Voluntary Carbon Standard 2007

Validation Report:

Name of Verification company:	Date of the issue:
Scientific Certification Systems (SCS)	August 31, 2011
Report Title:	Approved by:
Rimba Raya VCS Validation Report	Todd Frank
Client:	Project Title:
InfiniteEARTH	Rimba Raya Biodiversity Reserve Project

Summary:
This validation assessed the Rimba Raya Biodiversity Reserve Project for conformance against the Voluntary Carbon Standard 2007.1 (VCS) and its supporting documents including the selected VCS approved methodology VM0004 – VM0004 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0. The project proponent is Infinite Earth. SCS has confirmed that Infinite Earth sufficiently demonstrated 'user rights' to the project area to achieve validation under the VCS 2007.1. The review of the project design documentation, field visits and subsequent follow-up interviews have provided SCS with sufficient evidence to determine the fulfillment of the stated criteria. The project correctly applies the approved VCS methodology element VM0004 – Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0. The main project activity is to prevent deforestation caused by land use conversion to palm oil plantation. The project results in reductions of GHG emissions that are real, measurable and give long-term benefits to the mitigation of climate change. Emission reductions attributable to the project have been shown to be additional to any that would occur in the absence of the project activity. The total emission reductions from the project are estimated to be 105,853,625 tCO_2e over the 30-year crediting period (1 July, 2009 to 30 June, 2038). This includes project emissions, total confidence deduction and leakage deduction applied as per VM004, and the VCS AFOLU buffer deductions currently assessed at 20%. This estimate assumes the baseline does not change during the baseline re-evaluation. Adequate training and monitoring procedures have been implemented. In summary, it is the opinion of SCS that the "The Rimba Raya Biodiversity Reserve Project" in Central Kalimantan, Indonesia as described in the VCS PD of April 20 2011, meets all relevant VCS 2007.1 requirements for validation and correctly applies the VCS approved methodology element VM0004 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0.

Work carried out by:	Number of pages:
Dr. Carly Green – SCS Lead Auditor Mr. Todd Frank – Auditor Dr. Aswin Usup – Peat Specialists/Local Translator Mr. Yosep Hut – Local Forestry Specialist Mr. Ryan Anderson – Spatial Analyst Specialist Mr. Zane Haxton – Technical Review	83

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1 Introduction

1.1 Objective

The objective of the validation by SCS is to provide an independent assessment of the proposed project activity against all defined criteria as defined by the Voluntary Carbon Standard (VCS). Validation will result in a conclusion by SCS as to whether the project activity is compliant with the VCS standard and whether the Project should be submitted for registration. The ultimate decision on the registration of a proposed project activity rests with VCS.

1.2 Scope and Criteria

The Project was assessed for conformance against the VCS Standard 2007.1 and its supporting documents including the selected VCS approved methodology.

The scope of the audit encompassed the analysis of documentation, data and calculations and the outcomes of field visits to the project area and stakeholder discussions. The SCS Lead Auditor issued a number of New Information Requests (NIR) and Non-Conformity Reports (NCR) and re-analyzed new submissions arising from the project proponent response to the issues raised. These issues were subsequently closed and the validation report finalized.

1.3 VCS Project Description

The Rimba Raya Biodiversity Reserve Project is an initiative by Infinite Earth, which aims to reduce GHG emissions by protect 91,215 hectares of tropical peat swamp forest from conversion to palm oil. This area, rich in biodiversity including the endangered Bornean orangutan, was slated by the Provincial government to be converted into four palm oil estates.

Located on the southern coast of Borneo in the province of Central Kalimantan, the Project is also designed to protect the integrity of the adjacent world-renowned Tanjung Puting National Park (TPNP), by creating a physical buffer zone on the full extent of the ~90km eastern border of the park.

This project will avoid the loss of forest through the conversion to palm oil and is therefore classified as Reducing Emissions from Deforestation and Degradation (REDD) through Avoided Planned Deforestation (APD). The methodology applied is the VM0004 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0, developed by Winrock International.

The Project qualifies as a Mega Project as it is estimated that it will reduce atmospheric emissions by 131,107,818 t CO_2e over a 30-year project life. Following confidence and risk buffer deductions, the total emission reductions from the Project are estimated to be 104,886,254 tCO_2e over the 30-year crediting period (1 July, 2009 to 30 June, 2039).

1.4 Level of Assurance

SCS provides reasonable assurance that the emission reduction estimations for the "Rimba Raya Biodiversity Reserve Project" are conservative and meet the VCS criteria and approved methodology, VM0004 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0.

To ensure complete transparency, SCS has included any clarification or corrective actions that were raised with the proponent and their responses at the end of this validation report.

1.5 SCS Audit Team

Dr Carly Green – Lead Validator

Dr Carly Green has 10 years International experience in cross sector greenhouse gas accounting. Her experience extends through research, government policy adviser, project developer, training facilitator, and lead auditor in Europe, South America and Asia Pacific. She completed her PhD in Europe in 2006 with her research contributing to IPCC National level carbon accounting methodologies in Agriculture, Forestry and Other Land Use (AFOLU). Since then she has been a policy adviser to the Irish and Australian governments and involved in the development of IPCC compliant forest sink accounting methodologies for projects in Australia, South America, Indonesia, China and Kenya. She has lead or participated in over 10 forest project and methodology validation/verifications under a range of standards including ISO 14064, the Voluntary Carbon Standard and the Climate Community and Biodiversity standard. She is a VCSA-approved AFOLU expert for IFM and ALM project types.

Todd Frank - Validator

Mr. Frank holds a master's degree in International Environmental Policy from the University of California San Diego and a Bachelor's degree from the University of California at Berkeley. Mr. Frank is certified as a lead verifier under the CAR, VCS, CCB, CCX, and TCR programs and has formal training in ISO 14064 and ISO 9001. He has served as lead verifier for a wide range of projects across various industries, globally. Mr. Frank also has experience in emissions trading and offset project development experience having worked on the first project ever to be validated to the CCB standard. Mr. Frank serves on the Verification Advisory Board for The Climate Registry and serves on the Advisory Board for Northern Arizona University's Climate Science Solutions master's program.

Dr Aswin Usup – Peat Specialists/Local Translator

Dr Aswin Usup has earned a master's and doctorate degree in Earth Systems Science, specializing in Geoecology from Hokkaido University in Japan. Dr. Usup is a lecturer at the School of Agriculture as well as the Graduate School of Natural Resources and Environmental Science at the University of Palangka

Raya in Central Kalimantan, Indonesia. Dr. Usup has spent his time studying environmental ecology, concentrating on the effect of fires on microclimates in tropical peat lands. In 2005 Dr. Usup became the director of the Research Center for Fire Prevention & Land Rehabilitation at the University of Palangka Raya.

Ryan Anderson – Spatial Analyst Specialist
Mr. Anderson holds a BS in Environmental Science from the University of Denver and an MS in Natural Resource Science and Management with emphasis in geospatial assessment, monitoring, and modeling of forest resources. His experience with terrestrial carbon cycle related research includes work at the Cedar Creek Long Term Ecological Research Station, the Chequamegon Ecosystem Atmosphere Study, and the North American Carbon Program's Site Synthesis modeling effort. His master's work focused on the use of LiDAR remote sensing for improved land cover classification, inventory of forest carbon stocks, and modeling of mean annual growth increments in the Chequamegon National Forest in northern Wisconsin. He is currently pursuing a Ph. D. in Forestry with the University of Montana's Numerical Terradynamic Simulation Group. His research focuses on the development and calibration of physiologically-based models of terrestrial ecosystem carbon, nitrogen, and water cycles.

Zane Haxton – Technical Review
Mr. Haxton holds a M.S. in Forest Resources from Oregon State University and a B.S. from The Evergreen State College. A well-rounded forestry professional, Mr. Haxton held a wide variety of positions in forest research and management before coming to SCS, ranging from work on logging and tree planting crews to experience as a biological sampling technician and research assistant. Mr. Haxton is a specialist in forest inventory, with areas of expertise including sampling design, inventory management and the use of growth and yield models to evaluate potential management regimes. Mr. Haxton is currently a verifier under the Climate Action Reserve, the Verified Carbon Standard and the Climate, Community and Biodiversity Standard

2 Methodology

SCS began reviewing the Project in June 2010, beginning with a desk audit of the proponent's project documentation and phone calls and email correspondence with various Infinite Earth staff. An SCS team of independent auditors conducted a formal site visit to complete the fieldwork, interviews and assessment of procedures components of the validation assessment over nine days between 21 - 29th July 2010.

During the field visit the validation team spent 2 days at the OFI Pangkalan Bun office going over the documentation and approach. A half day meeting with relevant organizational stakeholders was also conducted. Five days were spent

in the project area visiting four villages (Telaga Pulang, Jahitan, Muara Dua and Tanjung Hanau) and taking measurements within two transects (No. 1 and 8).

Following the initial assessment and field audit 28 Non-Conformity Reports (NCR), 9 Opportunities for Improvement (OFI) and 19 New Information Requests (NIR) were issued that the project proponent were required to respond to; this final report, therefore, represents the final report based on the satisfactory response to the identified .

2.1 Review of Document

The following client documents were reviewed for conformance against the various elements of the VCS 2007.1, relevant VCS Program Updates and the selected methodology:

1. *PD - Rimba Raya Biodiversity Conservation Project, Project Document, Voluntary Carbon Standard v2007.1 (Nov 2008) Infinite Earth May 15, 2011. (and supporting Annexes)*

   Annex 1a Carbon Survey Report – Transects T1-T6

   Annex 1b Carbon Survey Report – Additional Transect T7, T8

   Annex 2a Land Cover Classification

   Annex 2b Land Cover Accuracy Assessment

   Annex 3 Rimba Raya Fire Management Plan

   Annex 4 Land License Supporting Documents

   Annex 5a Carbon Survey SOP

   Annex 5b Forest Patrol SOP

   Annex 6 QA/QC Plan

   Annex 7 Monitoring Plan

   Annex 8a Baseline Calculations

   Annex 8b Baseline Report

   Annex 9 Econometrics Model demonstrating no Activity Shifting or Market Leakage

   Annex 10 Environmental Impact Assessment Summary Conclusions

   Annex 11 Community Surveys, Engagement, Education & Support Documents

2. *Final Baseline GHG Emission Estimates for the Rimba Raya Biodiversity Reserve Project May 15, 2011 (and supporting Annexes)*
   Annex 1 Bolick 2010a, Landcover Assessment for Rimba Raya February 5, 2010

   Annex 2 Bolick 2010b, Accuracy Assessment 2009 Landcover Classification Rimba Raya August, 2010

Annex 3 Bolick 2010c, Field Report to Infinite Earth: Rimba Raya Carbon Assessment Survey July 18, 2009 and Bolick 2010d, Additional Transects 7 & 8 Rimba Raya Carbon Assessment Survey August 5 - September 1, 2009

Annex 4 Additionality Support Documents

Annex 5 Econometrics argument on Leakage

Annex 6 Non-Permanence Risk Buffer Assessment

Annex 7 Baseline Calculations

3. *Rimba Raya Biodiversity Reserve Project Monitoring Plan April 2009 (Revised 2011) (and supporting Annexes)*
Annex 1 FMEA & Control Plan

Annex 2 Fire Plan & Community Involvement

4. *Baseline Calculations for Rimba Raya 2011.05.15 (spreadsheet)*

5. *VM0004 - Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests.Version 1.0*

6. *Dwiastuti, S., Hut, M., Si IR. Untung Darung, MP Ube Tito, Sp Jenne, S. Hut. 2010 Final Report Measurement of The Peat Bulk Density PT. Rimba Raya Conservation Seruyan Regency of Central Kalimantan, Indonesia. September 2010.*

2.2 Follow-up Interviews

Personnel spoken to in the course of this validation that provided important information include:

Infinite Earth/PT. Rimba Raya Conservation (RRC)
- Todd Lemons - Chairman and CEO
- Jim Procanik - Managing Director - Asia
- Leslie Bolick - Science and Technical Director
- Jeff Reece - President
- Hartjahjo Ariawan - RRC Community Relations Coordinator

Forest Carbon
- Scott Stanley - Managing Director
- Gabriel Eickhoff - Director

Orangutan Foundation International
- Dr. Birute Galdikas - Founder
- Fajar Dewanto - OFI manager
- Robert Yappi - GIS manager

World Education
- Handoko Widagdo - Acting Country Representative

Staff from Tanjung Puting National Park

- Handi Nasoka - Head of Section II, Kuala Pembuang
- M. Taufik - Staff of Section II
- Supriyanto - Head of Section I, Pembuang Hulu
- Toto Sutiyoso - Administration Head of TPNP Office

Forestry & Plantation District Office (FPDO) of Seruyan:
- Ir. Priyo Widagdo - Head of FPDO Seruyan
- Heri Purnomo - FPDO Staff

BKSDA:
- Ir. Eko Novi - Head of BKSDA Section II Kotawaringin Barat
- Sunaryo - BKSDA Staff

2.3 Resolution of any Material Discrepancy

A number of NIRs were issued prior to the field visit to assist the validator in understanding the linkages between the documents provided by the project proponent prior to the field trip. This assisted in effective use of the time in the field. Following the field visit a number of NCRs were raised. The approach to resolving them was primarily through phone and email conversations with the project proponent and their consultants and project partners. These

communications focused on clarification around the issued Non-Conformance Reports and New Information Requests. Additional guidance was also sort from the VCS where applicable. In many cases the project proponent revised and resubmitted versions of the documentation, in particular the VCS project document, the Baseline Report and the Monitoring Report. This communicative and review process continued until the queries related to the project elements were in conformance with the selected methodology and the VCS 2007.1.

Finally new versions of the PD and supporting documents were issued.

3 Validation Findings

3.1 Project Design

3.1.1 The project title, purposes and objectives

The project title is clearly listed as "The Rimba Raya Biodiversity Reserve Project" under Section 1.1 of the PD. The aims and visions of the Project are discussed. Section 1.4 of the PD states that the aims of the Project are to reduce Indonesia's emissions from through the preservation of peat swamp forests and to demonstrate that protecting endangered peat swamp forest is commercially, socially and environmentally advantageous. The InfiniteEARTH vision is to develop a project that harnesses the global carbon market in order to successfully compete with commercial agricultural interests in order to provide social and environmental benefits that would not otherwise be attainable. InfiniteEARTH is determined to create an operational, voluntary market and community involvement model that can be replicated in peat swamp forest ecosystems across Indonesia for decades to come.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.1.2 Type/eligibility of GHG project

The type of project is clearly defined in Section 1.2 of the PD as Reducing Emissions from Deforestation and Degradation (REDD) through Avoided Planned Deforestation (APD). This Project is an eligible AFOLU activity under the VCS2007.1 standard. The PD clearly states that the Project is a single, standalone project, not a grouped project.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.1.3 Project Location

The Rimba Raya Carbon Accounting Area comprises 47,237 hectares of uninhabited lowland peat swamp forest located in Seruyan Hilir District, Danau Sembuluh and Hanau, Seruyan Regency, in the province of Central Kalimantan, Indonesia. In accordance with the methodology the project boundary was defined at the beginning of a proposed project activity and is presented in a number of figures in Section 1.5 of the PD. The figures depicting the project boundary provide the geographical coordinates of lands to be included, so as to allow clear identification for the purpose of verification. Remotely sensed data with adequate spatial resolution and land administration/planning maps are used that provide a clear delineation of the project boundary. The data is geo-referenced, and was provided in digital (KML) format.

Section 2.4 of the PD explains that the project boundary (carbon accounting area), comprises 47,237 hectares and is situated within the western Seruyan River watershed. It also states that the carbon accounting area is protected by a 91,215 hectare Project Management Zone which has been defined in the west by the boundary of the Tanjung Puting National Park, in the east by the Seruyan River and in the south by the Java Sea. The latter two of these form the eastern and southern hydrologic boundaries of the Project. To the north the Project Management Zone boundary is defined by the oil palm plantation boundaries. The carbon accounting area boundary is drawn down 3km in accordance with eligibility condition K of the selected methodology.

The carbon accounting area is described as uninhabited lowland peat swamp forest located in Seruyan Hilir District, Danau Sembuluh and Hanau, Seruyan Regency, in the province of Central Kalimantan, Indonesia. The latitude and longitude of the Project Management Zone is said to lie between 112°01'12 "- 112°28'12" east longitude and 02°31'48"- 03°21'00" south latitude, which is consistent with the maps provided. The maps provided have appropriate scales and the boundaries of both the Project Management Zone and the Carbon Accounting Area are clearly defined. During the field validation component, GIS spot points taken at various points near the boundary and within transects correlated to the maps provided.

The shape of the project boundary (in particular the encroachment of the palm oil) was consistent with what was seen during the field trip.

The requirement of the standard to view the original GIS files used to make the project maps and assess the accuracy of the mapping process was assessed and considered appropriate and consistent with the written descriptions provided.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: NIR VCS 2010.24

Opportunities for Improvement: OFI VCS2010.37

3.1.4 Technology Used

Section 1.9 of the PD details the technologies, products and services that the Project utilizes. These include carbon stock assessment, aerial imagery collection, field patrols and fire prevention infrastructure and patrols. These technologies are relevant for the type of project represented. This section clearly describes the considerable resources coordinated between InfiniteEARTH (IE) and Orangutan Foundation International (OFI) in the design and implementation of field patrol teams and the required infrastructure to monitor the region for fire and deforestation. Three of the field posts were visited during the field visit. From these posts the extensive forest degradation as a result of many years of shifting agriculture was evident in the Rimba Raya area. Historically, patrols have been funded by OFI and reliant on donations to this organization. It was not immediately clear how effective these patrols have been in completely stopping the forest degradation threats or 'illegal conversion' of palm oil encroachment within the boundaries of the project area. In fact the project team conceded that the funding and resources to patrol the entire area have not been completely adequate, which supports the additionality of the Project. The effectiveness of this approach under the new funding regime will be monitored through the forest monitoring plan.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.1.5 Project Duration, Crediting Time and Project Start Date

Section 1.6 of the PD specifies that the project start date was 1st November 2008 which corresponds to the initiation of the Indonesian Government process for the granting of an Ecosystem Restoration concession license for the project area and confirmation that there are no conflicting recognized claims to the Carbon Accounting Area. This date is adequately justified and indicates a financial commitment being made to the Project at this time.

Section 1.6 of the PD also states that the crediting period start date is June 1st, 2009 which coincides with the commencement of field patrols for the baseline assessment, following stratification of the project area and GIS and remote sensing analysis of project conditions which began in January 2009. This is consistent with

the standards requirement that the project crediting period start date can be the date on which the first monitoring period commences. The field report which outlines the commencement of the baseline assessment is Annex 5A to the PD namely: OFI Field Report - Field Report to Infinite Earth – Rimba Raya Carbon Assessment Survey 2009, dated 22nd June – 24th July 2009.

