characterized by illegal logging and a great number of concessions being granted. Those factors are normalized by only considering conversion rates relative to the area on which concessions are granted.

The auditor does not believe it is necessary to specifically exclude periods of time from analysis in a non-region specific methodology, as those periods of time may be relevant for some projects in areas that experienced different trends or were cleared under different circumstances. The methodology includes several requirements that serve to ensure the areas analyzed to determine the deforestation rates are appropriate, and additional project-specific scrutiny can be performed at validation. The response is considered adequate.
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<th>Applicability Conditions – p.9 8.2.2</th>
<th>The baseline rate of conversion: (c) If option (b) is not applicable, then a conversion rate from the literature may be used for each of the project conversion strata on the condition that it can be demonstrated that this rate (i) is conservative, (ii) is not older than 10 years, (iii) and is from the same country.</th>
<th>This is not considered appropriate and is recommended to be removed from the methodology as it enables the establishment of baselines that have limited relevance to the actual project area.</th>
<th>We do not think it is fair to remove option (c): project proponents first and foremost have to justify the threat of deforestation regardless of which option to quantify the conversion rate is selected. Therefore, option (c) can safely assume that the project area is under a real threat of deforestation, the different options are met to set the rate conversion. As a consequence, we do not think that option (c) will enable baselines with limited relevance. In addition, the relevance of literature-based conversion rates is still to be demonstrated at the PD level, and the burden of proof lies with the project proponents. If a proposed conversion rate is truly irrelevant to the actual project area, this conversion rate will not be accepted during project validation.</th>
<th>As discussed in NIR 8, the audit team expressed similar concerns. Please refer to the conclusions of that NIR.</th>
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<td>8.1.2</td>
<td>For each of the legal zoning categories present on the land, identify the most likely conversions based on (a) previous official applications of concessions in the project area, or (b) previous active concessions in the project area that are not active anymore, or (c) common practice.</td>
<td>As discussed above, the potential legality of an application must be considered in the context of final legal forest land use and regional spatial planning zones. Within Indonesia, common (past) practice in the area 250km around the project area cannot also be considered as this relates to a period during which the context of legal compliance and related issues is likely to differ from current and future</td>
<td>The procedure aims to stratify the areas into homogenous blocks over which baseline conversion scenarios will be generated. The revisions mentioned above (“The quantification of the conversion rate shall only be based on the land that is legally allowed to be converted using current legal restrictions, even if such restrictions were not into force at the time the historical...”)</td>
<td>The auditor agrees that the revisions made in response to comments above account for the changing legal environment in which projects may be implemented. The response is adequate.</td>
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In the examples given, it is assumed that production forest degrades and becomes production forest for conversion. While this has occurred in Indonesia, it cannot be assumed to have general application. Such an application will artificially inflate the baseline scenario. **conversion occurred.)** will take care of the difference in legal context argument.

The example from Indonesia is given only for illustration and is certainly not a requirement. If it can be demonstrated that the most plausible baseline scenario is a gradual degradation of production forest followed by conversion, why can project proponents not use this baseline? We agree that this must be evaluated on a project-by-project basis.

<p>| 8.1.3   | Historical Reference Period | 6-10 years prior to the project start date. For projects starting in 2012, this reference period would be defined as 2002-2006 during which time illegal logging was at a high level. In 2005, Indonesia initiated efforts to reduce illegal logging (Inpres 4/2004 and other actions), which have had some positive impact. The historical reference period must reflect recent deforestation rates. | See our previous responses: the conversion rates used are relative to the area on which concessions are granted, and not simply total conversion rates. | The auditor is in agreement with the methodology developers. See comments above. |</p>
<table>
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<tr>
<th>8.4.1 Peat Subsidence</th>
<th>Drainage depth</th>
<th>1. For plantation situations, drainage depth can be established based on practice and the literature. However, for non-plantation strata, the drainage depth will be dependent upon (a) existing drainage and (b) future drainage. (a) can be defined, while (b) is unknown and unpredictable. A conservative approach for non-plantation strata would be to only include existing drainage infrastructure. Any additional drainage infrastructure constructed could then be included in the five-year revision of the baseline.</th>
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<td>We have added more specificity to the relevant text and require to justify that the drainage infrastructure from on which drainage depths are based can be installed. Using literature or water-table monitoring points, identify the drainage level for every potential conversion stratum. Smaller values are more conservative. The drainage level can be demonstrated by evidence such as photographs and images of locations that are identical to the project area, or scientific literature. In addition, the drainage level can also be substantiated by investigating the intended purpose of the land, or the common practice within the jurisdiction, or past activities of the identified agents of deforestation. If drainage levels from the literature are used, it shall be justified that the conditions of the project area are such that the value from the literature is applicable. More specifically, it shall be justified that the drainage infrastructure</td>
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<td>The auditor believes the additional guidance is appropriate and that the specifics of baseline drainage patterns are best assessed at the project validation stage. We note that other future components of baseline scenarios, such as deforestation rates, can also be difficult to define with certainty, and that it is acceptable practice to define these components from observations made in already converted, similar areas.</td>
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of the cited literature can be effectively implemented in the project area.