Section 1.6 states the credit period start date as July 1st, 2009 The VCS crediting period is specified as 30 years.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS 2010.1

New Information Requests: NIR VCS 2010.25

Opportunities for Improvement: None

3.1.6 Ownership / Proof of Title / Rights of Use

Section 8.1 of the PD lists the major milestones that are required to achieve an Ecosystem Restoration Concession (ERC) in Indonesia (also outlined in Section 1.10 of the PD). Section 8.1 and Appendix 12a also provides evidence that the allocation of such a Concession embodies the right of use and carbon rights to the specified project area. Section 8.1 of the PD and related Annexes and documents cited by the validator demonstrate that the milestones that have been completed to achieve the ERC have been achieved in accordance with Table 27. The process has not yet fully completed, with the final map and decree from the Minster still outstanding. Given this, the project proponent is not able to demonstrate that the project area is under their control at the time of validation.

In the absence of the project proponent being able to demonstrate control over the project area, the VCS 2011 provides additional guidance which was considered during this validation. The text of the standard states: "**The project proponent shall demonstrate control over the entire project area with proof of title with respect to one or more rights of use accorded to the project proponent as set out in the VCS Standard, noting the following:**

1) The entire project area shall be under the control of the project proponent at the time of validation, or **shall come to be under the control of the project proponent by the first verification event. Where the project proponent does not yet have control over the entire area at validation, the entire project area is to be validated as if it were under control and the project is ready to be implemented. Where less than 80 percent of the total proposed area of the project is under current control at validation, the following applies:**

a) It shall be demonstrated that the result of the additionality test is applicable to the project area at the time of validation and to the entire project area to come under control in the future.

b) The monitoring plan shall be designed such that it is flexible enough to deal with changes in the size of the project.

c) The project shall be verified within five years of validation. At verification, the size of the project becomes fixed.

d) Where the area fixed at verification is smaller than intended at validation, areas that at verification have not come under control of the project shall be considered in the leakage management, mitigation and accounting. This requires the selection, at validation, of a methodology with appropriate leakage methods that may be used in the event the entire area does not come under control of the project. "

It is the validators opinion that in the absence of demonstrating control over the project area at the time of validation through the finalisation and granting of the ERC licence, the guidance presented in the VCS 2011 standard is relevant to this project and should apply. As no credits are issued at validation and credits can only be issued at verification once the project can demonstrate that the project area is under their control, validation at this point does not pose a risk to the VCS program. The project has demonstrated that it will be able to conform to the VCS 2011 requirements and be able to adjust the project accordingly in its pursuit of control over the project area, which is consistent with the requirements of VCS 2011.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.1
NCR VCS2010.2

New Information Requests: NIR VCS2010.26

Opportunities for Improvement: None

3.1.7 Double counting

Section 8.2 of the PD states 'Not Applicable' to which the validator agrees as there is no national level commitments in Indonesia

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.1.8 Description of how the project will achieve GHG reductions/removals

Section 1.8 of the PD states that the Rimba Raya Reserve Project will achieve greenhouse gas emissions reductions through the avoidance of planned deforestation of peat swamp forest and subsequent conversion to palm oil within the Carbon Accounting Area. The Project will diverge from the baseline emissions

scenario by obtaining and holding legal land tenure rights to the area for the sole purpose of ecosystem restoration. This will avert the planned forest clearing and peat land draining expected in the business as usual (BAU) scenario and thus mitigate the associated emissions resulting from those activities. The integrity of existing aboveground and belowground carbon will be maintained through a combination of fire prevention, forest conservation, and community development interventions to reduce remaining local level demands on forest resources.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.1.9 Project applicability to the VCS for projects rejected under other GHG programme (if applicable)

This project has not been rejected from any other GHG program. This project is undergoing validation against the CCB standard concurrently with this VCS validation. This project type is applicable under both standards.

The Indonesian Government does not have a National program or obligation to which such projects contribute to National commitments.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.1.10 Eligibility to the VCS

This project is classified as Reducing Emissions from Deforestation and Degradation (REDD) through Avoided Planned Deforestation (APD). Within Indonesia Palm Oil is currently classified as an Agricultural crop. Therefore the process for converting native forest to palm oil is a deforestation event with forest land being converted to agricultural land by definition.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.1.11 Chronological plan for project initiation and monitoring

Section 7 of the PD outlines the project activities and Implementation Schedule. This schedule lists activities from March 2008 until December 2039. The schedule details the project phase, the event or milestone, the activity description /relevant, start and finish date, status and responsibility. This format is consistent with the VCS guidelines for implementation and monitoring. The activities listed as completed appear to match evidence provided and was consistent with activities that were seen to have taken place on the ground during the field validation component. Whilst the schedule presents project implementation activities it does not integrate the present monitoring activities. The schedule of monitoring activities is presented in Section 3, Table 5.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: OFI 2010.45

3.1.12 Roles and responsibilities

The roles and responsibilities of the project proponent and associates are presented in Section 1.15. In this section the entity, their description and their function in the Project is clearly listed.

InfiniteEARTH is listed as the project proponent who is responsible for the design and implementation of the Project via its registered business entity in Indonesia, PT. Rimba Raya Conservation. Other project associates are listed as Orangutan Foundation International (OFI), Forest Carbon, Winrock International, PT Daemeter Consulting, World Education, Potters for Peace, MBK, and Health in Harmony. The large number of associates are specialists in a range of areas and appear to have the skills and resources to implement the range of monitoring and project activities presented in the PD.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.1.13 Compliance with relevant laws and regulations

Section 1.10 of the PD provides a commitment of the project proponent to be in compliance with relevant International, national and local laws and regulations. These include laws and regulations that cover employment, project implementation,

REDD, fire management, and carbon rights ownership. The National representative on the audit team confirmed that those listed appear to be a full list of relevant laws and regulations.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.2 Baseline

3.2.1 Conditions prior to project initiation

Section 1.7 of the PD adequately describes the climate, hydrology, geology, topography, soils, biodiversity, vegetation and land use/land cover of the project location. Several maps are included in this section in support of the text.

The land cover and vegetative cover maps presented were developed from fieldwork and satellite imagery. Land use is described in detail in this section stating that the area was legally zoned for commercial timber production and conversion to agricultural production. The agent of deforestation is described as large Palm Oil companies. This section also describes a more passive threat to the forest from the local communities along the Seryan river who have a long history of dependence on the forest and river system to provide fuel wood and timber for housing. Fuel wood is reportedly on a subsistence level by the local communities through the collection of deadwood from secondary forests on the borders of villages. The communities have also utilized the land along the river for traditional swidden agricultural practices where fire is used as a tool for clearing peat swamp forest land. Evidence of this practice (i.e. large cleared areas along the river) was seen during the field validation.

Data and information about the community use of the forest and agricultural practices was collected by the project proponent and is presented in Annex 10 – Environmental Impact Assessment Summary Conclusions and Annex 11 – Community Surveys, Engagement, Education & Support Documents. The complete EIA conducted for the Project was cited by the validators in the OFI offices on the field trip. This two volume document was written in Bahasa. A summary of the impacts was provided in the VCS PD and the CCB PDD.

The findings reported in the documentation were consistent with the findings that the validators determined through conversations with communities during the field visits.

The conditions that persisted prior to the Project are common for the region. Large tracts of peat swamp forest have been cleared for the establishment of palm oil

plantations which border the project area. The validation team drove through extensive areas of palm oil of varying age classes to arrive at the project boundary.

Section 2.4 of the PD states that the most likely baseline scenario was determined by applying the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM Project Activities which is consistent with the requirements of the selected methodology and the standard.

Of the alternative scenarios considered, complete conversion of the peat swamp forest to palm oil plantations was identified as most likely to occur in the absence of the Project, and was therefore chosen as the baseline scenario. The evidence presented to the validator strongly supported this baseline scenario. This baseline scenario conforms to the eligibility requirements as set out in the selected methodology.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: OFI VCS2010.40

3.2.2 Approval of the baseline methodology

The baseline methodology selected follows the approved VCS methodology element VM0004 – Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0 available at http://www.v-c-s.org/docs/VM0004%20Methodology%20for%20Conservation%20Projects%20that%20Avoid%20Planned%20Land%20Use%20Conversion%20in%20Peat%20Swamp%20Forests,%20v1-0.pdf

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.4

New Information Requests: None

Opportunities for Improvement: None

3.2.3 Application of methodology revisions or deviations (if applicable)

Section 4.3.2.1 and Section 4.5 describe some deviations from the methodology as follows:

"There were deviations in the Aerial Image Method (AIM) steps of the baseline calculations, which are detailed in Figure 29. Briefly, equations 23, 24 and 25 reflect a deviation in tree height and crown area field measurements, neither of which was

used in direct biomass estimation. Tree biomass was estimated using the Broadbent et al. (2008) regression equation (deviation in Eq. 28 and Eq. 30) using tree crown areas digitized in virtual plots. This model performed better than the allometric model using DBH parameters.Biomass estimates were then adjusted downward to match ground‐based biomass estimates, which are lower than IPCC default values for tropical moist forest and are considered conservative.
Further, all aboveground biomass contributes <3% to total carbon stocks in Rimba Raya's peat‐dominated area."

The description provided by the project proponent describes a variation in the approach taken from that strictly described in the methodology, rather than a deviation. This variation led to a more conservative estimation given that the project proponent took a further confidence deduction which was equivalent to the variation between estimated biomass and measured biomass. This approach appears to be conservative and consistent with the approach described in the selected methodology.

Conformance: Yes ☐ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.12

New Information Requests: None

Opportunities for Improvement: None

3.2.4 Conformance with methodology applicability criteria

The justification for the application of the selected methodology is described in Section 2.2. The methodology has ten (10) applicability criteria. The project proponent provided adequate justification or supporting evidence to demonstrate compliance with all ten applicability criteria.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS 2010.5
NCR VCS 2010.54

New Information Requests: None

Opportunities for Improvement: None

3.2.5 Correct application of the baseline methodology

The baseline methodology has been correctly applied by the project proponent and is detailed in a number of sections of the PD including Section 2.5 and Section 4.2 of the PD. The Rimba Raya Baseline Report document also present in detail the projects approach to implementing field work and spatial analysis techniques to establishing the baseline which are consistent with the requirements of the selected

methodology. The specific methodology requirements for the baseline are covered in more detail in Sections 3.2.6 and 3.4.3 of this validation report.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.45

New Information Requests: None

Opportunities for Improvement: None

3.2.6 Appropriate setting of the baseline scenario

The VCS standard has a number of specific requirements for the setting of baselines as stated in the VCS Tool for AFOLU Methodological Issues; Step 4. Those that relate to REDD projects cover two main components: land-use and land-cover (LU/LC) change and (ii) the associated carbon stock change component.

Requirements that should be specifically presented in the PD for projects that avoid planned deforestation (APD) are listed in the following table alongside the relevant validation findings.

VCS Baseline Requirements	Finding
Project documentation must clearly demonstrate that the land would have been converted to non-forest use if not for the REDD project (i.e. clear demonstration of the Project's additionality). The project developer must provide verifiable evidence to demonstrate that, based on government and landowner-planned land use changes, the project area was intended to be cleared.	Figure 3 - Planned and Active Oil Palm Concessions in and around the Project Management Zone and Figure 4 - Central Kalimantan Spatial Plan clearly show that the project boundaries correspond to areas that are identified for conversion to Palm Oil.
The annual rate of forest conversion shall be based on the common practice in the area—i.e. how much forest is typically cleared each year by similar baseline activities.	Table 8: Land conversion rate in 17 oil palm estates near the Rimba Raya project area presented in Section 4.2 of the PD presents actual clearance rates for the typical baseline activity from which an annual average estimate is conservatively drawn.
If it is common practice in the area for timber to be removed before clearing, then the amount of carbon that ended up in long-lived wood products must be estimated and deducted from the baseline emissions estimates (subject to the de minimis rule of 5%).	Section 4.2 of the PD outlines The calculation approach presented in the PD and the supporting spreadsheet calculations take into consideration the storage of carbon in long-lived wood products. These calculations are conducted in accordance with the selected methodology and were found

	to be *de minimis.*

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: OFI VCS2010.40

3.2.7 Demonstration of additionality

Section 2.5 of the PD outlines the approach to demonstrating additionality. In accordance with the selected methodology the current version of the VCS "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) project activities are applied correctly to demonstrate additionality.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.45

New Information Requests: None

Opportunities for Improvement: None

3.3 Monitoring Plan

3.3.1 Approval of the monitoring methodology

The monitoring methodology selected follows the approved VCS methodology element VM0004 – Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0 available at http://www.v-c-s.org/docs/VM0004%20Methodology%20for%20Conservation%20Projects%20that%20Avoid%20Planned%20Land%20Use%20Conversion%20in%20Peat%20Swamp%20Forests,%20v1-0.pdf

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: see NCR VCS2010.4

New Information Requests: None

Opportunities for Improvement: None

3.3.2 Correct application and justification of selected monitoring methodology

The monitoring methodology outlines methods for monitoring land use change, forest degradation and carbon pools and includes methods for monitoring four elements (Section 15, page 67 of VM0004).

Section 3.2 of the PD explains that the monitoring activities will consist of remote sensing and GIS analysis, routine field patrols and direct field sampling.

The monitoring requirements are outlined in more detail in Section 3 of the PD. The validation findings of VM0004 monitoring elements are presented in the following table.

Monitoring Methodological Steps	**Finding**
Monitoring the proposed project activity including the project boundary, a buffer region surrounding the project boundary to ensure against impacts of outside drainage and all activities that result in increased GHG emissions inside the project boundary	Section 3 provides details of the activities that will be monitored within the project area, including: 1. Area where natural or anthropogenic disturbances (including fire, illegal logging and other land use change) occurred within the project boundary by date, location, biomass lost or affected, and the preventative or curative measures, if any implemented 2. Number and location of logging gaps by date, location, biomass lost or affected, and the preventative or curative measures, if any implemented Area and depth of peat burned within the project area by date, location, estimated peat emissions, and the preventative or curative measures, if any implemented 3. Area of peat, if any, that was drained within the project boundary by date, location, estimated peat emissions, and the preventative or curative measures, if any implemented 4. Information on forest protection practices 5. Monitoring will be conducted with a combination of satellite imagery and field patrols. This approach is consistent with the requirements of the selected methodology.
Actual net GHG emissions including changes in carbon stocks in above-ground biomass, peat emissions	Section 3.4 describes in detail approaches that are consistent with the selected methodology. The approach to estimating actual net GHG emissions in aboveground biomass and peat are defined. This process includes: 1. Sampling design and stratification 2. Monitoring of the boundary of the proposed project activity 3. Monitoring of forest protection activities: including forest fires, logging gaps, new canals, biomass loss from logging. 4. Calculation of ex post baseline net GHG emissions, if required

	5. Data to be collected and archived for the estimation of baseline net GHG emissions 6. Calculation of ex post actual net GHG emissions avoided
Leakage due to displacement of economic activities	The PD describes an approach that is consistent with the methodology. The only activity displacement considered is the shifting of pre-project activities to outside the project boundary. In accordance with the VCS and the selected methodology, the PD states that the Activity Shifting leakage shall be assessed for five full years beyond the date at which deforestation was projected to occur in the baseline. The PD describes a multilayer approach to determining leakage from displaced economic activities that is consistent with the general requirements of the standard and the specific approaches described in the selected methodology.
A QA/QC plan, including field measurements data collection verification, data entry and archiving to ensure the integrity of the data collected.	Section 3.2 refers to the QA/QC plan for data management and references Annex 6 QA/QC Plan. This plan discusses the projects approach to quality assurance and quality control and is considered adequate considering the complexity of the Project. Evidence that the Project's QA/QC process is a functioning part of the management of the Project was experienced by the validation team during the process of the third party assessment.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.13
NCR VCS2010.47

New Information Requests: NIR VCS2010.30

Opportunities for Improvement: None

3.3.3 Conformance with VCS specific criterion related to monitoring

Section 5.11 of the VCS 2007.1 specifies some specific monitoring requirements. The validation findings of these specific requirements are presented in the following table.

VCS Required Monitoring Procedures	Finding
Specification of the purpose of the monitoring	Section 3.2 of the PD states "The purpose of monitoring is to ensure that the estimates of GHG removals presented in

	the Project Document are being met, and to identify and account for any unplanned reductions in project carbon stocks or increase in project emissions or possible leakage outside the project boundary."
Types of data and information to be reported – including units of measurement	Section 3.4 of the PD outlines the data and their units that will be captured during the implementation of the monitoring plan. The list of data was found to be consistent with those listed in the selected methodology.
Monitoring methodologies, including estimation, modeling, measurement or calculation approaches	Section 3.4 lists monitoring methodologies and the calculation approaches that are consistent with the requirements of the selected methodology.
Monitoring times and period, considering the needs of the intended users	Table 5 adequately lists the monitoring, reporting and verification activities and frequencies.
Monitoring roles and responsibilities	Monitoring roles and responsibilities are adequately outlined in Section 3.4.
GHG information and management systems, including location and retention of stored data	Section 3.2.8 of the PD provides details on the Project's approach to managing data quality, storage and access. This section states two locations where the data will be stored. These locations are consistent with offices of the project proponent.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.46

New Information Requests: None

Opportunities for Improvement: None

3.3.4 Collection and archiving of all relevant data

The data and parameters to be monitored are detailed in Section 3.3 of the PD. The 28 parameters listed in the data tables include all relevant parameters for the monitoring methodological pathways selected. The tables provide transparent and relevant details regarding the collection/selection of various parameters, the values used and the sources of such data.

In accordance with the Voluntary Carbon Standard 2007.1 section 5.13, the Project Proponent has made a commitment to store all project data in a secure and retrievable manner for at least two years after the end of the project crediting period. Project data will be stored and regularly maintained on redundant external

hard drives at onsite (Pangkalan Bun) and offsite (Jakarta) locations and secured with backup software using standard protocols. Data storage locations are listed as

Onsite data storage
Jl. Hasanudin, No. 10 Blk
Pangakalan Bun Kalimantan Tengah, 74111
Phone: 0532 24778
Fax: 0532 27506

Offsite data storage
Mayapada Tower, 11th Floor
Jl. Jenderal Sudirman Kav.28,
Jakarta Selatan, 12920
Tel: +62-21-5289-7446
Fax: +62-21-5289-7399

Section 3.2.8 of the PD explains the key data storage, access and storage requirements for the project. The client provided a final version of their QA/QC plan which adequately covered the expected components of such a plan.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR 2010.46

New Information Requests: NIR VCS2010.32

Opportunities for Improvement: None

3.3.5 The frequency, responsibility and authority for registration, monitoring, measurement and reporting activities

Section 3.2 of the PD adequately describes the frequency, responsibility and authority for registration, monitoring, measurement and reporting activities. Section 1.14 provides more specific descriptions on the roles and responsibilities and presents information on the responsibility for relevant project activities. This detail was found to be consistent with the project implementation requirements of selected methodology and the standard.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.4 Calculation of GHG Emissions

3.4.1 The appropriateness of the source, sink and reservoir

The methodology outlines that the selected carbon pools are: above-ground tree biomass, aboveground non-tree biomass, peat and wood products.

The methodology states that these pools are 'major carbon pool subject to the project activity' and does not specify that these selected pools are 'optional'.

The selected methodology lists the following carbon source, sinks and reservoirs as selected/included: Burning of aboveground biomass (CH_4 only), Peat oxidation from drainage (CO_2 only), Burning of peat (CO_2 and CH_4)

Section 2.3 of the PD states that the major carbon pools subject to the project activity are peat and aboveground biomass. It states that long-lived wood products are also included. It states that aboveground non-tree biomass (as well as litter and deadwood) is conservatively excluded. The methodology does not explicitly allow for the exclusion of the aboveground non-tree biomass pool based on *de minimus*, however this methodology was developed against the VCS 2007.1 and it was not explicitly clear that the exclusion of a pool needed to be set out in the methodology.

According to the Tool for AFOLU Methodological Issues, which was relevant at the time this methodology was approved, aboveground non-tree biomass is optional for REDD projects when the expected baseline scenario is either annual crop or pasture grassland. Where the expected baseline scenario is perennial tree crop, then the aboveground non-wood pool must be included in the project boundary.

The proponent estimates the aboveground non-tree biomass pool using standard operating procedures as outlined in AR-AM0007. This tool states that "The sum of decreases in carbon pools and increases in emissions that may be neglected shall be less than 5% of the total decreases in carbon pools and increases in emissions, or less than 5% of net anthropogenic removals by sinks, whichever is lower."

Non-tree biomass was surveyed in 150 small plots in the Project and was found to contribute 3.72 – 5.60% to total aboveground biomass representing <0.5% of GHG emissions. Therefore, this carbon pool was deemed to be an insignificant emission and was conservatively excluded from Baseline calculations. This assessment is presented in the field biomass survey section of the Rimba Raya Baseline Report. The project proponent has demonstrated that the aboveground non-tree biomass pool is *de minimus* and in conformance with VCS 2007.1 Tool for AFOLU Methodological Issues.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS 2010.50

New Information Requests: NIR VCS 2010.27

Opportunities for Improvement: None

3.4.2 The correctness and transparency of formulas and factors used

The selected methodology presents 131 individual equations and various calculation pathways which the project proponent can apply to determine the net GHG benefits of the Project. The PD presents the equations and equation pathway figures from the selected methodology in a transparent manner. Section 3.4 (Leakage) and Section 4 (GHG Emission Reductions) outline the equations used and provides references to the selected methodology. The equations were found to be transparently presented and correctly presented. The calculations spreadsheet provided was also found to present the equations as specified in the PD. The spreadsheet was presented in a manner that the validator could assess its correctness and completeness. The factors used were referenced and justified and consistently reported between the PD and the calculation spreadsheet.

Conformance:	Yes ☒ No ☐ N/A ☐
Non-Conformity Reports:	NCR VCS2010.8
New Information Requests:	None
Opportunities for Improvement:	OFI VCS2010.43 OFI VCS2010.44

3.4.3 Calculation of emissions in the baseline scenario (ex-ante)

Step 4, Section 2.4 of the PD provides a summary of the procedure for calculating ex-ante baseline GHG emissions from the Project. It states that the baseline GHG emissions were estimated based on equations provided in the methodology. It states the estimates are based on a combination of site-specific data, high resolution aerial images, remotely sensed data and IPCC default values from peer reviewed science. This section directs the reader to Annex 8b - Baseline Report for more detail.

In addition, section 4.1 of the PD states that emissions from peat represent 92% of the total project emissions of the baseline scenario. This section also lists the three main steps to estimating the ex-ante baseline GHG emissions that are consistent with the selected methodology, namely:

- Stratification and sampling
- Estimation of carbon stock changes in above ground biomass
- Estimation of GHG emissions from peat.

Within the selected methodology Equations 1 – 61 are relevant to the development of ex-ante estimations of the baseline scenario. The validation findings of the ex-ante baseline estimate are presented in the following table.

Stratification and sampling

The methodology specifies a number of steps to achieve stratification. The PD describes the approach to stratification in Section 4.2.1. The description provided in this section is consistent with the steps listed in the methodology.

Stratification Steps	Findings
1.Stratification according to pre-existing conditions and baseline projections	
Define the factors influencing carbon stock changes in carbon pools.	Section 4.2.1 of the PD states that the factors influencing carbon stock changes in the region are oil palm concession boundaries, land cover type / extent and distribution of peat. This appears to be adequate to define the factors influencing carbon stock changes (i.e. forest type and soil type). The oil palm concession boundaries are also used to determine the project extent and the timing of conversion.
Collect relevant maps and literature concerning key factors identified in step 1.	Section 4.2.1 describes the use of land cover classification and palm oil concession boundaries as the basis of primary stratification. This section refers the reader to Section 1.7 for specific data on stratification of the carbon accounting area. This section provides land cover maps which have been developed by the project proponent from LANDSAT data 2003/2008 as well as aerial photos taken in 2009. The selected methodology states on page 11 that, 'where baseline activities are expected to affect peat reserves to a depth that exceeds the available peat supply in some areas of the project boundary, project participants shall also consider peat depth in their stratification scheme'. As the peat depth is shown to be greater than 1 m throughout the project area where peat swamp forest is defined, the project proponent is not required to stratify by peat depth.
Undertake a preliminary stratification	Section 1.7 of the PD explains the preliminary stratification process. Existing hardcopy maps, G.I.S. data, Landsat and SPOT satellite imagery were compiled and assessed for initial project description and stratification in January 2009. A third land cover assessment made use of Landsat image interpretation combined with Ministry of Forestry land cover mapping.
Conduct supplementary sampling for site specifications in each stratum	The focus of the stratification was using aerial images and remote sensing. A subset internal validation process was instigated through the design of a limited field survey which focused on measuring biomass and peat depth. The location of the field plots were not random but rather

	based on accessibility. Given the general access issued faced by the field teams the locations of the transects and plots were considered adequate for the purpose of supplementary sampling. The PD details that soil type was primarily determined from vegetation type (i.e. peat swamp forest overlays peat, kerangas forest overlays sandy soils and lowland forest overlays mineral soils) and supplemented with the Wetlands International Peat map for areas classified as non-forest. This approach was considered appropriate for the conditions present on the project area.
Do final stratification of baseline scenario (Distinct strata should differ significantly in terms of baseline GHG emissions)	Upon completion of the field surveys, remote sensing and GIS methods were used to update the land cover classification. The final identified strata are listed in Section 4.2.1 of the PD. A total of 8 land use/land cover strata are listed which are distributed across 4 palm oil concessions that make up the project area. Therefore there are 24 strata identified.
2. Stratification according to the project activity	
Final ex-ante stratification	The final ex-ante stratification is presented in Section 4.2.1 Table 15 of the PD. The area of each strata are consistently reported in the calculation spreadsheets and other project documentation.
Leakage stratification	Leakage stratification was conducted in accordance with the selected methodology and this is clarified in Section 3.5 of the PD. Stratification is performed in two stages: first in accordance with Step 3 of the methodology to focus the leakage analysis and then in Step 7 of the methodology to refine impact assessment for carbon stock and emissions changes.
General Requirements	The methodology states that where baseline activities are expected to affect peat reserves to a depth that exceeds the available peat supply in some areas of the project boundary, project participants shall also consider peat depth in their stratification scheme. Stratification by peat depth is not required by this project due to the considerable depth of peat reserves found in the project area (circa 3 - 5 m). The methodology restricts GHG impacts on peat drainage to a depth of 1m.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.6

	NCR VCS2010.7
	NCR VCS2010.8
	NCR VCS 2010.10
	NCR VCS2010.13
New Information Requests:	NIR VCS2010.28
	NIR VCS2010.29
	NIR VCS2010.31
Opportunities for Improvement:	OFI VCS2010.38
	OFI VCS2010.39

Estimation of carbon stock changes in above ground biomass and Estimation of GHG emissions from peat.

Calculations	Finding
Estimation of carbon stock changes in aboveground biomass	The key elements of the selected methodology are listed and explained. Figures are presented in tables in Section 4.2. The reader is also referred to Annex 8a for the excel calculations.
GHG Emissions from timber extraction before land clearing • Estimation of the area cleared and logged • Estimation of biomass logged	**Estimation of area cleared and logged** The methodology states that the deforestation rate requires estimation from a valid and verifiable plan by the agent of deforestation for estimating the rate at which deforestation and/or logging is projected to occur. The project proponent presents a deforestation rate based on historical conversion rates by the agent of deforestation within the region of the project area. The proponent presents a linear average annual conversion rate based on the historical data collected (Table 16/17 of the PD). The approach taken by the proponent presents a valid estimation of the area cleared (being the full extent of the defined palm oil concessions) and presents a valid conservative annual conversion rate which ultimately results in conservative baseline emissions. **Estimation of biomass logged** In accordance with the methodology emissions from timber extraction are calculated as emissions from timber extraction minus carbon stored in wood products. All tree species above the minimum diameter threshold were assumed to be harvested. The minimum diameter was reported to be 30 cm which was based on market survey information collected by BOSF on common practice in the region. The biomass in the commercial component of tree species logged was estimated based on Mawas plot data. The total biomass of trees larger than the 30 cm threshold was estimated based on aerial imagery sampling plots. Based on measurements of 93 logging gaps in the Mawas project region, 36% of the total aboveground biomass per tree is assumed to be extracted as timber, leaving 64% of the aboveground biomass in the forest.
GHG Emissions from	The approach to estimating emissions from biomass

biomass burning for land clearing	burning for land clearing appears conformant with the selected methodology requirements. This approach was correctly applied in the calculation spreadsheets to arrive and an estimate for GHG emissions form biomass burning for land clearing.
Mean carbon stocks in aboveground biomass • Estimation of mean carbon stocks in aboveground non-tree biomass • Estimation of mean carbon stocks in aboveground tree biomass	**Mean Carbon Stocks in Aboveground Non-Tree Biomass** A small sample of plots were measured by the project proponent to demonstrate that aboveground non-tree biomass stock were *de minimus* and was therefore excluded from calculations **Mean Carbon Stocks in Aboveground Tree Biomass** The methodology provides three alternatives for measuring aboveground tree biomass. Given the large extent and inaccessibility of Rimba Raya's peat swamp forests, the Aerial Image Method (AIM) was selected as recommended in the methodology (see p. 20). Methods applied are based on Brown et al. (2005) and Slaymaker (2003) and work was conducted by Forest Carbon. The AIM method consists of nine (9) steps to estimate GHG emissions from timber extraction before land clearing. *AIM 1. On the ground, measure diameter at breast height (DBH), total tree height and crown area of individual trees of varying diameters and species found within the project region. Sample size should be large enough to capture the variability in DBH and crown areas of trees in the project boundary.* The Rimba Raya Baseline Report states that 36 biomass plots (each of 2500m^2) located along 8 transects were used for measurements of DBH of trees >20 cm DBH (n=1555) and tree crown diameter (n=340). Descriptive statistics show that variability in DBH and tree crown diameter was adequately captured. These ground measurements of crown cover and DBH where then correlated with analysis of aerial imagery. AIM 2. *Create a relationship between a combination of the height and/or crown area and the biomass of each tree observed.*

	Allometric relationships were created to relate Tree Biomass to some combination of Tree Height (H) and /or Tree Crown Area (A) from ground plot data. All equation types were tested using all data and species ‐ specific models were constructed using 16 of the most common species. Results of regression analysis showed that tree species diversity and variation in allometries limited the explanatory power of a single site ‐ specific regression model (R2 = 0.379) . Broadbent et al (2008) conducted a similar exercise but for a larger dataset in the neotropics for the purpose of applying a site ‐ specific regression model to aerial image data. The Broadbent model represents a good alternative to site ‐ specific model and was applied as a variation in AIM Step 2. In order to account for possible over ‐ estimation of biomass, the results were then calibrated to match biomass estimated from ground ‐ plot data. Results of biomass estimation were reduced over landcover classes by 22.85%, ensuring a conservative estimate. *AIM Step 3: In a standard aircraft, collect high resolution (10-15 cm per pixel) imagery in systematically spaced, overlapping parallel transects evenly distributed over the project boundary where land cover change is expected to occur.* 3,380 high resolution photographs were taken over Rimba Raya, each one covering approximately 120 ha, with a focus on the carbon accounting area. Photos were orthorectified in preparation for tree crown assessment. *AIM Step 4: Use software to create overlapping high resolution images in each transect and use the file's accuracy information, level and scale of overlapping images to create a 3-dimensional stereo view.* ArcGIS software was used to view and analyze aerial imagery. 2D aerial image files were processed since only tree crown (not tree height) was used in biomass estimation modeling as allowed by the methodology. *AIM Step 5: Randomly select high resolution images to analyze and establish a virtual plot on each image selected. The selection of images should follow the same sampling scheme as in the selection of ground*

	plots. Virtual plots were established on images in a stratified random manner.1ha square plots were systematically installed at the center of each photo to avoid any effects from lens distortion. Sample size, plot size, plot location, stratification and accuracy assessment are all described in the PD. *AIM Step 6: For each of the selected plots, create a feature project within Stereo Analyst that contains empty feature classes for plant types (typically broadleaf trees and palm trees for closed canopy tropical forest), and import a shape file of the virtual plot.* For each plot, tree crown areas were digitized using standard and customized tools in ArcGIS software. Code was written to run in ARCGIS that allowed the GIS operator to click with the mouse on three different points of the outline of each visible tree crown and the software would automatically create a circle polygon using the averaged radius from the three points. *AIM Step 7: Estimate the biomass of each tree in the virtual plot by relating crown areas and/or heights to biomass using Equations 27, 28 or 29 chosen in AIM Step 2.* As a result of relatively poor relationship found between crown area and/or heights to biomass, tree biomass was estimated using the Broadbent et al. (2008) regression equation (deviation in Eq. 28 and 30) using tree crown areas digitized in virtual plots. This model produced biomass estimates closer to field data than the allometric model using DBH. The Broadbent equation was relevant to the project area and was adjusted to be conservative based on the field measurements taken. Whilst this equation had an R2 of slightly less than 0.7 the approach and confidence deduction taken was considered consistent with the requirements of the methodology. *AIM Step 8: Calculate the above-ground biomass carbon per plot on a per area basis by summing the biomass carbon per tree within each virtual plot and*

	multiplying by a plot expansion factor which is proportional to the area of the measurement plot. Above ground biomass was calculated per plot. *AIM Step 9: Calculate mean carbon stock within each stratum by averaging across plots in a stratum or stand.* Mean biomass was calculated for each stratum by averaging across plots in a stratum. Biomass was converted to carbon in subsequent baseline spreadsheet calculations.
Estimation of increase in carbon stocks due to aboveground biomass growth of vegetation in baseline land-use	The methodology states that an appropriate equation that links above ground carbon stock with stand age should be used in this estimation. Section 4.2.4.3 explains the use of a palm oil growth curve that meets the methodology requirements and appears to be a conservative approach given that the model relates to palm oil on higher productive mineral soil in tropical regions (Ng et al. 1968). The equation was confirmed to be applied correctly in the calculator provided.
GHG emissions from harvesting aboveground biomass on baseline	For the purpose of applying Eq. 14 in the proposed methodology to estimate the change in carbon stocks of long-term wood products, "long-lived" is assumed to be >5 years. In the project region, the proportion of harvested wood that goes into long-term wood products was obtained using FAO data for Indonesia cited in Winjum et al. (1998). This approach was considered appropriate.
Estimation of GHG emissions from peat	
Depth of peat drainage	In accordance with the methodology, the project proponent conducted canal depth measurements in the neighboring palm oil concession of the deforestation agent. Survey target locations were established by interpreting peat drainage areas on 10-meter resolution SPOT5 satellite imagery. A total of 50 canal depths were taken with the average drainage depth found to be 1.44 meters averaged across all primary, secondary and tertiary drainages. The four primary drainages measured were all >2 meters deep (average 2.23 meters). These data exclude newly opened areas of deeper peat, which had not yet been planted in oil palm. Three of these areas were visited during an initial survey, and new drainage canals were

	measured at >3 meters deep (average 3.40 meters). The Project assumes that all peat areas within the project area are undrained and that palm oil plantations maintain a constant drainage depth of 100 cm below the surface, which is consistent with the methodology constraints placed on drainage depth. The PD cites Hooijer et al. (2006) who derived a minimum estimate of 0.80 m, a likely estimate of 0.95 m and a maximum estimate of 1.1 m based on peat depths more shallow than those found in the project site. The Project conservatively assumes that areas outside the proposed plantation boundaries would be unaffected by drainage under the baseline scenario. This approach appeared to be in conformance with the methodology.
Time dimension of peat drainage	In accordance with the methodology and the consistent with the field measurements conducted for drain depth, the default relationship listed in the methodology was correctly described in the PD and applied in the calculation spreadsheet.
Area of peat drainage	The methodology assumes that the area of peat drained each year in the baseline scenario will be equal to the area cleared and planted for the new land use. Land conversion figures presented in the PD and the supporting spreadsheets indicate that the project proponents approach was consistent with the methodology requirements.
Relationship between CO2 emissions and drainage depth	The relationship between CO_2 emissions and drainage depth is correctly reported in the PD and applied in the calculation spreadsheet.
GHG emissions from peat burning • Estimation of peat depth burned • Estimation of area of peat burned under the baseline scenario • Estimation of peat bulk density • Estimation of CO_2 and CH_4	**Peat Depth Burned** In accordance with the methodology and the particular conditions of the Project, the estimate of peat burn depth should be 34cm. This figure is correctly reported in the PD and the calculation spreadsheet. **Estimated Area Burned** The estimated area burned is equivalent to the total area converted to palm oil. This area is correctly applied in the calculation spreadsheet. **Peat Bulk Density**

emissions factors	Default peat bulk density values are used for ex-ante estimates. As such there is a requirement to measure peat bulk density ex-post. The project proponent has committed to conducting peat bulk density measurements ex-post. This commitment and a timeframe for implementation is specified in the PD. Note that peat bulk density was surveyed and assessed to be 0.1505 g/cm^3 based on test results from the University of Palangkaraya survey of the project area (see Peat Survey Report). This survey was conducted for the single belowground strata defined for the Project and met the uncertainty requirements of the methodology (n=48, sd = 0.0584, uncertainty = 9.234%). However, an additional survey of peat bulk density will be carried out to better represent potential variation in above-ground strata. Following baseline update in year 3, carbon stocks will be added or subtracted from the total project carbon stock as warranted to account for data improvements as allowed by the Methodology. The default value listed in the PD and the calculations presented in the spreadsheet are correct. **Estimation of CO_2 and CH_4 emissions factors** In accordance with the methodology and the description in the PD, the estimation of CO_2 and CH_4 and N_2O emission factors are correctly applied.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports:

NCR VCS2010.14
NCR VCS2010.15
NCR VCS2010.16
NCR VCS2010.17
NCR VCS2010.18
NCR VCS2010.19
NCR VCS2010.20
NCR VCS2010.21
NCR VCS2010.23
NCR VCS 2010.48
NCR VCS 2010.49
NCR VCS2010.51
NCR VCS2010.52
NCR VCS2010.53
NCR VCS2010.55
NCR VCS2010.56

New Information Requests: NIR VCS2010.24
NIR VCS2010.33
NIR VCS2010.34
NIR VCS2010.35
NIR VCS2010.36

Opportunities for Improvement: None

3.4.4 Calculation of emissions from project activities (ex-ante)

The methodology does not specify equations to estimate emissions from project activities. Subsequently the PD does not address emissions from project activities.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement:

3.4.5 Calculation of emissions from leakage (ex-ante)

The methodology considers both activity shifting leakage and market leakage.