2. The impacts of drainage infrastructure on water table depth are not uniform on peat land, in particular outside of plantation settings, i.e. there is spatial dependence. Application of a uniform figure for a single stratum is potentially highly erroneous and, given the likely contribution of oxidation emissions, this spatial dependence must be accounted for.

There are two mechanisms that will prevent an erroneous figure from being used in a stratum that is too large. First, if the application of a uniform figure is not feasible on a single stratum, the stratum is not a valid strum, by definition. As part of a project validation, the correct nature of a specific stratification is evaluated. Additionally, we have now included a requirement to use a hydrological model for estimating water table depth in the project area as indicated in the following text in Section 5.3:

A map indicating the extent of the area that is hydrologically connected to the project area in which peat is present shall be presented at validation. This map must contain the extent of the buffer zone as

The assessment team agrees with the methodology developers that appropriate stratification can alleviate the concerns of the commenter.
specified in applicability condition 7. The area that is hydrologically connected to the project area shall be determined using a hydrological model using bulk density and peat depth data measured at project site to simulate the water table depth under known hydrological conditions according to the following flow diagram.

An example of a sufficient hydrological model is SimGro\(^6\), which utilizes the Modflow model in the backend; an example of how SimGro is applied for peat swamp forests in Indonesia is provided in Wösten et al. (2008). Project proponents must duly record all procedures used to
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<th>delineate the area of hydrological connectivity in the Project Document.</th>
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<td>3. Land clearance through burning for plantation establishment is illegal, although it still occurs in some cases. It cannot be simply assumed that a plantation will use fire and therefore that there will be subsidence from burning in year 1 for oil palm conversion.</td>
<td>We have clarified that illegal practices are not allowed under the baseline scenario; section 8.1.1.2 specifies</td>
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<td>Identify the most relevant conversion scenarios that may be present on the land while taking into account any legal limits and requirements for the conversion.</td>
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<td>The example under Table 3 now includes this requirement:</td>
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<td>Conversion of palm oil may only be done on areas that are not riparian and that have less than 3 m of peat.</td>
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<td>The methodology text adequately requires that the baseline scenario only include legal conversion practices. Specific legality issues must be addressed at the project development and validation stages, as the methodology is not specific to Indonesia.</td>
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<td><strong>Land clearance through burning for plantation establishment is illegal.</strong></td>
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<td>Land clearing through burning may be illegal in Indonesia, in other countries, it is still practiced. Our methodology is intended to allow quantification of potentially realistic scenarios and clearing through burning. Additionally, please note that burning may not be human induced but may be due to accidents or of other natural causes.</td>
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4. The figures for oxidation emissions are (a) very high (9.6 cm/yr) and (b) do not change from year 1 to year >5. These assumed values are not supported by the scientific literature and recent studies, which find lower levels of subsidence and subsidence declining after the initial years following drainage. Furthermore, patterns of rainfall (and therefore geographical location), peat type (fibric, hemic, sapric) and land cover influence levels of drainage-mediated peat subsidence.

| (1) | The values in the table referred here are mere examples. We have reduced the rates from 9.6 cm/yr to 5.6 cm/yr. |
| (2) | Influences of rainfall, peat type and land cover are taken into account through the stratification procedures. The values in the table represent a homogeneous stratum. |
| (3) | Section 8.1.4.1 now specifies more clearly the necessity of using only relevant rates: |

**The relevance of the use of any value from literature shall be justified by taking into**
5. It is not clear why years 1, 3 and 5 contain fire emissions for the clear cutting class. Fire in such situation is much more complex than this and cannot be applied as a uniform emission factor.

It is an example. The following disclaimer was added below the example:

* This table serves as an example of subsidence rates for 3 hypothetical conversion scenarios in which, for example, fire is used to convert forest to oil palm plantation (case 1), or the fire recurrence period is every two years after severe degradation (case 3).