Activity Shifting Leakage

The activity displacement considered by the methodology is the shift of pre-project planned activities to outside the project boundary. The area of activity shifting leakage shall be assessed for five full years beyond the date at which deforestation was projected to occur in the baseline. However, emissions resulting from activity shifting leakage shall be tracked beyond the initial year of clearing where applicable to account for emissions from peat and mineral soils that continue after the initial year of clearing. The methodology requires that an estimate of leakage be developed based on the following methodological approach.

Activity Shifting Leakage Calculations	Finding
Step 1: Determine the baseline rate of forest clearance for the deforestation agent.	Deforestation rate is discussed initially on page 72 of the PD. The approach to determining the deforestation rate is explained in detail on page Section 4.2.2. Assessment of deforestation and conversion rate (page 90-93). The project proponent considers that all land already owned by the agent of deforestation is equivalent to the baseline rate of forest clearance.

Step 2. Estimate the new rate of forest clearance by the focal agent of deforestation with the project implementation if no leakage is occurring.	The project proponent will monitor new concessions to be bought by the agent of deforestation and give special attention to illegal clearing in the areas specified in the PD. Any additional activity will be classified as 'the new rate of forest clearance'.
Step 3. Monitor all areas by baseline agent of deforestation through the years in which the planned deforestation was forecast to occur.	The agent of proposed deforestation and conversion to oil palm plantation is known - PT BINTANG ERA SINAR TAMA (BEST) Investment Holding. PT BEST oil palm concessions are limited to four districts in Central Kalimantan and total 139,424 ha on 15 parcels according to government GIS data for HGU and Izin Lokasi permits in Central Kalimantan. This data is somewhat more extensive than information on permit licenses which were also researched. Where concession name or concession location identified in permit records made a close match to the GIS data, the concession was conservatively, considered to be affiliated with PT BEST. These areas are all to be monitored via satellite imagery as well as areas within 100km radius of palm oil processing plants (a processing limitation of palm oil) to detect any potential activity shifting leakage.

Section 3.5 discussion pages 75 and 82, state that deforestation was projected to occur by early 2009 and provides a commitment that leakage will be monitored June 2009 to June 2014. It also states that activity shifting is not technically possible in the first two years since obtaining new concessions takes 2-3 years.

Section 3.5 details how the monitoring area will be restricted to a boundary of 100 km radius around the two palm oil processing plants owned by the deforestation agent (identified as PT Best and its subsidiary companies) in the region.

Market Leakage

Market leakage represents a one-time deduction to baseline emissions and is presented in Section 4.4 of the PD.

The selected methodology specifies the equations and the factors to be used in the estimation of market leakage. The approach required by the methodology, and documented in the Project Document (PD) provided, is consistent with the calculation spreadsheets provided by the project proponent. The default factors

used in the equations are selected from the range given in the methodology and are appropriate. The factors selected lead to the most conservative estimate of market leakage. These factors are:

LFME,i (leakage factor for market effect calculations) = 0.7
ϕi (volume weighted average wood density) = 0.57
CF (carbon fraction of dry matter) = 0.5
LDF (logging damage factor) = 0.37

The factors selected to estimate market leakage are consistently applied to all identified strata. A weighted figure (based on the identified strata) is appropriately applied to the total area for each concession. The estimation for total market leakage over the entire project period is now correctly calculated and reported as 4,836,855 tCO_2e.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS 2010.9
NCR VCS2010.10

New Information Requests: NIR VCS 2010.30

Opportunities for Improvement: None

3.4.6 Calculation of emission reductions or avoided emissions due to the project (ex-ante)

The methodology states that the ex ante net anthropogenic GHG emissions avoided as a result of the Project is calculated as the baseline net emissions minus leakage, in t CO_2-e:

The actual ex-ante net avoided GHG emissions are correctly calculated in the project spreadsheets and consistently documented to be 104,886,254 t CO_2-e throughout the project documentation.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.10

New Information Requests: None

Opportunities for Improvement: OFI VCS2010.41

3.4.7 Uncertainties

The methodology states that "in choosing key parameters or making important assumptions based on information that is not specific to the project circumstances, such as in use of default data, project participants should select values that will lead to an accurate estimation of net GHG emissions, taking into account uncertainties. If

uncertainty is significant, project participants should choose data such that it tends to underestimate, rather than overestimate, net avoided emissions."

In many cases throughout the PD and supporting documentation related to the selection of values the project proponent has erred on the side of being conservative.

The methodology provides relatively clear guidance on when uncertainty of individual values must be incorporated into the baseline:

- No quantification of uncertainty in allometric equations is necessary, provided they have been properly verified (Sec. 12.1.2).
- When literature values are used, a 90% confidence interval must be calculated and reported (Sec. 12.1.3).
- Since a valid verifiable plan must exist for estimating the deforestation rate, uncertainty in the deforestation rate is assumed to be 0. When default values are required by the Methodology, they can be assumed to be conservative and uncertainty need not be quantified.
- If the calculated combined error in estimated GHG emissions reductions is less than 10%, the proponent is not required to take a deduction (Sec. 24.3). However, a deduction is required otherwise.

The selected methodology requires that uncertainty is to be considered for the following parameters:

Parameters requiring consideration of uncertainty	Proponent Response	Finding
Area Uncertainty		
$A_{B, itlogged}$ - Area of land logged under the baseline scenario for stratum i, in time t	Required. Zero. Case 1 described adjacent. "*In this methodology, deforestation rates are based on actual deforestation plans by the baseline agent of deforestation, therefore assume the uncertainty of this baseline rate of clearing is zero"* (pg 53 of the methodology).	The area cleared is based on existing defined concessions that are slated for palm oil conversion. Page 109 of the VCS PD states that since the methodology is only applicable to projects where deforestation is planned and projected to occur within 10 years of the project start date (Applicability Condition D), uncertainty in deforestation rate is assumed to be zero (methodology p. 53). To demonstrate the most likely deforestation rate scenario, an analysis of recent palm oil conversion in the reference area by the agent of deforestation was conducted. These GIS-based calculations are estimated to be > 90% accurate. GIS-based parameters for ex ante calculations fall into one of two cases, which are referenced in the parameter table: Case 1. Area cleared, logged or planted (2,800 ha/yr): These parameters are based on the actual rate of clearing by the deforestation agent, determined from analysis of Landsat data. Landsat is the primary tool for mapping tropical deforestation (Defries et al. 2005) and has been validated against high resolution imagery to be 92-97.5% accurate (NASA accessed January 15, 2011 http://www.glcf.umd.edu/data/paraguay/description.shtml). Case 2. Area drained: Drainage area is based on stratification of peat/non-peat which derives from landcover stratification where non-peat types (Kerangas Forest and Open Kerangas Scrub) were differentiated from all other types with 92% producer's accuracy and 98.5% user's accuracy. A zero uncertainty is justified.
$A_{cleared}$ - Area cleared under the baseline scenario for stratum *i,* in time *t B it*	Required. Zero. Case 1 described above. "*In this methodology, deforestation rates are based on actual deforestation plans by the baseline agent of*	Deforestation rates are reported as an annual linear average based on actual deforestation rates in PT BEST concessions. The approach takes into consideration the annual land conversion rate of 6 concessions owned by the agent of deforestation over 6 years. The average annual conversion rate is determined and uncertainty around that rate calculated. A deduction is made for the variation from the linear average and this annual conversion rate is then applied. This is considered an appropriate and conservative reflection of the actual rate of annual conversion. It is a

	deforestation, therefore assume the uncertainty of this baseline rate of clearing is zero" (pg 53 of the methodology).	conservative approach in the early years and the total does not exceed the maximum historical rate of conversion by the agent of deforestation. Given that the total area to be harvested is delineated and will not be exceeded, applying an uncertainty of zero is justified. Required. Zero. Case 1 described above
$A_{itplanted}$ - area of biomass growth on future land use in the baseline scenario in stratum *i* at time *t*	Required. Zero. Case 1 described above. GIS analysis of actual areas.	The proponent used the same value as the deforestation rate. As the uncertainty is integrated into the overall conversion rate, uncertainty of this parameter need not be quantified.
A_{BH} cleared - Area cleared at harvest H under the baseline scenario for stratum i, in time t	Eq. 48 not calculated – as palm oil plantations operate on a 25-30 year timeframe, emissions from harvest rotations Eharvest were not considered in baseline estimation. This is conservative.	Since the baseline scenario does not involve planting short-rotation crops, this is OK.
$A_{B,drain,it}$ - area of drainage impact under the baseline scenario in stratum *i*, time *t*	Required. Zero. Case 2 described above. GIS analysis of actual areas.	The proponent used the same value as the deforestation rate. As the uncertainty is integrated into the overall conversion rate, uncertainty of this parameter need not be quantified.
$A_{B,burn,it}$ - area of peat burned under the baseline scenario in tratum *i* at time *t*;	Required. Zero. Case 1 described above. GIS analysis of actual areas.	The proponent used the same value as the deforestation rate. As the uncertainty is integrated into the overall conversion rate, uncertainty of this parameter need not be quantified.
Timber Uncertainty		
P - percent of harvest industrial	Required. Zero. Conservative Value. Industry	The project proponent utilizes Winjum et al 1998 as the basis for the percent harvest industrial roundwood going into long term wood products. Whilst this paper does not present the

roundwood going into long term wood products	standard dataset (FAO 1995) and report (Winjum et al. (1998).	90% confidence interval, this is a widely used reference for these parameters and could be considered a default value. A zero uncertainty is considered appropriate in this instance.
B_{logged} - mean merchantable wood volume	Logging site data from Mawas used ("Logging gap data Mawas calculation sheet 23jun08-1.xls") Mean = 0.36, SE = 0.0176, n=93. Uncertainty (90%CI/mean*100) = 8.04%	Reported uncertainty is consistent with that reported in the literature.
Biomass Burning Uncertainty		
CE - Average biomass combustion efficiency	Required. Zero. Default value used.	The IPCC default value was used and as such is considered to represent conservative values based on verifiable literature sources. Therefore the zero uncertainty is justified.
$MV_{B,AG\_timber,it}$ - Mean merchantable volume under the baseline scenario in stratum i at time *t*	N/A - Eq. 34 not used since BEF method not selected as allowed by the methodology p. 20; Parameter Blogged used in place of *MVB,AG_tree,it* in Eq. 76 leakage	N/A
ϕ i	Literature value used (Reyes, Brown, Chapman, & Lugo, 1992) representing wood density for tropical Asia. Mean = 0.57, SE = 0.007, n = 428. Uncertainty (90%CI/mean*100) = 2.03%	Reported uncertainty is consistent with that reported in the literature.
Future Land Use Uncertainty		
$\mathbf{R}_{ARB,it}$ - increase in carbon stocks	Palm oil growth curves were constructed to	The proponent built in the uncertainty reported in the literature value used and therefore applies conservative values in estimations of palm oil growth. A zero uncertainty

due to palm oil sequestration.	estimate annual carbon accumulation as presented in the spreadsheet Oil Palm Growth Model …xls" which shows the 90% CI and calculated uncertainty of the carbon accumulation parameter in each year. Uncertainty was calculated across palm oil growth cohorts and years. Uncertainty is low overall in the palm oil growth parameter (<4% over the 30-year project life) but exceeds the 10% precision target in years 3-8. Baseline palm oil carbon accumulation associated with these years is low compared to other carbon pools such that the Project meets the allowable uncertainty under this methodology of +/- 10% CREDD, at the 90% confidence level. (meth p.98). However, in order to build in conservativeness, estimated carbon accumulation	is justified.

	associated with palm oil growth has been increased in years 3-8 and an uncertainty of zero is assumed as allowed by the methodology (p. 52):	
Peat Uncertainty		
BD_i - Bulk density of peat in stratum I (g cm3 = t m3)	Required. Zero. Default value used.	The methodology default value was used therefore the zero uncertainty is justified.
$D_{B,burn,it}$ - depth of peat burned under the baseline scenario in stratum *i* at time *t*;	Required. Zero. Default value used. According to the methodology p. 37 "The depth of peat burned shall be assumed to be equal to the drainage depth, minus a critical threshold of 40 cm above the drainage depth. If the difference between drainage depth and the critical threshold exceeds 34 cm, then the maximum burn depth of 34 cm shall be applied." Since drainage depth for the baseline is 100cm, a burn depth of 34 cm is used.	The methodology default value was used therefore the zero uncertainty is justified.

In addition to the methodology parameters specified by the methodology, the project proponent integrated uncertainty in to the reported figured for palm oil re-growth calculations.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.11
NCR VCS2010.22

New Information Requests: None

Opportunities for Improvement: None

3.4.8 Calculation of net VCUs to be issued (ex-ante)

Neither the methodology, nor the PD presents an equation for calculating the net VCUs to be issued (ex-ante) but rather present an approach to estimating net GHG benefits (ex-ante). The actual net greenhouse gas emissions avoided represent the sum of the avoided net decreases in carbon stocks and avoided peat emissions within the project boundary (CBSL), minus any GHG emissions from the baseline scenario that are not prevented within the project boundary in the project case (CPRJ), such as logging, fire, or other land use changes that lead to an increase in emissions. The project proponent has correctly applied the methodology to arrive at an ex-ante estimation of 131,107,818 t CO_2-e. The PD reports the ex-ante GHG emissions avoided as 104,886,254 t CO_2-e after consideration of the 20% risk with holding buffer. Review of the project calculation spreadsheet confirmed that the estimations were in accordance with the specified estimation approach presented in the methodology and the PD.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.4.9 The assumptions made for estimating GHG emissions

Generally the assumptions made throughout the PD and supporting calculations are consistent with the relevant VCS criteria and are carried through to the calculations correctly.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.5 Environmental and Social Impact

3.5.1 Requirements for and approval of an Environmental Impact Assessment (if applicable)

Section 8 of the PD explains that the completion of an Environmental and Social Impact Study by a third party is the sixth step in the acquirement of an Ecological Restoration Concession license in Indonesia. Section 5 of the PD confirms that an Environmental Impact Assessment was conducted by independent consultants in March 2010 and directs the reader to Annex 7. This Annex was cited in the offices of OFI in Punkalan Bun and was in Bahasa Indonesian. A summary of the EIA was provided and was sufficient to demonstrate conformance with this component of the standard.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.5.2 Negative environmental and socio-economic impacts of the project

Section 5 of the PD provides a brief summary of the Environmental Impact Assessment, stating the majority of impacts with have a positive environmental outcome. It lists some of the positives as:

- protection of hydrological function
- improved marine habitat
- maintenance of biodiversity and preservation of habitat
- mitigation of erosion, resulting in improved water quality

Some potential negative environmental impacts resulting from the Project include (among others):

- Risks to water quality from increased tourist in the area
- Increased water pollution from increased boat traffic for eco-tourism
- Regional population increases from improved services leading to increased stress on the forest
- Construction of fire access roads may disturb natural habitat and cause soil compaction

This section also suggests mitigation strategies that are considered consistent with the risk posed.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: None

3.5.3 Comments by stakeholders

Section 6, page 98 of the PD outlines a list of stakeholder engagement meetings that the project proponent has undertaken. These engagement exercises were largely undertaken in December 2008. During the audit evidence was presented that significant additional stakeholder meetings had also taken place. The Project is seeking approval under the Climate Community and Biodiversity standard and community and stakeholder engagement process are a significant part of this application. In general it was determined that the community's interests and needs had been taken into consideration during the project development and contracts had been clarified as tot eh benefit sharing arrangements between the key project stakeholders (i.e. Infinite Earth and the Orangutan Foundation International). Significant work had also been completed during 2010 to improve the general understanding of the benefits the project activities will bring to the region.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: None

New Information Requests: None

Opportunities for Improvement: OFI VCS 2010.42

3.6 Project Risk

3.6.1 Identification of Project Risk

The project risks register is detailed in Section 1.11, page 28 of the PD. Fire is listed as the greatest risk to the project area, which is said to be mitigated by the experience of project partners and a local community approach.

The risk approach taken to determine the non-permanence buffer utilizes the relevant sections of the VCS Tool for AFOLU Non-Permanence Analysis and Buffer Determination. The full validation of the Risk Assessment is presented in the First Assessment of the Double Approval Elements Report.

Conformance: Yes ☒ No ☐ N/A ☐

Non-Conformity Reports: NCR VCS2010.3

New Information Requests: None

Opportunities for Improvement: None

4 Validation conclusion

Scientific Certification Services (SCS) has performed a validation of "*The Rimba Raya Biodiversity Reserve Project"* against the requirements of the Voluntary Carbon

Standard 2007.1 (VCS) and its supporting documents, as well as the selected approved methodology VM0004 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0.

The project proponent is Infinite Earth. SCS has confirmed that Infinite Earth has the right to all and any reductions generated by the Project during the Project Crediting Period, 1July 2008 – 30 June 2039.

The review of the project design documentation, field visits and subsequent follow-up interviews have provided SCS with sufficient evidence to determine the fulfillment of the stated criteria.

The Project correctly applies the approved VCS methodology element VM0004 – Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0.

The main project activity is to prevent deforestation caused by land use conversion to palm oil plantation. The Project results in reductions of GHG emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

Emission reductions attributable to the Project have been shown to be additional to any that would occur in the absence of the project activity.

The total emission reductions from the Project are estimated to be 104,886,254 tCO_2e over the 30-year crediting period (1 July 2009 – 30 June 2039). This includes project emissions, total confidence deduction and leakage deduction applied as per VM0004, and the VCS AFOLU buffer deductions currently assessed at 20%. This estimate assumes the baseline does not change during the baseline Re-evaluation. Adequate training and monitoring procedures have been implemented.

In summary, it is the opinion of SCS that the "The Rimba Raya Biodiversity Reserve Project" in Central Kalimantan, Indonesia as described in the VCS PD of May 15, 2011 meets all relevant VCS 2007.1 requirements and correctly applies the VCS approved methodology element VM0004 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Version 1.0.

Dr. Carly Green
Lead Verifier
Contractor to Scientific Certification Systems
31 August 2011

Todd Frank
Program Manager, Greenhouse Gas Verification
Scientific Certification Systems
August 31, 2011

Appendix A – Responses to Non Conformity Requests / New Information Requests / Opportunities for Improvement

NCR Number 2010.1 of 56 Dated 13th July 2010

Finding: Please provide evidence of necessary government authorizations to obtain the carbon rights to the Carbon Accounting Area.

Proponent Response: Please see attached the updated section 8.1 of the PD and refer to new PD Annexes 12A and 12B for details on the government regulations and authorizations necessary to obtain carbon rights to the Carbon Accounting Area.

Validator Response: The additional clarifying text presented in Section 8.1 of the PD indicates that the project has sufficiently demonstrated 'user rights' in accordance with the requirements of the VCS 2011 guidance on demonstration of 'user rights' and control over the project area.

The project proponent shall demonstrate control over the entire project area with proof of title with respect to one or more rights of use accorded to the project proponent as set out in the VCS Standard, noting the following:

1) The entire project area shall be under the control of the project proponent at the time of validation, or ***shall come to be under the control of the project proponent by the first verification event. Where the project proponent does not yet have control over the entire area at validation, the entire project area is to be validated as if it were under control and the project is ready to be implemented. Where less than 80 percent of the total proposed area of the project is under current control at validation, the following applies:***

a) It shall be demonstrated that the result of the additionality test is applicable to the project area at the time of validation and to the entire project area to come under control in the future.

b) The monitoring plan shall be designed such that it is flexible enough to deal with changes in the size of the project.

c) The project shall be verified within five years of validation. At verification, the size of the project becomes fixed.

d) Where the area fixed at verification is smaller than intended at validation, areas that at verification have not come under control of the project shall be considered in the leakage management, mitigation and accounting. This requires the selection, at validation, of a methodology with appropriate leakage methods that may be used in the event the entire area does not come under control of the project.

It is the validators opinion that the design of the project meets these requirements in the absence of the full allocation of the Ecosystem Restoration Licence at the time of validation. It is also the validators opinion that this guidance from 2011 is relevant to this project and poses no foreseeable adverse risk to the VCS program as the proponent has adequately demonstrated that the requirements of the standard can be meet once the project is ready for verification.

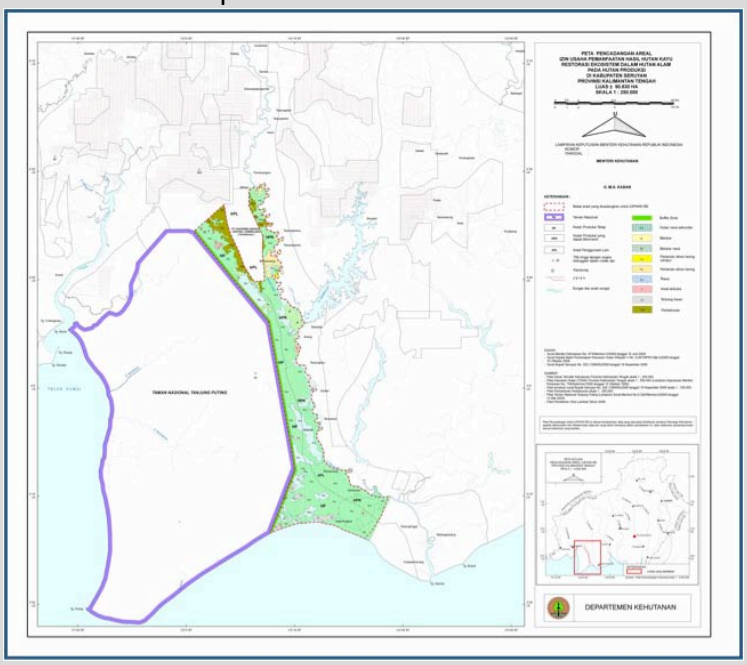
NCR Number 2010.2 of 56 Dated 13th July 2010

Finding: Please provide the official government issued map of license area boundaries.

Proponent Response: The Ministry of Forestry Area Verification map, shown below has been included as Figure 31 in the updated section 8.1 of the PD. This map shows

the entire Rimba Raya concession (Project Management Zone) which surrounds the project boundary (Carbon Accounting Area) – see below and Figure 2 of the PD. Note that the Indonesian government does not differentiate the (smaller) carbon project boundary but instead recognizes the entire concession within which carbon trading activities are allowed.

Area Verification is a key step in the Ecosystem Restoration License authorization process and is described in detail in the updated section 8.1 of the PD. Briefly, the Rimba Raya PMZ was designated, refined and approved by a series of letters by the Minister of Forestry. These letters have been specifically referenced and are included in a new Annex 12B to the PD. The Minister's SP1 Letter has conditionally approved the Rimba Raya concession presented in the Area Verification Map. The Minister's SP2 Letter has ordered this map to be formalized and a final decree to be drafted.



Validator Response: The maps and additional clarifying text related to the Ecosystem Restoration License authorisation process indicates that the project has demonstrated 'user rights' to the project areas presented in the PD and supporting documentation. This is sufficient to demonstrate that the boundaries of the project are the same boundaries considered for the Ecosystem Restoration license and subject to the demonstration of 'user rights' justified in NCR 1 above.

NCR Number 2010.3 of 56 Dated 13th July 2010

Finding: The Non-Permanence Analysis and Buffer Determination tool states that if a project developer /implementer has no previous experience in the design and implementation of activities that may ensure the longevity of carbon benefits then the minimum buffer amount applied should be 20%. Please clearly justify why the project proponent has applied the lowest buffer amount.

Proponent Response: Revised risk assessment with justification of buffer has been provided by Gabe Eickoff and is currently undergoing third party validation.

Validator Response: The justification was not satisfactory and the 20% withholding buffer was agreed as defined in the First Assessment of the Double Approval

Elements Report.

NCR Number 2010.4 of 56 Dated 13th July 2010

Finding: Please provide evidence the methodology used is double approved and that the latest versions of both the selected and ADP methodology elements are applied.
Proponent Response: Please see VCS link: http://www.v-c-s.org/VM0004.html
Validator Response: With this response and changes to the VCS PD are adequate to close this issue. Therefore non-conformances relating to 3.2.2 Approval of the baseline methodology and 3.3.1 Approval of the monitoring methodology of this validation report are closed.

NCR Number 2010.5 of 56 Dated 13th July 2010

Finding: In accordance with the requirements of the methodology applicability criteria, please provide proof that each applicability criteria has been fulfilled in the appropriate section of the PD.
Proponent Response: Please see Applicability Table attached herein.
Validator Response: The project proponent provided a table which addressed all 10 applicability criteria and a specific descriptive response which included, where relevant, the section and page of the PD where each criterion is covered in more detail and any relevant references presented to support justification. The completed table was added to the PD Final document and adequately closed this non-conformance.

NCR Number 2010.6 of 56 Dated 13th July 2010

Finding: References within the document provide important explanation and justification for decisions made within the project. Please provide a detailed and complete bibliography for the PD so that a third party can evaluate it.
Proponent Response: A bibliography has been provided.
Validator Response: The PD Final document has a bibliography which a third party can use to validate the claims made in the report and was sufficient to close this non-conformance.

NCR Number 2010.7 of 56 Dated 13th July 2010

Finding: In accordance with the requirements of the selected methodology the CDM Tool —Calculation of the number of sample plots for measurements within A/R CDM project activities should be applied to determine/justify the number, size and location of sampling plots.
Proponent Response: The biomass survey using aerial plots was planned so that photographs would be taken systematically over Rimba Raya concession, with a focus on the carbon accounting area. A total of 3,380 photographs were taken over Rimba Raya, each one covering approximately 120 ha (see Figure in last page). An initial pilot study was done were by 20 photographs per land cover/land use strata were chosen to gain an estimate of the standard deviation of the biomass per strata. This initial sample generated a table with the following statistics: (see last page).

Table 1 Results from pilot sample of biomass (n = 20 per LC/LU strata).

LC/LU Classes	Mean Biomass (ton/ha)	Std Err (ton/ha)	Std Dev (ton/ha)	Number of plots needed
Peat (lightly degraded)	262,722	4,688	46,489	58
Peat (highly degraded)	96,140	20,677	63,584	49
Peat Scrubland	no photo plots			
River and Coastal Forest	228,296	31,803	80,122	77
Kerangas	87,117	25,423	76,253	70
Open sandy scrub	40,863	8,877	41,914	74
Seasonally inundated wetlands	no photo plots			
Bare or sparsely vegetated	24,592	5,683	16,072	78

The Std Deviation was incorporated into the relevant formula shown in p. 14 of the Baseline Report (Annex 11) and a 10% sample error was applied to generate the number of plots needed in each strata. Note, after this pilot was conducted, LC/LU strata were redone using a 2009 satellite image and the River and Coastal Forest were merged with lightly degraded peat swamp.

Additional aerial plots were added to meet the number recommended in the above pilot and the table below (shown in Annex 11 as Table 7) presents the final biomass estimates.

Table 2. Statistics for the estimate of biomass by strata

Land Cover/Land Use Classes	No. of plots	Mean Biomass (t/ha)	Std. Error	Sample Error w/ 90% CI
Peat Swamp - lightly degraded	129	267	3.6	2.3%
Peat Swamp - highly degraded	54	166	7.7	7.8%
Peat Swamp - shrub (deforested)	61	63	5.4	14.4%
Kerangas (heath)	66	112	6.9	10.3%
Kerangas - scrub (deforested)	54	75	8.0	18.0%

Only in the strata classed as deforested does the sample error exceed the recommended 10% (at a 90% level of confidence). The strata with the highest biomass has a very low sample error due to the large number of plots installed (the coastal and riverine forest plots were merged into this class).

Validator Response: Whilst there is no reference to the use of the CDM tool the approach taken is consistent with the tool and the response to NCR 2010.13 states that the tool was used. The validator is satisfied that the approach taken is

consistent with the selected methodology.

NCR Number 2010.8 of 56 Dated 13th July 2010

Finding: The PD and supporting documents do not specifically address the methodology elements applied in ex-ante calculations nor always clearly define and justify any variations/deviations from the methodology. Given the complex nature of the methodology and the structure of the PD and supporting Annexes, this makes it very difficult for a third party to validate that the methodology was correctly applied. Please update the PD to adequately and clearly address the specific elements of the methodology that were applied (and any deviations from such) so that a third party can validate it. This specifically relates to stratification, leakage and biomass stocks. Stepping through the methodology elements applied in Section 4, as is done in Section 3.4 of the PD would improve transparency and the ability to validate the approach.

Proponent Response: The PD and supporting documents have been revised and updated to clearly address the methodology elements applied throughout the document including the sections on ex-ante calculations. Special attention was given to revising the presentation and adding references to the methodology for sections on stratification, leakage and biomass stocks. Methodology steps have been addressed in Section 4 of the PD to improve clarity and facilitate review.

Validator Response: The project proponent has added some key aspects to the final PD document that assists in the validation of the approach taken by the project proponent. These include methodological pathway figures consistent with those presented in the methodology. These are presented in Figure 16, 25 and 29. These figures clearly show any variations from the prescribed approach in the methodology.

In addition, the spreadsheet calculation tool was improved to provide more guidance which lead to improving the ability to validate the approach taken by the proponent against the selected methodology. Comments were added to highlight and justify key assumptions and the selection of parameters.

These improvements assisted in the validation of the spreadsheets as well as the identification of some inconsistencies and errors in the calculations which were rectified through discussions with the project proponent and the validator. Therefore the additions to the documentation are sufficient to close this non-conformance.

NCR Number 2010.9 of 56 Dated 13th July 2010

Finding: Areas defined as protected should not be excluded from leakage monitoring as there is no evidence that these boundaries are recognized by deforestation agents.

Proponent Response: This has been corrected and the Monitoring Report will reflect that the protected areas have been included. Please see Monitoring Report Year 1-Rev2.0.

Validator Response: The text in the Monitoring plan states that “For purposes of monitoring areas of possible leakage that would not appear in government records, project proponents initially expanded focused monitoring to include **all**

lands within a 100km radius of the project area. Upon further analysis, it was felt that an area of 100km radius around each of the two CPO processing mills owned and operated by the agent of deforestation would be more appropriate as this coincides with the 100km operational constraints of edible palm oil operators such as the agent of deforestation."
However Figure 19 and 20 of the Monitoring Report show monitoring areas that are not consistent with this statement. Two large concessions sit outside this 100km range. When queried, the project proponent explained that these concessions are not currently viable due to the distance to the processing facility. Nonetheless the project proponent has committed to monitoring activity on all PT BEST concessions, including the two that fall outside the 100km radius. The information provided by the proponent is sufficient to close out this NCR.

NCR Number 2010.10 of 56 Dated 13th July 2010

Finding: Ensure that the ex-ante net anthropogenic GHG emissions avoided are estimated in accordance with the selected methodology. In particular that the ex-ante leakage estimates are developed/reported in accordance with the methodology or any variation/deviation explained.
Proponent Response: The ex-ante net anthropogenic GHG emissions avoided are estimates in accordance with the selected methodology. Specifically, the ex-ante leakage estimates are developed and reported in accordance with the methodology and are presented in the updated Baseline Report. Please refer to the final Baseline Report and Baseline Emissions calculations.
Validator Response: Following many iterations and revisions of the ex-ante calculator and improvements in the documentation of the methodological approach, the ex-ante net anthropogenic GHG emissions avoided appear to be estimated in accordance with the selected methodology. The methodology variation from the documented Aerial Image Method (AIM) steps are adequately described in the text and Figure 29 in section 4.5 of the PD as well as the text of the Baseline Report. These variations represent a project-specific change that does not change the equation logic in the chosen methodology. Additionally the variations utilized equations relevant to the forest type and geographical location and were demonstrated to result in conservative estimates.

NCR Number 2010.11 of 56 Dated 13th July 2010

Finding: Please choose key parameters and make important assumptions that will lead to an accurate estimation of net GHG emissions which includes taking into account and calculating uncertainties in accordance with the selected methodology.
Proponent Response: Please see Table 4 attached. Also, extensive explanations and references have been made inside the cells of key parameters in the Final Baseline Calculation worksheet.
Validator Response: The project proponent has improved the reporting of key parameters, assumptions and uncertainty related to these parameters in Table 24 of the PD. This Table is consistent with the Data Tables presented in the selected methodology. This table presents justified parameters and reports uncertainty where requested by the selected methodology. In accordance with the methodology (pg 52) conservative estimates can also be used instead of uncertainties, provided

they are based on verifiable literature sources or expert judgement. In this case the uncertainty is assumed to be zero.

NCR Number 2010.12 of 56 Dated 13th July 2010

Finding: There are a number of points in the application of the selected methodology where possible variations/deviations have occurred. These include the elements related to leakage, logging gap detection and potentially above ground biomass estimation (see NIR VCS2010.4 and NIR VCS2010.11). Given the lack of connectivity between the methodology and the PD it is currently difficult to determine if there are others. Please clearly document any if there are any methodology deviation or variations, their justification and their expected impact on the ex-ante/ex-post estimations of project GHG emissions.

Proponent Response: We have highlighted any variations to the methodology and we have clearly documented the pertinent sections of the methodology in the Baseline Report, Baseline Calculations Sheet, Monitoring Plan and Monitoring Report.

Validator Response: Section 4.5 of final PD states that there were variations in the Aerial Image Method (AIM) steps of the baseline calculations, which are detailed in Figure 29. These variations are considered to represent a project-specific change and do not change the equation logic in the selected methodology.

During the validation process the selected methodology was finally approved. This final version had some changes to approach that the project proponent took into consideration. The approach taken by the project proponent now appears to be consistent with the methodology. This conclusion was assisted by the changes and clarifications made by the project proponent in Figure 29 - Methodological Pathways and the final version of the calculation spreadsheet.

NCR Number 2010.13 of 56 Dated 13th July 2010

Finding: Please justify the sampling framework in accordance with the selected methodology. (i.e.) It is not clear if the accuracy of the initial stratification is sufficient. It is not clear if the monitoring of 16 plots in the baseline transects is likely to lead to statistically improved data for the 10 year re-evaluation.

Proponent Response: To respond to this NCR, three points are addressed: 1) sampling framework, 2) accuracy of stratification and 3) biomass plot monitoring."

1. Sampling Framework

In accordance with the Methodology, above ground carbon stocks were estimated using high-resolution aerial imagery (AIM Steps, Methodology). Sampling framework followed methodology requirements:

Sample size was established by conducting a pilot study with n=20 plots for each land cover strata and calculating biomass variance. As required by the Methodology, a 10% sample error with a 90% Confidence Interval was applied to generate the number of plots needed in each strata and updated to final land cover stratification. A total of 364 aerial plots were analyzed for biomass estimation.

Plot size was sufficiently large to minimize between-plot variation in biomass for the number of sample plots established. The CDM Tool suggests plot sizes of at least 100-1000 m2 (depending on stand density) to adequately capture biomass variation, and subsequently reduce sample size. Aerial plot size at Rimba Raya was 10,000 m2,

so each plot should be highly representative of the vegetation within its boundaries. Plot location followed a stratified random design with all Carbon Accounting Area land cover classes represented. Plots centers are located at the center point of aerial images as recommended by the Methodology.

2. Stratification

Following the methodology, a preliminary stratification was performed based on existing information (e.g. Ministry of Forestry land cover mapping). Initial stratification included all major forest blocks and transects were located throughout these blocks to maximize sample size for ground measurements including tree DBH, crown diameter and peat depth. Final stratification was performed based on improved data and supplementary sampling (e.g. 2009 Landsat imagery and aerial image and ground reference data).

An accuracy assessment was performed on final stratification and a confusion matrix generated as required by the Methodology. An overall classification accuracy of 81.3% was obtained. The predominant class by area, lightly degraded peat swamp forest covering 30,445 ha or 33.5% of Rimba Raya, was mapped with 90.0% accuracy. A weighted kappa coefficient of 0.78 indicated there is good agreement between all map classes interpreted from satellite imagery and aerial photo data. This stratification was used in the final sample design for aerial plot locations.

3. Biomass Plot monitoring

To clarify, the primary purpose of the ground survey was to provide data that served to validate biomass estimates derived from the Aerial Image Method. The field survey of 36 biomass plots distributed on 8 transects across the Carbon Accounting Area had the following objectives:

- Gain an idea by strata of the variation in biomass and use this to compute a coefficient of variation for the aerial survey assuming a 10% sample error with a 90% CI.
- Gather data on canopy widths and DBH spread throughout a range of diameters and crown illumination classes, which will allow a linear regression model to be constructed that uses crown width as the independent variable.
- Using observations in the field, validate the land cover/use classes before conducting the aerial survey analysis.

Biomass plots will not be used to try to “statistically improve data for the 10-yr re-evaluation”, since according to the Methodology:

1. “Baseline net GHG emissions are not monitored in this methodology. The methodology prescribes validity of the baseline identified ex ante at the start of the project activity for the crediting period, thereby avoiding the need for monitoring of the baseline over the crediting period, and achieves savings in the costs associated with baseline monitoring. However, the baseline is re-assessed/revised every 10 years.” (page 5), and

2. “when estimating existing carbon stocks within baseline strata for an avoided emissions project, permanent sampling plots are not necessary because these carbon stocks do not need to be tracked over time. Therefore, temporary sampling plots can be used” (page 10).

Biomass plots have been established so that they may be re-surveyed during monitoring every 3-4 years. This is not required by the methodology but can provide long-term data that may improve the understanding of the project area in a way that will inform future management and monitoring.

Validator Response: : The response is adequate to close this NCR.

NCR Number 2010.14 of 56 Dated 13th July 2010

Finding: Please provide evidence the methodology used is double approved and that the latest versions of both the selected and ADP methodology elements are applied.
Proponent Response: Please see VCS link: http://www.v-c-s.org/VM0004.html
Validator Response: The response is adequate to close this NCR.

NCR Number 2010.15 of 56 Dated 13th July 2010

Finding: The methodology outlines three possible approaches to estimating aboveground biomass using aerial imagery, allometry or biomass expansion factors. It is not clear in the PD or supporting Annexes which if these approaches was ultimately used and as such it is difficult to adequately validate that the specific requirements for the selected approach have been fulfilled. Please clearly relate the approach taken to the methodology applied. (see also NCR VCS2010.8).
Proponent Response: The aerial-based approach was used in Rimba Raya to provide a cost-effective and accurate estimate of biomass over a large and remote peat area. This method was chosen due to the extremely limited access to the Rimba Raya concession, and ensures a comprehensive distribution of the biomass plots. The process described in the methodology was followed to measure tree crowns in the aerial photographs with the only difference being that Broadbent et al.'s formula was used since it generated an estimate closest to the biomass measured in the ground-based plots and that estimate also coincided closely with published studies from similar peat swamps. Additionally, the aerial photos could serve for monitoring this forest since the same flight lines could be flown and photographed periodically. A map was included in NCR-2010.7_NCR-2010.7 that shows the flight lines and location of the aerial photos taken over Rimba Raya.