The methodology clearly states that this instance is simply an illustrative example. The response is adequate.
| 8.4.2 Peat map | Sampling Plan | For a methodology of this nature, standards for estimation of peat depth must be included as well as independent verification. Peat sampling is highly dependent on field interpretation and given the importance of this for the methodology, standards and guidelines must be included as well as independent verification. The error associated with standard measures of peat sampling are typically greater than the expected annual subsidence rate, so conservative means of estimating this must be made (e.g. lower 95 percent confidence interval). | The methodology requires standardized methods for peat sampling, but does not prescribe the exact and specific methods to be used. It is up to the project proponents to select the most appropriate sampling techniques. A Standard Operation Procedure must be developed and shall be approved during validation of a specific project. The exact procedures used to measure peat depth and analyze peat samples must be duly recorded in a Standard Operations Procedure (SOP) that must be made available to an auditor at validation of the Project Document. • Note that 95% CI at uncertainty not exceeding 15% is now standardized. | The methodology requires the project developer to provide standard operating procedures for estimating peat depth. These will be assessed at project validation by a third party validator. The uncertainty deductions applied by the methodology are appropriate for ensuring these estimates are conservative. |
### 8.4.3 Baseline Peat

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<th>The model presented is a spatially explicit but static model of peat emissions. In short, each strata is divided into a grid with (a) peat depth and (b) land status (converted / not converted) recorded for each cell in the grid. For each cell, subsidence from drainage and subsidence from fire is calculated for each year and summed.</th>
<th>We do not agree that the peat emissions model is static. It is dynamic in the sense that every year’s emissions are dependent on last year’s emissions. See our responses to the next three comments.</th>
<th>The final draft of the methodology has considerably clarified the peat emissions model. The assessment team agrees with the methodology developer and finds the model adequate.</th>
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<td>1. Subsidence from drainage in plantations – As stated above, the impacts of drainage in a plantation context can be predicted at a general level. However, the scientific literature reports a range of emissions factors for this, which may be related to factors such as peat type. For such a calculation, emissions factors specific to a particular peat type and land use in the region should be used, not a general estimate from the literature. Furthermore, the static model presented does not account for rainfall variation. Rainfall along with drainage will be key determinants of water levels and therefore subsidence. These factors need to be accounted for.</td>
<td>The stratification of the project area is intended to fully capture all the variations in the conditions of the project area that may impact subsidence rates. The model is used to calculate emissions under baseline conditions. It is required to validate baseline emissions at project validation, at a time where the actual rainfall is not known. As a consequence, actual rainfall cannot be used to calculate baseline emissions. We strongly believe that average rainfall rates are sufficient to calculate emissions over a period of decades, even though there may be small deviations at an annual scale.</td>
<td>The assessment team agrees that baseline emissions over long periods can be adequately estimated using average rates.</td>
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2. Subsidence from drainage in non-plantation landscapes – The same applies in non-plantation landscapes except that the actual emissions factor for such a landscape will depend on the nature of the drainage infrastructure in the peat land. For plantations, this can be established based on standard plantation layout, but for non-plantation landscapes this will typically specific to the landscape in question and based on past logging history as well as local community land use and water management practices. In short, the estimation of subsidence from drainage in non-plantation landscapes required (a) existing drainage infrastructure to be mapped and (b) the spatial impact of this on the surrounding peat land to be assessed (the further from a drainage canal, the less the impact on peat water levels). Application of a uniform emission factor is not appropriate and will likely overestimate baseline emissions. The dynamic factors of rainfall and actual drainage conditions should also be included in such strata as described above.

The analysis and measurement of existing drainage now requires simulating the water table using a hydrological model mentioned earlier. In addition, a note was added in section 8.1.4.3 to the peat model description to focus the attention on the impact of the factors mentioned in this comment on the emission factor and the requirement to re-stratify:

\[\text{Note that for non-plantation landscapes, the peat emission factor will be very specific to the landscape in question and be based on past logging history, land use and water management practices, existing drainage infrastructure, and from a drainage canal. If it is determined that these factors will significantly impact the peat emission factor, project proponents shall re-stratify the area according to these factors so that the emission factor can be assumed to be}\]

The methodology includes sufficient guidance to address these concerns at the project validation stage where appropriate.
### METHODOLOGY ELEMENT ASSESSMENT REPORT: VCS Version 3

| 3. Peat subsidence from burning. The calculation of peat subsidence from burning does not reflect actual field conditions and patterns of fire in peat land. Fire in peat land occurs predominantly in the long dry seasons associated with El Nino when water levels in degraded and managed peat land are typically more than 1 metre below the surface level. The issue of 40cm water depth is therefore not considered relevant. The key factors determining whether a cell will burn are (a) rainfall and therefore water depth of the peat, (b) fuel in the form of biomass and material that can burn and (c) the likelihood that a fire will be lit, which is based on accessibility and other factors. The current model does not adequately reflect likely patterns of fire and there is no attempt to validate the model based on | Studies such as Gnatowski et al 2002 have shown that peat layers remain sufficiently moist up to 40cm above the water table for averagely decomposed peat material. The methodology allows subsidence of peat material only when the peat layer is at least 40 cm above the water table (this is more conservative that what is suggested in the comment). The inclusion of subsidence from burning has been provided as a part of the methodology but is completely optional. Under no circumstances, it is not necessary for the project proponents to assume burning. If it can be demonstrated that the project area will burn, then the accounting mechanisms can be applied. If such evidence is not available, the subsidence from burning is simply set to 0. This requirement is enforced in |}

| homogeneous within one stratum. | The methodology has clarified the procedure for estimating peat subsidence from burning and is, in the assessment of the audit team, sufficiently conservative. |
past fire history. As a result, this is not appropriate.