As a way to validate the aerial-based biomass estimate, ground plots were also installed beforehand. These plots also served as a failsafe system in the event that the aerial photography mission failed to acquire sufficient imagery.
Validator Response: The methodological pathways (Figure 29) of the updated PD clearly documents the decision making process and the approach taken. This information was adequate such that a third party could validate the approach taken matched the approach presented in the selected methodology.

NCR Number 2010.16 of 56 Dated 13th July 2010

Finding: In the PD clearly justify that the sample size was large enough to capture the variability in both DBH and crown areas of trees in the project boundary in accordance with the methodology.
Proponent Response: In the field, 36 2500m^2 biomass plots on 8 transects across the project area were established, within which DBH was measured for all trees >20 cm

DBH (n=1555) and tree crown diameter (n=340) was measured for a range of tree sizes in each biomass plot. Descriptive statistics show that variability in DBH and tree crown diameter was adequately captured. This is described in attached document "VCS Validation_IE_NCR-2010.16_NCR VCS2010.16_071310_SUPPL.doc"
Validator Response: The additional explanation provided by the proponent adequately demonstrates that the number of plots was sufficient to capture the variability.

NCR Number 2010.17 of 56 Dated 13th July 2010

Finding: The methodology states that 'species and minimum diameter classes sold in the local timber market can be obtained from government records, timber records of existing logging operations, surveys of illegal logging activities, sawmill surveys, or records of previous land use conversion also meeting the applicability conditions of this methodology'. The PD gives some indication that the minimum diameter is 30cm however uses 15cm, whilst this is conservative the justification for its use appears unfounded.
Proponent Response : The size limit and definition of merchantable timber for solid wood production is legally defined and regulated by the license of Forest Utilization. The latest regulation is quoted below:

Minister of Forestry Regulation Number: **P. 11/Menhut-II/2009:** Silvicultural System on the Area of Business License on Wooden Forest Products Utilization in Production Forest Area.

Article 8.
Cutting cycle and diameter limit of cutting referred to in paragraph (2) is:

a. On dry land forest land:
(1) 30 (thirty) years with diameter limit ≥ 40 cm (forty centimeters) in production forest area or convertible forest area, and ≥ 50cm (fifty centimeters) in limited production forests with the TPTI or TR silviculture system.
(2) 25 (twenty five) years for the TPTJ silvicultural system with 3 (three) meters line plantation of ex clear-cutting forest with diameter limit ≥ 40 cm (forty centimeters).

b. 40 (forty) years for **diameter limit ≥ 30 cm** (thirty centimeters) in **swamp forests** .

The original calculations done by Forest Carbon were designed to be conservative. This approach is being re-addressed throughout the document and all calculations are now being based on "accurate data" with an appropriate confidence interval assigned. The baseline and PD will be updated accordingly.
Validator Response: The response and updated final PD is adequate to close this NCR. The diameter limit of 30cm was applied and was demonstrated to be consistent with the methodology, in particular Condition J outlined in section 3 (i.e. it is assumed that the size class and species of trees sold in the local timber market would have been extracted in the project area prior to clearing). The Additional text and changes to the calculator were sufficient to close this issue.

NCR Number 2010.18 of 56 Dated 13th July 2010

Finding: In accordance with the methodology and the particular conditions of the project, the estimate of peat burn depth should be 34cm. While correctly referred to in the PD, in Annex 11 it is listed as 30cm and subsequently the calculations are incorrect. Please use the correct estimate of peat depth burned in all calculations as specified in the methodology.

Proponent Response: The Baseline calculations have been corrected to use a peat burn depth of 34 cm as specified in the methodology.

The Baseline calculation spreadsheet is attached for reference. Please see Excel Worksheet tab "Peat Burning-BL" Cell E-3 for Depth of peat burned.

Validator Response: The changes made are adequate to close this NCR.

NCR Number 2010.19 of 56 Dated 13th July 2010

Finding: Please specify a commitment and timeframe for measuring peat bulk density in the project area.

Proponent Response - The default value for peat bulk density 0.14 g/cm3 will be used in baseline calculations for years 1 and 2. Then in year 3 (July 2011 – June 2012), this value will be replaced with a project-specific value and the baseline will be updated to reflect this change in accordance with the Methodology.

Note that peat bulk density was already surveyed and assessed to be 0.1505 g/cm3 in the single belowground strata defined for the project and met the uncertainty requirements of the methodology. However, the additional survey of peat bulk density will be carried out to better represent potential variation in above-ground strata.

Following baseline update in year 3, carbon stocks will be added or subtracted from the total project carbon stock as warranted to account for data improvements as allowed by the Methodology.

Validator Response: This response is adequate given that the measurement of peat bulk density was not undertaken across all project strata. The commitment to extend the collection of bulk density measurements across strata is consistent with the requirements of the methodology and is sufficient to close this NCR.

NCR Number 2010.20 of 56 Dated 13th July 2010

Finding: Please quote and use the correct default value for peat bulk density in all calculations.

Proponent Response: The default value for peat bulk density 0.14 g/cm3 will be used in baseline calculations for years 1 and 2. Then in year 3 (July 2011 – June 2012), this value will be replaced with a project-specific value and the baseline will be updated to reflect this change in accordance with the Methodology.

Note that peat bulk density was already surveyed and assessed to be 0.1505 g/cm3

in the single belowground strata defined for the project and met the uncertainty requirements of the methodology. However, the additional survey of peat bulk density will be carried out to better represent potential variation in above-ground strata.

Following baseline update in year 3, carbon stocks will be added or subtracted from the total project carbon stock as warranted to account for data improvements as allowed by the Methodology.

Validator Response: As reported and documented in the fieldwork report, the fieldwork conducted found that the average peat bulk density was 0.154 g/m^3. The fieldwork approach taken was consistent with scientific protocols, however the selection of the number of samples appears to have no basis. The existing transects were utilised with three cores taken per transect (3 x 8 = 24 sampling locations). Rings were taken every 50cm down each core and so samples ranged depending on the depth of peat found at the core. 764 peat bulk density measurements were taken at various depths along the profile. A simple average was taken to arrive at 0.154 g/m^3 which represents the bulk density 0-100cm. This depth is consistent with the maximum depth stipulated in the methodology and is within the ranges presented in Table 2 (pg 37) of the approved methodology. However the approach did not result in peat bulk density measurements that were representative of all defined strata. Therefore the client reverted to the use of the default peat bulk density figure (NCR VCS 2010.53) with a commitment to conduct measurements in each forest strata. This is consistent with the requirements of the methodology.

NCR Number 2010.21 of 56 Dated 13th July 2010

Finding: Please remove estimates of CO_2 emissions from aboveground tree biomass burning in the calculation spreadsheet as this is not an included gas in methodology as specified in Table 4 of the PD.

Proponent Response: Email exchange (attached) between Carly Green and Leslie Bolick confirmed that current carbon accounting follows the approved Methodology for calculating CO_2 emissions associated with above ground tree biomass burning. This will be more clearly presented in the final VCS Project Document.

To summarize, with reference to the Methodology page numbers: estimation of Baseline net GHG emissions (Eq.1) page 21 includes the sum of carbon stock changes in aboveground biomass, a component of which is biomass burning (Eq. 3) page 21 which is derived as the sum of CO_2, N_20 and CH_4 emissions from burning (Eq. 12) page 25.

Validator Response: Further clarification of the estimation approach by the project proponent and documentation in the excel spreadsheet was sufficient to close this NCR.

NCR Number 2010.22 of 56 Dated 13th July 2010

Finding: Please undertake the uncertainty assessment in accordance with the selected methodology.

Proponent Response: Uncertainty has been quantified as reported below and has been noted in the Baseline Calculation spreadsheet for the following parameters:

ϕ wood density
B_{logged} (representing mean merchantable wood volume) and
$R_{ARB,it}$ (increase in carbon stocks due to palm oil sequestration)

Uncertainty was not assessed for peat bulk density (default value used) or Non-tree biomass (carbon pool shown to be insignificant and not included in baseline estimation).

Uncertainty was assessed to be zero for the deforestation rate parameters (e.g. $A_{cleared}$) and $MC_{B,AG\_tree,it}$ (mean carbon stocks in aboveground tree biomass) and conservative values used for these parameters as presented in the discussion below.

ϕ wood density

literature value used (Reyes, Brown, Chapman, & Lugo, 1992) representing wood density for tropical Asia. Mean = 0.57, SE = 0.007, n = 428. Uncertainty (90%CI/mean*100) = 2.03%

B_{logged} (representing mean merchantable wood volume)

Logging site data from Mawas used ("Logging gap data Mawas calculation sheet 23jun08-1.xls")
Mean = 0.36, SE = 0.0176, n=93. Uncertainty (90%CI/mean*100) = 8.04%

$R_{ARB,it}$ (increase in carbon stocks due to palm oil sequestration)

Palm oil growth curves were constructed to estimate annual carbon accumulation as presented in the spreadsheet Oil Palm Growth Model …xls" which shows the 90% CI and calculated uncertainty of the carbon accumulation parameter in each year.

Uncertainty was calculated across palm oil growth cohorts and years in the Baseline Calculation spreadsheet…xls.

Uncertainty is low overall in the palm oil growth parameter (<4% over the 30-year project life) but exceeds the 10% precision target in years 3-8. Baseline palm oil carbon accumulation associated with these years is low compared to other carbon pools such that the project meets the allowable uncertainty under this methodology of +/- 10% CREDD, at the 90% confidence level. (meth p.98). However, in order to build in conservativeness, estimated carbon accumulation associated with palm oil growth has been increased in years 3-8 and an uncertainty of zero is assumed as allowed by the methodology (p. 52):

"a precision target of a 90% confidence interval equal to or less than 10% of the mean recorded value shall be targeted..."

"Alternatively, (indisputably) conservative estimates can also be used instead of

uncertainties, provided that they are based on verifiable literature sources or expert judgement. In this case the uncertainty is assumed to be zero."

uncertainty in deforestation rate

The proponents would like to clarify several points related to deforestation rate assessment in this methodology:

1. Since this methodology is only applicable to projects where deforestation is planned and projected to occur within 10 years of the project start date (Applicability Condition D), uncertainty in deforestation rate is assumed to be zero. (p.53).

2. The rate of deforestation must be estimated from “a valid verifiable plan by the agent of deforestation” (p. 13). Recognizing that in Kalimantan, written plans for land conversion may not be available, one of the authors of the methodology qualified that a “valid verifiable plan” may consist of either plantation permit records or records of previous land use conversion and that GIS analysis of actual plantation development by the agent of deforestation provides sufficient record of previous land use conversion (Harris, pers comm.).

3. Project proponents have assumed an uncertainty of zero in deforestation rate as allowed by the methodology and have presented a conservative annual conversion rate of conversion in the baseline scenario based on GIS analysis of previous conversion by the baseline agent.

To demonstrate the conservativeness the following assessment is presented to supplement the discussion of deforestation rate in the Baseline Report and VCS PD.

On other PT BEST parcels, the average annual rate of conversion was 2030 ha/yr in year 1 and 2868 ha/yr in year 2 after which concessions were reaching full development (74% by year 2 and 88% by year 3) (Table 12 Baseline Report).

Rapid build-out on relatively small concessions limits conversion rate analysis based on annual area of conversion. In order to extend this analysis to future scenarios, the cumulative proportion of buildout is assessed and presented here:

% developed							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	concess area
KUCC N	44.0	4.5	8.8	21.1	11.2	10.3	100.0
KUCC S	23.5	59.5	17.0	0.0	0.0	0.0	100.0
BANGUN	16.1	41.9	19.0	11.9	4.5	6.6	100.0
HAMP north	19.5	66.3	14.1	0.0	0.0	0.0	100.0
HAMP south	40.6	49.3	10.1	0.0	0.0	0.0	100.0
HAMP east	42.6	36.5	15.0	3.5	0.0	2.6	100.0

cumulative % developed						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
KUCC N	44.0	48.5	57.3	78.5	89.7	100.0
KUCC S	23.5	83.0	100.0	100.0	100.0	100.0
BANGUN	16.1	58.0	77.0	88.9	93.4	100.0
HAMP north	19.5	85.9	100.0	100.0	100.0	100.0
HAMP south	40.6	89.9	100.0	100.0	100.0	100.0
HAMP east	42.6	79.0	94.0	97.4	97.4	100.0
Average % dev	31.1	74.1	88.1	94.1	96.8	100.0
sd	12.7	16.8	17.5	8.8	4.3	0.0
se	5.2	6.8	7.1	3.6	1.8	0.0
uncertainty	22.0	11.5	10.0	5.6	3.5	1.7
low	18.4	57.3	70.6	85.3	92.4	100.0
high	43.7	90.8	105.5	102.9	101.1	100.0

On average, 31.1% of the land area in concessions were developed by year 1 and 74.1% by year 2. Applying these average percentages to RR concessions we get the following expected rate of conversion:

AVERAGE									
	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	total area
RR1	2884.6	6878.9	8176.9	8740.8	8984.6	9286.0	0.0	0.0	9286.0
RR2	3906.9	9316.8	11074.9	11838.6	12168.7	12577.0	0.0	0.0	12577.0
RR3	3628.6	8653.1	10285.9	10995.2	11301.8	11681.0	0.0	0.0	11681.0
RR4	4253.6	10143.6	12057.6	12889.1	13248.5	13693.0	0.0	0.0	13693.0
total	14673.7	34992.4	41595.3	44463.8	45703.6	47237.0	0.0		
									11809.3
LOW									

There is a moderate amount of variation and uncertainty associated with these averages, so to incorporate this uncertainty, accounting for standard deviation in the data, the low expected average % development (18.4% in year 1, 57.3% in year 2 etc) was applied to RR concessions to quantify minimum expected rate of development (table below)

LOW								
	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8
RR1	1707.2	5322.3	6553.2	7923.0	8583.1	9286.0	0.0	0.0
RR2	2312.2	8435.5	9800.6	9558.6	9386.1	9286.0	0.0	0.0
RR3	2147.5	6695.0	8243.4	9966.5	10796.8	11681.0	0.0	0.0
RR4	2517.4	7848.2	9663.3	11683.2	12656.4	13693.0	0.0	0.0
total	8684.2	28301.1	34260.6	39131.4	41422.3	43946.0	0.0	0.0

This rate accounts for the uncertainty around the mean proportion of area converted. From these data its evident the rate of development is not linear, peaking around year 2 then tapering close to build-out. We apply a linear rate because it makes baseline calculations more straight-forward and transparent and we don't

have enough data to build a reliable non-linear function. By delaying expected plantation development in the south (concessions 3 and 4) and by applying below the minimum expected conversion rate in year 1 across all years as a linear function with no peak in development, the baseline scenario shows longer, slower conversion that would be expected even at the maximum level of uncertainty.

BASELINE	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8
RR1	2000.0	4000.0	6000.0	8000.0	9286.0	9286.0	9286.0	9286.0
RR2	2000.0	4000.0	6000.0	8000.0	10000.0	12000.0	12577.0	12577.0
RR3	0.0	2000.0	4000.0	6000.0	8000.0	10000.0	11681.0	11681.0
RR4	0.0	2000.0	4000.0	6000.0	8000.0	10000.0	12000.0	13693.0
total	4000.0	12000.0	20000.0	28000.0	35286.0	41286.0	45544.0	47237.0

Validator Response: This response and additional information presented in the PD, specifically references supporting the justification for various uncertainty parameters and built in conservative estimates was adequate to close out this NCR.

NCR Number 2010.23 of 56 Dated 13th July 2010

Finding: Annex 4c - Field Protocol Manual does not list the key elements of a SOP. Details of how the key field measurements were/are undertaken is required by the selected methodology, including for example how crown and tree height measurements taken; how trees were selected for crown and tree height measurement, how DBH measurements taken and standardised amongst field staff, how multi stemmed trees were treated.

Proponent Response: The Carbon Assessment Field Protocol SOP has been included in the updated VCS PD and is provided as an attachment to this response.

The SOP includes details of how key field measurements were taken including: how tree crown and tree height measurements were taken, how trees were selected for crown and tree height measurement, how DBH measurements were taken and standardized among field staff, and how multi-stemmed trees were treated.

Validator Response: The improvements made to the SOP document will assist in verification of the fieldwork. These additions are sufficient to close this NCR.

NIR Number 2010.24 of 56 Dated 13th July 2010

Finding: The methodology and the VCS require that the project maps be provided in digital format. Please provide in an appropriate digital format.

Proponent Response: As required by the methodology, Section 4. Project Boundary, data have been geo-referenced and provided in digital format (see attached .zip file). To facilitate review, both KML and ArcGIS shapefile formats have been provided. Data delivered also include stratification layers as requested by email.

Files include:

1. Carbon Accounting Area (CAA) boundary
2. “Ijin Lokasi” Planned Oil Palm Estates in Central Kalimantan (basis for CAA boundary)

3. Former Planned Oil Palm Concession boundaries in CAA (Baseline stratification)
4. Land Cover Classification 2009 in CAA (Project initial conditions stratification)*

*Note that in the final revision to Baseline calculations, Wetlands International peat mapping was not used in stratification. Both above and below ground carbon stock calculations derive from the Land Cover Classification 2009 data as described in the updated VCS PD.
Validator Response: The files provided were adequate to close this issue.

NIR Number 2010.25 of 56 Dated 13th July 2010

Finding: Please provide additional information that explains the non-AFOLU component of this project.
Proponent Response: Quoted below from our VCS PD 1.6 (end) (version dated April 2010)

"VCS project crediting period: A 30-year crediting period will be used for this project. This consists of a non-AFOLU component having a 10-year crediting period to be renewed two times and an AFOLU component having a 30-year crediting period"

Was incorrect and will be corrected and amended to the following.

"VCS project crediting period: A 30-year crediting period will be used for this project"
Validator Response: The response and changes to the VCS PD are adequate to close this issue.

NIR Number 2010.26 of 56 Dated 13th July 2010

Finding: Please explain why the areas listed in the various government authorisations provided in Annex 2 are not consistent. Also step 6 of the proof of ownership process is incomplete as it states *"... YZ office of the XYZ for formal approval"*. Please ensure that this is complete.
Proponent Response: In order to clarify any confusion, please see the below list of documents which show the original land amount of 101,730 ha to the current amount of 89,185 ha which has been consistent in all documents since 2009. (attached) In the early stages various parts of the local, provincial or national government may have had slightly differing maps however the MOF (national) has the jurisdiction on this issue and has been consistent in all decrees. It is normal for there to be discrepancies between local and national records since local agencies often do not have digital maps. Additionally, it is not uncommon for the area to change throughout the process as the various departments sometimes have conflicting agendas (production vs planologi vs conservation). Ultimately, the final area and an official map will be issued and all references to project boundaries and size will be changed to reflect such. The carbon accounting area will not be affected.

Initial Area Verification letter dated Oct 10, 2008 regional office of Forest Area Mapping – 101,730 Ha (this letter had NOT deducted the 14,197 as in SK481 although later all official letters did so.
Minister's decree letter SK 481 dated subtracting the northern wedge to palm oil – 14, 197 Ha
Leaving a balance of 87,533 (this area changed slightly to 89,185 after the national

government used correct maps.
Ministers decree SK617 Dated Oct 5, 2009 – allocating 89.185 ha for RE use
Ministers decree S958 – (SP1) Dated Dec 29, 2009 asking Rimba Raya to perform UKL UPL on 89,185 ha
Ministers decree S.291 (SP2) Dated June 15, 2010 approval of UKL UPL listing 89,185 ha.

"... YZ office of the XYZ for formal approval". Has been amended to read ""Environment Agency of Central Kalimantan Province"
Validator Response: The response, additional files provided and changes to the VCS PD are adequate to close this issue.

NIR Number 2010.27 of 56 Dated 13th July 2010

Finding: The PD states that the major carbon pools subject to the project activity are peat and aboveground biomass. It states that long-lived wood products are also included. It states that aboveground non-tree biomass (as well as litter and deadwood) is conservatively excluded. The methodology states that aboveground non-tree biomass is a major carbon pool that is listed as included. Please confirm that the methodology allows for the exclusion of pools it lists as 'major carbon pool subject to the project activity'.
Proponent Response: The methodology uses the A/R Tool titled "Tool for testing significance of GHG emissions in A/R CDM project activities" to exclude litter from the list of major carbon pools subject to project activity. See methodology footnote page 7:

According to field measurements conducted by the project proponent in 57 plots using standard operating procedures as outlined in AR-AM0007, the litter pool represents approximately 0.01% of the total aboveground carbon stocks in peat swamp forests (0.009 ± 0.0017 t C ha-1); therefore a decrease in this carbon pool does not result in a significant GHG emission. Sulistiyanto (2004) also showed that litter makes up 2.4% of the above and belowground tree biomass in both mixed swamp and low pole peat forests in Central Kalimantan. If the REDD project were an A/R project, the litter pool would be deemed an insignificant emission (<5% of total emissions) using the CDM approved tool titled "

The same tool was used to test for significance of the non-tree biomass carbon pool in Rimba Raya. This tool states that "The sum of decreases in carbon pools and increases in emissions that may be neglected shall be less than 5% of the total decreases in carbon pools and increases in emissions, or less than 5% of net anthropogenic removals by sinks, whichever is lower."
Non-tree biomass was surveyed in 150 small plots in the project and was found to contribute 3.72 – 5.60% to total aboveground biomass representing <0.5% of GHG emissions. Therefore, this carbon pool was deemed to be an insignificant emission and was conservatively excluded from Baseline calculations. This assessment is presented in the field biomass survey section of the Baseline Report. Please refer to attached document and Excel spreadsheet (Tabs 1,2,3) of field data and non-tree biomass assessment.

Validator Response: The response to this NIR indicates that the project proponent estimated this pool and then conservatively excluded it based on *di minimus* approach. Therefore, this carbon pool was deemed to be an insignificant emission and was conservatively excluded from Baseline calculations. This assessment is presented in the field biomass survey section of the Rimba Raya Baseline Report. The project proponent has demonstrated that the aboveground non-tree biomass pool is *de minimus* and in conformance with VCS 2007.1 Tool for AFOLU Methodological Issues.

NIR Number 2010.28 of 56 Dated 13th July 2010

Finding: Please provide a (digital) copy of the Wetlands International Peat depth map that was used for stratification of the project area.

Proponent Response –

Please see attached Wetlands International peat distribution data:

1) .zip file of GIS data layer containing ArcView shapefile of peatlands in the project area

2) .jpg file of the digital map of regional peatlands

Validator Response: Files provided are sufficient to close this NIR.

NIR Number 2010.29 of 56 Dated 13th July 2010

Finding: Please justify why leakage stratification was not conducted in accordance with the selected methodology.

Proponent Response - Leakage stratification was conducted in accordance with the selected methodology and this is clarified in the revised sections on Leakage in the Monitoring Plan, the VCS PD and Monitoring Report. Briefly, stratification is performed in two stages of the monitoring process: first in Step 3 to focus the leakage analysis and then in Step 7 to refine impact assessment for carbon stock and emissions changes in accordance with the Methodology.

Validator Response: The approach presented by the proponent is consistent with the text presented in the final approved version of the selected methodology. The response provided is sufficient to close this NIR.

NIR Number 2010.30 of 56 Dated 13th July 2010

Finding: Please confirm that the identified agent of deforestation only operates in Central Kalimantan. In accordance with the methodology the area owned by the deforestation agent within the bounds of the country in which the project is established needs to be monitored.

Proponent Response: Leakage monitoring is conducted in accordance with the methodology. Five main points outline leakage monitoring:

1. PT BEST operates plantations only in Central Kalimantan
2. All existing PT. BEST concessions will be monitored for development and/or expansion
3. Any new PT. BEST concession in Indonesia will be monitored
4. Unpermitted plantation expansion will be monitored within PT BEST's infrastructure
5. The area of activity shifting leakage and carbon impact will be assessed and reported at each verification

These points are described in a revised section of the VCS PD.

Validator Response: This response indicates that that the agent of deforestation has operations throughout Indonesia, however its palm oil plantations are limited to the concessions presented in Table 7 and Figure 18a of the PD.
The concessions numbered 14 and 15 are noted as being isolated from the palm oil processing plant by the lack of roading and circumstances have made them less viable than those in the 100km radius. Analysis of recent satellite images of the area supported the proponent's comments about accessibility in this area.
The additional information provided by the proponent presented the approach to leakage monitoring with increased clarity. The approach taken is in conformance with the methodology and the more intensive monitoring of the areas within 100km of the palm oil processing facility is in excess of the requirements of the standard and the methodology. The response provided is sufficient to close this NIR.

NIR Number 2010.31 of 56 Dated 13th July 2010

Finding: Please provide an accuracy assessment with a completed confusion matrix to validate the accuracy of the mapping.
Proponent Response - Please see attached Accuracy Assessment report including confusion matrix for land cover map validation.
Validator Response: The reported accuracy in the assessment report was considered appropriate for a landsat-based classification at this spatial scale. The accuracy calculations used are sound. A check of a subset of provided uncertainty calculations and kappa statistics lead to identical results as those reported.
The proponents classification scheme has some difficulty distinguishing between 'lightly' and 'heavily' degraded peat swamp forest. This may be due to subjectivity in the definition of these classes. Most of the misclassifications are with closely related types and don't show any problematic biases. Given the relative sizes of each cover type, these misclassifications were not considered a major problem.
One potential issue relates to the checking of landsat accuracy against manually interpreted air photos, rather than field verified ground control points. While field verified points are preferable, it is common to perform accuracy assessment in the way presented by the proponent, as the cost of visiting enough field sites for a sufficient assessment (hundreds of points) can be large and impractical. The language presented in the selected methodology allows for the sort of checking presented in the assessment report. The method used assumes that the person interpreting the photos identified the correct land cover class for each photo. The

methodology states that "A subset of image plots should be selected randomly and interpreted independently by a different analyst." Confirmation that a subset of these points were checked by an independent analyst was provided.

NIR Number 2010.32 of 56 Dated 13th July 2010

Finding: Annex 6 is referred to as the Preliminary QC Plan so it is not clear if the plan is finished. Please confirm that this is the final QA/QC document for validation.
Proponent Response - Annex 6_Draft 1.2 is referred to as the Preliminary QC Plan and it is finished to be considered as the final QA/QC document for validation. Attached, please find the final version of the QA/QC Plan version 1.2.
Validator Response: The final version of the QA/QC Plan appears to be more complete, however there is no reference to the VCS 2007.1 requirement that "The project proponent shall keep all documents and records in a secure and retrievable manner for at least two years after the end of the project crediting period."
See NCR 2010.47. With the additional changes made and reported in NCR 2010.47, this NCR is now closed**.**

NIR Number 2010.33 of 56 Dated 13th July 2010

Finding: The carbon stock represented in Annex 11 is not clearly referenced and the calculations for this stock are not provided. There is also a comment that states "need more specific data". Please provide the spreadsheet of the calculations used to arrive at aboveground biomass estimates.
Proponent Response - The carbon stocks shown in the Final Baseline Report (Annex 11) are from two different biomass assessments; those relating to the ground plots and those from the aerial plot assessment of biomass. The results of the ground plots provided a method to validate the aerial plots and to gain information about the biomass variance within the lightly degraded peat swamp class. This variance was used to determine the required number of plots using the IPCC recommended guidance. Lastly the ground plots provided a means to gain data on the relationship between canopy diameter and DBH and a regression formula was developed that allowed DBH to be predicted for the aerial plots. Therefore, there are two different spreadsheets, one for ground plots and one for aerial plots. Since the results of the aerial plots were actually used to estimate the baseline emissions, the associated spreadsheet for those plots will be attached to the email with this response. The formulas for canopy area, DBH, and biomass were all estimated in JMP statistical software from SAS, and its associated spreadsheet has been converted into MS Excel but does not have the formulas built in. The equation that was used to estimate biomass from aerial plot data is Equation (6) in Annex 11 (Final Baseline GHG Estimate).
Validator Response: The project proponent provided additional information and an updated excel spreadsheet which were thoroughly reviewed and finally shown to have correctly calculated the ex-ante estimates. The response is adequate to close this NIR.

NIR Number 2010.34 of 56 Dated 13th July 2010

Finding: Please provide the calculation tool used to develop the palm oil growth estimates.
Proponent Response - See tool attached.

Validator Response: The project proponent provided an excel spreadsheet that clearly demonstrated the application of the model described in the PD. This spreadsheet was correctly integrated in to the overall project calculation spreadsheet and the response is adequate to close this NIR.

NIR Number 2010.35 of 56 Dated 13th July 2010

Finding: The life of the palm oil plantation is said to be equivalent to the life of the project, however the equation used only provides biomass growth estimates to 20 years and the project life is specified as 30 years. Please describe/justify how the selected palm oil growth curve was extrapolated to 30 years.
Proponent Response - Data shows that the productive life cycle of a single crop of palm oil is 15-25 years. The palm reaches maturity at 15 years and productivity begins to decline dramatically, eventually dying between year 25-35. Between the period of 20-30 years, it can be assumed that it becomes an ineffective above ground carbon sink and most likely begins to produce emissions as the tree dies.

For purposes of baseline calculation the most accurate figure of 20 years has been used given that after this date, the use of pesticides and fertilizer must be dramatically increased while yield decrease, making the tree economically unviable. Additionally, proponents have reverse extrapolated a slow decline in the rate of biomass accumulation and carbon sequestration, when in reality the rate either decreases dramatically, reaches zero and goes into retrograde as the tree dies or is cut and burned or left to decay.

Additionally, at the end of the life cycle of one crop and in preparation for another crop, the soil is turned and fertilized intensively or allowed to lie fallow for up to five years in preparation for a new crop. This clearly involves significant emissions which are conservatively excluded when calculating continuous biomass accumulation/reductions and carbon sequestration/emissions beyond the productive 20 year life cycle.

See Annex in NIR_34 for background support data on these published values.
Validator Response: The response and updated excel spreadsheet provided by the project proponent demonstrates the approach taken to set the asymptote at the maximum growth year (i.e. Year 20) and allow the model to estimate a slight increase in growth (almost stagnant growth) over the next 10 years. Given the available evidence the validator is satisfied that the approach is conservative and the response is adequate to close this NIR.

NIR Number 2010.36 of 56 Dated 13th July 2010

Finding: The life of the palm oil plantation is said to be equivalent to the project life. However there is no justification for this given in the PD. Please justify the life of palm oil plantations in the region of the project.

Proponent Response - The productive life of palm oil is 15-25 years at which time the palm becomes unproductive and is most likely cut and burned or simply cut and left to decay in situ in preparation of another new crop. The total life of an oil palm is said to be 25-35 years during which time it will reach its maximum life span and begin to die. Therefore, within these ranges, the life cycle of palm oil closely equates to the 30 year project life.

See Annex in NIR_34 for background support data on these published values.

Validator Response: The response indicates that approach taken to deduct palm oil plantation growth over the 30 year project period is conservative. It is likely that within the 30 year period the palm oil would be burned (or left to decay). The validator is satisfied that the approach is conservative and the response is adequate to close this NIR.

OFI Number 2010.37 of 56 Dated 13th July 2010

Finding: Figure 3, on page 11 of the PD should have the correct Project Management Zone boundary overlaid on the map for consistency.

Proponent Response - All figures in the Baseline Report and VCS PD, including Figure 3 on page 11 of the PD, have been updated to show the correct Project Management Zone boundary on the map for consistency.

Please see attached maps (Figure 2 and Figure 3 in the updated Baseline Report) showing correct project boundaries.

Validator Response: The response and changes made to the final version of the PD and Baseline report is adequate to close this OFI.

OFI Number 2010.38 of 56 Dated 13th July 2010

Finding: Within the PD, Section 2.4, Step 2 Stratify project area refers to Section 1.7.6 which is not numbered in the PD. Either update numbering to reflect this reference or remove reference to avoid confusion.

Proponent Response - The VCS PD has been thoroughly reviewed and updated. Numbering on this section has been corrected.

Validator Response: The response and changes made to the final version of the PD is adequate to close this OFI.

OFI Number 2010.39 of 56 Dated 13th July 2010

Finding: Refer to the methodology to justify why stratification by peat depth is not required.

Proponent Response - As part of Baseline stratification Step 1, the Methodology states:

"Stratification of the project area by peat depth is important when depth in parts or all of the project area is less than the depth that is projected to be lost in the baseline scenario over time… **If peat depth across the project area is greater than the depth of peat lost via subsidence and burning in the baseline scenario over the project life**, then it is assumed that there is an adequate supply of carbon in peat in

the project area to sustain the assumed baseline scenario and **stratification by peat depth is unnecessary**."

Current literature on peat subsidence suggests that drained tropical peat in SE Asia subsides at an initial rate of 4.5 cm yr-1, translating into a loss of approximately 1.35 m over a 30-year project life. (Though Applicability Condition F limits peat drainage emissions in the baseline scenario to a net peat drainage depth of no more than 1 meter). And the methodology sets peat burn depth to 0.34 m.

In Rimba Raya, peat depth exceeds the depth of peat that could have been lost to subsidence and burning in the Baseline scenario, therefore stratification by peat depth is not required by the Methodology. Peat depth was measured at regular 100-meter intervals on 16,000 meters of transect across the project area. Peat depth averaged 4.3 meters exceeded 2 meters in all 160 locations measured. This data is presented in the two Carbon Survey Assessment reports (see attached).
Validator Response: The response is adequate to close this OFI.

OFI Number 2010.40 of 56 Dated 13th July 2010

Finding: Please refer the reader to the Section 2.5 of the PD where evidence/details of the application of the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM Project Activities" is presented.
Proponent Response - The updated Baseline Report and the updated VCS PD include a section that details the application of the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM Project Activities". Both documents refer to the section on additionality in the Table of Contents.

In the Baseline Report this section is "PROJECT ADDITIONALITY & BASELINE SCENARIO" and in the VCS PD it is "2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of project activity (assessment and demonstration of additionality)."

A copy of this section is provided. Please see attached document "Project Additionality and Baseline Scenario".
Validator Response: This OFI and the project proponents response was completed prior to the final approval of the methodology. The final version of the approved methodology required the use of the VCS "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities". Subsequently this tool is correctly applied and presented in the final versions of the VCS PD and Baseline report.

OFI Number 2010.41 of 56 Dated 13th July 2010

Finding: To ensure consistency the net avoided emissions should be recorded without rounding throughout the document.
Proponent Response - The net emissions reductions have been recorded consistently throughout the document.
Validator Response: The changes made to the latest version of the PD indicate this OFI has been completed and closed.

OFI Number 2010.42 of 56 Dated 13th July 2010

Finding: Whilst the elements of the VCS standard have been met as far as adaptive management to stakeholder consultation outcomes, there appears to be a general lack of understanding about the distribution of benefits amongst the various stakeholders. This should be addressed.

Proponent Response - Addressing the distribution of benefits to the various stakeholders has been readdressed with greater detail with regard specifically to the communities (via WE) and to OFI via an additional memorandum of understanding. We have in our next year's operational plan, ongoing interactions and opportunities for further education on what specific benefits stakeholders can assume to receive.

Validator Response: The MOU signed between Infinite EARTH and OFI provided to the validator has closed out the source of confusion which lead to the issuance of this finding.

OFI Number 2010.43 of 56 Dated 13th July 2010

Finding: Present an adaptive management process to accommodate changes to the (yet to be approved) selected methodology.

Proponent Response – N/A

Validator Response: The OFI was closed as the methodology was approved.

OFI Number 2010.44 of 56 Dated 13th July 2010

Finding: Conduct a thorough review of the PD document and correct spelling, table of contents etc. The quality of information should be improved though the addition of relevant summaries of key relevant findings from each of the referred annexes to ensure that the PD itself presents the information required to achieve validation.

Proponent Response - The VCS PD has been thoroughly reviewed to correct spelling and formatting including a revised table of contents. The quality of information has been improved by adding relevant summaries of key findings from each of the annexes with the aim of ensuring that the PD itself presents the information required to achieve validation.

Validator Response: The corrections and improvements made by the project proponent through this validation are sufficient to close out this OFI.

OFI Number 2010.45 of 56 Dated 20th January 2011

Finding: Strengthen the project planning by updating the project schedule to include project activities related to the forest management plans, fire management plan and the monitoring plan.

Proponent Response: In accordance with the Voluntary Carbon Standard 2007.1 section 5.13, the project proponent is committed to storing all project data in a secure and retrievable manner for at least two years after the end of the project crediting period. Project data will be stored and regularly maintained on redundant external hard drives at onsite (Pangkalan Bun) and offsite (Jakarta) locations and secured with backup software using standard protocols. Data storage locations are listed below. Any changes in these locations will be listed in annual verification reports. Project data will be managed by the Rimba Raya Conservation (RRC) project

coordinator in conjunction with the GIS manager to ensure security, accessibility and long-term storage. In order to facilitate project management and long-term accounting, all primary data outputs supporting annual verification including the spatial database, will be stored and maintained for each 10-year crediting period.

Onsite data storage
Jl. Hasanudin, No. 10 Blk
Pangakalan Bun Kalimantan Tengah, 74111
Phone: 0532 24778
Fax: 0532 27506

Offsite data storage
Mayapada Tower, 11th Floor
Jl. Jenderal Sudirman Kav.28,
Jakarta Selatan, 12920
Tel: +62-21-5289-7446
Fax: +62-21-5289-7399

Validator Response: The response to this OFI was adequate. Data was sited at the Pangakalan Bun offices during the site visit.

NCR Number 2010.46 of 56 Dated 21st January 2011

Finding: In accordance with the standard a commitment should be made and details given relating to data storage for at least 2 years after the project period ends.
Proponent Response: In accordance with the Voluntary Carbon Standard 2007.1 section 5.13, the project proponent is committed to storing all project data in a secure and retrievable manner for at least two years after the end of the project crediting period. Project data will be stored and regularly maintained on redundant external hard drives at onsite (Pangkalan Bun) and offsite (Jakarta) locations and secured with backup software using standard protocols. Data storage locations are listed below. Any changes in these locations will be listed in annual verification reports. Project data will be managed by the Rimba Raya Conservation (RRC) project coordinator in conjunction with the GIS manager to ensure security, accessibility and long-term storage. In order to facilitate project management and long-term accounting, all primary data outputs supporting annual verification including the spatial database, will be stored and maintained for each 10-year crediting period.