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<th>Methodology Element Assessment Report: VCS Version 3</th>
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| For every conversion stratum that is identified in the baseline scenario and for which subsidence from fire is included, project proponents shall demonstrate that the fire threat is real and anthropogenic. The threat of fire must be demonstrated with fire maps and historical databases on fires on areas within the reference region that are undergoing the specific conversion. The exact rate of peat subsidence from burning must be set in the PD and justified using (1) measurements by project proponents, or (2) literature values such as Couwenberg et al. (2010).

Additionally, the subsidence rate has to follow the identified existing pattern as required by the following text in section 8.1.4.3 after EQ. 16:

As a consequence, peat subsidence will follow
| 9.1 Legal Agreement | These legal agreements are particularly important when the project proponents do not legally own the forest land, and the land-tenure status is unclear or obscured by a complex administrative hierarchy. | If land tenure status is unclear, then so are the carbon rights. It is not clear from this narrative that a project proponent under such circumstance can therefore have clearly defined legal carbon rights. Indeed, the lack of legal certainty in Indonesia in the context of the legal status of land use zoning through forest land use, national and regional land use zoning provides a major obstacle for avoid emissions projects of the nature defined in this methodology. | Securing rights to carbon is a topic that is beyond the scope of a methodology. The VCS standard v3 – section 3.1.2 requires project proponents to fully demonstrate and establish ownership of the carbon. | We agree that assessing secured rights to carbon falls under the scope of the VCS standard, rather than under a methodology. |
10. Leakage  
When the deforestation agents can be identified, it must be demonstrated that the management plans and/or land-use designations of the deforestation agents’ other lands (which shall be identified by location) have not materially changed as a result of the project (e.g., the deforestation agent has not designated new lands as timber concessions)  
The identification of leakage as proposed here needs to be more detailed based on two issues. First, plantation companies are typically part of larger corporate groups – will this definition of leakage therefore apply to the whole group. Second, land banking is a common practice whereby land is held in reserve by a group and new land acquired. How will the acquisition and development of land outside the project area by a group that has not developed a specific land area within the project area be identified as a result of the project? Whether this new land developed is on peat land or not is also of relevance.  
When the deforestation agents are legally a part of bigger corporate groups, using the definition of the methodology, a bigger entity must be considered in the leakage analysis. Similarly, if smaller plantation companies conduct business independently and only sell products to bigger companies, then only smaller companies are considered for leakage.  
The second concern on land banking as a practice can be important in the local context. The idea of using empirical conversion rates on land on which permits are granted, is designed to safeguard from such activities. Additionally, these conversion permits come with the expiry dates and usually cannot be banked forever.  
The primary interest of the deforestation agent to clear the forest area in the peat swamp is to find suitable areas for cultivation. Leakage occurs when available areas for conversion are restricted due to project activity and at which time the agents will likely to move to some other place to continue the deforestation/cultivation activities. Such agents will use the land that is available irrespective of the presence of peat. However, if leakage does  
This first concern is appropriately addressed by the methodology, and assessment of the right agent for monitoring of leakage (i.e. large or small entity) is best done at project development and validation. The auditor believes it is conservative to assume activity shifting leakage has occurred on peatlands unless it can be demonstrated otherwise.
If the deforestation agents were found to have acquired new lands for planned conversion, the area of the new lands shall be used as the basis for calculating leakage. Unless project proponents can demonstrate that newly acquired lands have no peat or lower peat lands, by default, the leakage must be considered to be happening on areas containing peat at the same proportion as that of the project area. Project proponents can simply calculate emissions from leakage by multiplying the gross emission reductions from the project per unit area for a given year with the area of conversion occurring in the newly acquired lands.
| Leakage as a result of the displacement of forest products | This section only deals with community use of forests. The situation of market leakage for where a logging or timber plantation company, for example, does not utilise forest and land within the project area is not addressed | In the revised version, leakage from the displacement of forest products was taken out. This displacement would have happened under the baseline scenario anyhow. The methodology incentivizes community development activities that reduce unsustainable use of the forest. | The auditor does not agree with the removal of accounting for leakage from the displacement of forest products and believes such leakage should be assessed by the methodology. The response to NIR28 was revised by the project proponent to include this potential source of leakage. |