Onsite data storage
Jl. Hasanudin, No. 10 Blk
Pangakalan Bun Kalimantan Tengah, 74111
Phone: 0532 24778
Fax: 0532 27506

Offsite data storage
Mayapada Tower, 11th Floor
Jl. Jenderal Sudirman Kav.28,
Jakarta Selatan, 12920

Tel: +62-21-5289-7446
Fax: +62-21-5289-7399
Validator Response: The response is adequate to close this NCR.

NCR Number 2010.47 of 56 Dated 21st January 2011

Finding: Please ensure that the monitoring plan accuracy reflects the requirements set out in the selected methodology.
Proponent Response:
The monitoring plan has been updated to reflect the same level of detail as the monitoring report so that it meets the requirements of the selected methodology, including steps and equations used in monitoring calculations.
Validator Response: The response and changes to the monitoring plan are adequate to close this NCR.

NCR Number 2010.48 of 56 Dated 4th March 2011

Finding: The Methodology requires that proponents collect "high resolution (10-15 cm per pixel) imagery in systematically spaced, overlapping parallel transects evenly distributed over the project boundary where land cover change is expected to occur". Please provide evidence that the resolution requirement of 10-15 cm per pixel has been met. Also, Figure 13 on p 29 raised concerns on the part of the technical reviewer that imagery was not taken in "systematically spaced, overlapping parallel transects evenly distributed over the project boundary", as required by the Methodology. Please provide evidence that this requirement has been met.
Proponent Response: Low altitude aerial photography collected for the project area meets the resolution requirement of 10-15 cm per pixel as described in the VCS PD p.25. Photos were taken in systematically spaced parallel transects evenly distributed over the project area as described in AIM STEP 3 of the Baseline Report p58. Overlapping photos were not acquired since stereo image pairs were not needed to conduct 2-dimensional analysis of tree crown areas, as described in AIM STEP 4 of the Baseline Report p. 58. Biomass estimation based on tree crown area (2D analysis) was selected over biomass estimation based on tree crown area and tree height (3D analysis) as allowed by the Methodology AIM STEP 2 p. 22 which states “Create a relationship between a combination of the height and/or crown area and the biomass of each tree observed.”
Validator Response: The response to this NCR provided improved clarity of the approach taken and is adequate to demonstrate compliance with the selected methodology.

NCR Number 2010.49 of 56 Dated 4th March 2011

Finding: The proponent has reported that "plots that were overlaid on rivers were moved north to nearby forest areas, as long as moving the plot didn’t exceed 50 m." As long as riparian areas are included in the carbon accounting area, they cannot be excluded from sampling. Please provide further details on which rivers were excluded from sampling and whether or not a 100m buffer around these rivers has been removed from the carbon accounting area.
Proponent Response: The protocol described was not carried out for the Rimba Raya project since no major rivers fall inside the project area, therefore rivers were not

excluded from sampling.

To confirm this, aerial photo data were reviewed in the vicinity of the only two seasonally navigable rivers inside the project area, Baung and Sigintung. North-south flight lines only intersect these predominantly east-west rivers in several instances. Random selection only captured one of these aerial photos for aerial plot establishment. As shown in the figures provided, this plot was sampled and tree crowns were delineated in the same manner as other plots that did not cross a river. Also note this river is not open water, but appears as a narrow gap in the peat swamp forest canopy, which is characteristic of intact forest in Rimba Raya.
Validator Response: The response to this NCR provided improved clarity of the approach taken and is adequate to demonstrate a reasonable sampling regime for the project area.

NCR Number 2010.50 of 56 Dated 4th March 2011

Finding: Above-ground non-tree biomass is a required, as opposed to optional, pool under the Methodology. The CDM tool used by the proponent is not referred to by the Methodology. Therefore, above-ground non-tree biomass must be accounted for under the Methodology.
Proponent Response: The project proponents would like to clarify several points related to the treatment of non-tree biomass to demonstrate that VCS guidance for AFOLU projects has been followed and all major carbon pools accounted as required by the Methodology.

According to the VCS Guidance for AFOLU Projects under REDD (p. 19)

> For carbon accounting, all pools that are expected to show a decrease in carbon stocks between the baseline and the project greater than a **de minimis** (5% or less of total difference) as a result of project activities must be measured and monitored in both the baseline and project case.[25]

In Rimba Raya, the non-tree biomass pool is expected to show an increase in carbon stocks between the baseline and project. This increase is expected to be smaller than a de minimus and is therefore quantified, but conservatively excluded from carbon accounting. The Baseline scenario's major carbon pool is in oil palm tree biomass, which is accounted and taken as a deduction against the baseline.

According to the methodology (p. 18), the non-tree woody aboveground biomass component includes trees smaller than the minimum tree size measured in the tree biomass pool, all shrubs, and all other non-herbaceous (woody) live vegetation. More generally, project proponents consider non-tree biomass to be understory growth of woody vegetation. This is characterized as follows in the project vs. baseline scenario:

In the project, flooding, soil-type conditions and overstorey canopy are not conducive to understory growth. Woody vegetation is primarily comprised of mature trees and tree saplings, therefore the "non-tree biomass" class is dominated by very small trees 5-10 cm DBH.

In palm oil plantations, which are dominated by above-ground tree biomass, understory growth is even more sparse than in the project case, since active weeding and clearing are used to maintain worker access to the oil palm tree crop.

Non-tree biomass was surveyed in 150 small plots (78m2) on 30 0.5 km transects adjacent to carbon transects. Biomass was quantified using the Chave et al. (2005) regression equation and was calculated to represent < 0.5% of total carbon stocks as described in the Baseline Report p. 21.

Oil palm trees are considered to be "tree biomass" by the project proponents and are accounted as a major carbon pool. Estimated biomass growth of palm oil trees is described in the Baseline Report p. 66 and is taken as a deduction against the baseline avoided CO2 emissions.

Validator Response: The response to this NCR provided improved clarity of the approach taken and is adequate to demonstrate compliance with VCS 2007.1.

NCR Number 2010.51 of 56 Dated 4th March 2011

Finding: The proponents have proposed to account for biomass in obscured trees using a regression equation created by Broadbent et al. (2008). The Methodology does not allow the use of a regression equation to predict additional biomass in obscured trees and, therefore, the use of such an equation would be a deviation from the Methodology. The Voluntary Carbon Standard 2007.1 requires that "Methodology Deviations shall not be permitted where they result in changes to the conservativeness of the... included project GHG sources, sinks and reservoirs." While omission of carbon in obscured trees is conservative, use of the Broadbent et al. (2008) approach would result in an estimate of carbon in the above-ground tree pool that may not be conservative. Therefore, it should not be used.

Proponent Response:

The Methodology does not provide guidance as to whether the regression equation should or should not include obscured tree crowns. This science is in development and this point made by the Broadbent et al. authors may have been over-emphasized in the Baseline Report, as it was not substantive to model selection.

The Broadbent et al. (2009) regression equation is a model that more closely estimates actual tree biomass based on ground data collected in the Rimba Raya project area. This equation was selected for its good fit to project area data, for its data requirements (tree crown area obtained from aerial plot data) and for its conservativeness (AGB carbon is lower when applying the Broadbent equation as compared to the Chave et al. equation see Baseline report p. 37)

As further explanation of the Broadbent model, these authors suggest that their model is a good estimator of ground biomass where all trees are measured using aerial imagery where only some trees are measured, because it accurately accounts for obscured tree crowns in aerial imagery. Any biomass estimation model based on only visible tree crowns in aerial imagery essentially does the same. The discussion of this in the Baseline Report is included as a matter of scientific interest about how

this model performs not as an explanation for model selection.
Validator Response: The response to this NCR provided improved clarity of the approach taken and demonstrates a conservative approach to estimating above-ground biomass using an equation that is relevant to the region and ecosystem found in the project area.

NCR Number 2010.52 of 56 Dated 4th March 2011

Finding: In order to ensure that the sampling methodology used can be replicated, please describe the process for dealing with trees that were near enough to the edge of a photo plot that their crown area was at least partly bisected by the plot border, as is illustrated in Figures 14-17.
Proponent Response: All tree crowns overlapping any portion of the aerial plot boundary were digitized and areas calculated based on the measured tree crown radius. Then tree crowns were clipped to the plot boundary and areas recalculated in ArcGIS. Only the portion of crown areas falling inside the 1 ha plot boundary were included in plot-based tree-crown area assessments, as shown in the Baseline Report Figures 14-17.
Validator Response: The response to this NCR provided improved clarity of the approach taken and is adequate to demonstrate a reasonable sampling regime for the project area.

NCR Number 2010.53 of 56 Dated 4th March 2011

Finding: The Methodology specifies that "measurements of peat bulk density should be taken across each stratum within the project boundary." However it also notes that "One value can be used if mean values do not differ significantly across strata". Please provide evidence that a statistically valid sample was made of peat bulk density across each stratum within the carbon accounting area. Alternatively, provide evidence that mean bulk density values are not expected to differ significantly across strata. If this cannot be done, then please use the default values as provided for by the Methodology for ex ante estimation and make a commitment to sample for bulk density at a future date.
Proponent Response: The default value for peat bulk density 0.14 g/cm3 will be used in baseline calculations for years 1 and 2. Then in year 3 (July 2011 – June 2012), this value will be replaced with a project-specific value and the baseline will be updated to reflect this change in accordance with the Methodology.

Note that peat bulk density was already surveyed and assessed to be 0.1505 g/cm3 in the single belowground strata defined for the project and met the uncertainty requirements of the methodology. However, the additional survey of peat bulk density will be carried out to better represent potential variation in above-ground strata.

Following baseline update in year 3, carbon stocks will be added or subtracted from the total project carbon stock as warranted to account for data improvements as allowed by the Methodology.
Validator Response: Reverting back to the default value for bulk density and committing to measure bulk density to better represent potential variation in above-

ground strata is adequate to address the requirements of the methodology. The calculations were corrected and accurately represented in the excel spreadsheet.

NCR Number 2010.54 of 56 Dated 4th March 2011

Finding: The Methodology restricts applicability to "preventing land use change on undrained tropical peat swamp forests in southeast Asia only… Peat shall be defined as organic soils with at least 65% organic matter and a minimum thickness of 50 cm2." The proponent has stipulated that "All but the kerangas forest and kerangas open scrub types are on peat substrates." Please demonstrate that the kerangas forest and kerangas open scrub types meet the minimum requirements for peat.

Proponent Response:

The entire project area is classified as peat swamp by the Indonesian Ministry of Foresty (2005) (see map below) and lies within the "Borneo Peat Swamp Forest" and "Southern Borneo Freshwater Swamp Forest" Terrestrial Ecoregion (Wikramanayake et al. 2002). All peats in the project area conform to the applicability requirement (organic soils with at least 65% organic matter and a minimum thickness of 50 cm2) as described in the peat survey report (Dwiastuti et al. 2010), which is included as an Annex to the Baseline Report.

It is widely recognized that forests are not homogeneous and coastal Bornean peatlands may include mosaic patches of non-peat soils in close proximity to or mixed with peat. This variation in soil type is often reflected in tree species composition, such as patches of kerangas forest, which are mixed with peat swamp forest species in Rimba Raya.

Therefore, to be conservative, all areas that *may not meet* the peat requirement based on land cover classification, were excluded from below ground biomass estimation in the baseline accounting. This effectively excludes all potential non-peat areas from the Carbon Accounting Area, while maintaining the integrity of the concession-based boundary, which lies wholly in a region classified as peatland.

Validator Response: The response to this NCR provided improved clarity of the approach taken and is adequate to demonstrate compliance with the selected methodology.

NCR Number 2010.55 of 56 Dated 4th March 2011

Finding: The Methodology requires that proponents estimate biomass logged in each stratum on the basis of plot data. It does not allow for the use of generic equations from outside studies.

Proponent Response: Biomass logged is analyzed from Mawas plot data. These data are appropriate since the field site is a similar peat swamp forest within 100km of the Rimba Raya project which provides the most applicable "dataset of timber records of existing logging operations" required by the Methodology p. 13.

This dataset has a sufficient sample size with low uncertainty which is noted in the Baseline spreadsheet: ("Logging gap data Mawas calculation sheet 23jun08-1.xls") Mean = 0.36, SE = 0.0176, n=93. Uncertainty (90% CI/mean*100) = 8.04%.

Validator Response: This response is adequate to close this issue. The data used is relevant and based on plot data.

NCR Number 2010.56 of 56 Dated 18th March 2011

Finding: Please demonstrate how the requirements of the AIM Step 2 detailed in the methodology have been adequately addressed.

Proponent Response: In AIM Step 1, Tree Biomass (TB) was estimated using the allometric equations method that relates DBH or DBH and Tree Height to biomass. Chave et al. (2005) note that high species diversity in the tropics precludes using species-specific regressions models often used in the temperate zone; instead mixed species tree biomass regression models must be used. These authors use an extensive tropical dataset to test the generality of simple allometric models for biomass estimation since it is often impossible to independently build or quality test site-specific models.

Biomass was calculated using three widely-used equations: two from Chave et al. (2005) equations for tropical moist forest (one based on DBH and one based on DBH and Tree Height) and a general tropical biomass equation (Brown 1997) based on DBH.

AIM Step 2

As required by AIM Step 2, allometric relationships were created to relate Tree Biomass (TB) to some combination of Tree Height (H) and/or Tree Crown Area (A) from ground plot data. Using collected data, all equation types were tested. Tree height was not used as a predictor in allometric models where the response variable, biomass was also based on tree height to avoid redundancy which would invalidate regression models. The 7 models tested (n=340) are listed below with regression results:

1) TB [Chave D] = f(H) R2 = 0.336
2) TB [Brown D] = f(H) R2 = 0.322
3) TB [Chave D] = f(A) R2 = 0.176
4) TB [Chave D-H] = f(A) R2 = 0.193
5) TB [Brown D] = f(A) R2 = 0.170
6) TB [Chave D] = f(A*H) R2 = 0.379
7) TB [Brown D] = f(A*H) R2 = 0.364

The biomass models including tree height explained 32%-38% of the variability in DBH-based biomass estimates for the plot trees. The improved strength of these models over those based only on Tree crown area is not surprising since DBH sets a mechanical constraint on tree height (O'Brien et al. 1995). The DBH-Height allometric relationship has been found to hold across a number of study sites, biomes and species and shows less variation than the DBH-Tree crown area relationship since tree crown area can vary depending on species, individual age, successional status and light environment (O'Brien et al. 1995, Asner et al. 2002, Palace et al. 2008).

Given expected species-related crown characteristics, these same models were tested for the most common taxa surveyed in biomass plots. 1563 trees were recorded in 36 biomass plots covering 9 ha. Local names were recorded representing ca. 140 taxa (species or genus). Tabulation of these data show that only 8 taxa occur with > 3% frequency, with the dominant species occurring at a frequency of 8.39%. 20 taxa comprise ca. 60% of all observations and most of these are proportionally represented in the subset of trees for which tree height and crown area were measured. Of the 20 most common taxa, those with few observations (n<7) were excluded. 16 taxa (n=7 to n=28) representing >52% of all tree data were used in the species biomass models (112 models total were tested).

Results show that models 6 and 7 above perform best for the 16 common taxa. Nine of these species models show that tree height and crown area are strong predictors of biomass (R2 = 0.655 - 0.886). But there are several limitations that prevent applying these models to predict biomass from aerial-based tree crown delineations in AIM Step 7. Taxa in diverse tropical forests cannot be identified in aerial photos, so species-specific models cannot be applied. Regression slopes vary among these models and a combined-species model is not a good estimator of biomass (R2 = 0.322) in this dataset. Height data is not available from aerial image analysis and is difficult to derive in dense canopy (Asner et al. 2002) forest limiting the feasibility of this approach.

Greenberg et al (2007) applied similar methods with some success in Jeffrey Pine forest in the Lake Tahoe Basin and suggested that aerial image methods are best-applied in low-diversity, single-strata temperate forests. The Methodology was based on techniques developed for oak-pine savanna with 10% forest cover in Belize where geometric oak canopies with well-studied allometric relationships could be easily differentiated (see Brown et al. 2005). These same methods were not successful in a follow-on study in tropical forest in Puerto Rico, but were successfully employed and extended in a study by Broadbent et al. (2008).

Despite the limitations of applying aerial image methods for carbon stock assessment in tropical forest, the advantage is that low-altitude high resolution aerial imagery provides a detailed, top-down and synoptic view of all landcover types, which is especially important across remote and inaccessible areas (Brown et al 2005). This enables tree data to be collected across a statistically significant stratified random sample of large (1km2) plots, which has been carried out in AIM steps 3-6 for the project, and enables comparisons of tree stem density and tree crown size to be made across landcover types, which is presented in table 5 (check) in the Baseline Report.

Deviation in AIM Step 2

In order to use the best available information to meet the objectives of the tree biomass estimation, the following deviation is applied:

1. The Broadbent et al. (2008) equation was applied to tree crown data derived from aerial imagery to make use of this large statistically significant sample data from Rimba Raya. A review of the literature shows that these authors, including Asner and Palace who have published extensively in this field, provide the most applicable and rigorous study for developing and applying allometric models to aerial imagery in tropical forest. Their dataset is large, and predictions were tested and found to be applicable in another tropical forest site. The tree crown data delineated in aerial photos provides a substantially large stratified random dataset across the project site including inaccessible areas, and assessing crown density and crown area provides a means of proportionally representing tree biomass across landcover types.

2. Tree biomass estimates were then calibrated to the IPCC default values. Peat swamp forest biomass, estimated to be 267 tdm/ha using the Broadbent et al. equation was reduced 22.85% to meet the IPCC default value for moist tropical forest (206 tdm/ha). This same 22.85% reduction was applied to all landcover types. Revised biomass estimates are shown in this screen capture from the revised Baseline Calculation spreadsheet.

Substratum	Area (ha)	Areal proportion of forest class	Total Biomass in trees >10 cm diameter (t d.m. ha^{-1})
Peat Forest (lightly degraded)	5,718	0.91	206
Peat Swamp Forest Degraded (highly)	427	0.07	128
Peat Shrubland (<20% Tree Cover)	314	NA	49
Kerangas Forest	142	0.02	86
Kerangas Open Scrub	774	NA	58
Low, sparse vegetation cover	944	NA	10
Seasonally Inundated Wetlands	924	NA	14
Open Water	43	NA	0

This reduction in aboveground tree biomass essentially incorporates a confidence deduction associated with the AIM Step 2 deviation into the baseline calculations. Although this change made <1% difference in overall carbon credits since the project is overwhelmingly dominated by the peat carbon pool, it is nonetheless conservative.

Validator Response: The approach taken by the proponent was considered to be conservative. A ecosystem relevant equation was applied with a higher R2 than could be generated with the AIM Step 2 and a further confidence deduction was taken to be more consistent with the IPCC default figures and the subset of field measurements taken in the project area. This approach was considered consistent with the methodology approach and lead to more appropriate estimation of the aboveground biomass than the strict application of the AIM Step in this case.