

# VCS PROJECT VALIDATION - KARIBA REDD+ PROJECT VALIDATION REPORT



Document Prepared By: Environmental Services, Inc.

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## Summary:

Environmental Services, Inc., (ESI) was contracted by Carbon Green Investments (CGI) on 12 January 2012 to conduct the project validation of the *Kariba REDD+ Project*. A validation report was previously issued by ESI on 29 September 2012. VCS retracted the previous validation on the basis that the first step in building the cumulative deforestation model (CDM) (observing historical deforestation in the reference area over the reference period) did not adhere to the requirements of the methodology and did not qualify as a deviation. The Project Proponents have now provided a revised Project description (PD) and supporting documentation which corrects the first step in the CDM to be consistent with the methodology.

According to the PD, the *Kariba REDD+ Project* will generate approximately 196,513,929 carbon credits from reduced emissions associated with deforestation. The reduction in deforestation “will be achieved through a series of activities that are designed to significantly improve the livelihoods of locals, such as improved agriculture, beekeeping, fuelwood plantations and fire management. In addition, a significant share of the project’s carbon income will be invested in general activities that promote and guarantee project sustainability. The project’s Community and Project Sustainability Fund is structured to benefit whole communities, specifically the poorest members of society. The fund will be used to improve health and education in the project area with its long-term activities.”<sup>1</sup>

The project start date is 01 July 2011, and the project crediting period is 30 years (through 30 June 2041). The *Kariba REDD+ Project* “will lead to the protection of both unlogged forest and previously logged forest that has the regenerative capacity to reach a mature, ‘old growth’ state.”<sup>2</sup> The project activities designed to provide financial benefits to the community are expected to be sustained far beyond the 30-year crediting period.

The validation objective included an assessment of compliance with the Verified Carbon Standard (VCS) Version 3 (an all associated updates), and the likelihood that implementation of the planned greenhouse gas (GHG) project will result in the GHG emission removal enhancements as stated by the project developer (ISO 14064-3:2006). This validation assessed the GHG emission removals through an Agriculture, Forestry and Other Land Use (AFOLU) project, specifically: a Reduced Emissions from Deforestation and Degradation (REDD+), Avoided Unplanned Deforestation and/or Degradation (AUDD) project.

The scope of the validation included: the GHG project and baseline scenarios; physical infrastructure, activities, technologies and processes of the GHG project; GHG sources, sinks, and/or reservoirs; types of GHGs; and implementation periods covered. The geographic validation scope was defined by the project boundary, which includes the carbon reservoir types, management activities, growth and yield models, inventory program, and contract periods. The project is located in northwestern Zimbabwe, in the jurisdiction of four Rural District Councils (RDCs) located in the provinces of Matabeleland North, Midlands, Mashonaland West and Mashonaland Central and totals 784,987 hectares. The validation criteria followed the guidance documents provided by VCS and included the following: VCS Program Guide (04 October 2012, v3.4), VCS Standard (04 October 2012, v3.3), Program Definitions (04 October 2012, v3.4), AFOLU Requirements (04 October 2012, v3.3), AFOLU Non-Permanence Risk Tool (04 October 2012, v3.2), and the VCS Methodology VM0009 v1.1.

A summary of all findings is included in Appendix A. There are no restrictions of uncertainty.

ESI confirms all validation activities, including: objectives, scope and criteria, level of assurance and the PD’s adherence to the selected methodology and the VCS Version 3 as documented in this report are complete. ESI concludes without any qualifications or limiting conditions that *the Kariba REDD+ Project* dated 16 August 2013 meets the requirements of VCS Version 3.

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<sup>1</sup> South Pole Carbon Asset Management Ltd., VCS Project Description *Kariba REDD+ Project*, Version 11, 16 August 2013.

<sup>2</sup> *ibid*

**TABLE OF CONTENTS**

1 Introduction ..... 8

    1.1 Objective ..... 8

    1.2 Scope and Criteria ..... 8

    1.3 Level of assurance ..... 8

    1.4 Summary Description of the Project..... 9

2 Validation Process ..... 9

    2.1 Method and Criteria..... 9

    2.2 Document Review ..... 10

    2.3 Interviews ..... 10

    2.4 Site Inspections ..... 11

    2.5 Resolution of Any Material Discrepancy ..... 11

3 Validation Findings..... 12

    3.1 Project Design ..... 12

        3.1.1 Project Proponent and Other Entities ..... 12

        3.1.2 Project Start Date ..... 12

        3.1.3 Project Crediting Period ..... 13

        3.1.4 Project scale and estimated GHG emission reductions or removals..... 13

        3.1.5 Project Activities ..... 14

        3.1.6 Project Location..... 18

        3.1.7 Project compliance with applicable laws, statutes and other regulatory frameworks ..... 19

        3.1.8 Ownership and other programs..... 19

        3.1.9 Additional information relevant to the project..... 20

    3.2 Application of Methodology ..... 21

        3.2.1 Title and Reference ..... 21

3.2.2	Applicability .....	21
3.2.3	Project Boundary.....	24
3.2.4	Baseline Scenario .....	26
3.2.5	Additionality .....	27
3.2.6	Quantification of GHG Emission Reductions and Removals .....	28
3.2.7	Methodology Deviations.....	31
3.2.8	Monitoring Plan .....	32
3.3	Environmental Impact .....	32
3.4	Comments by stakeholders.....	33
4	Validation conclusion .....	33
Appendix A - Summary of NCRs/CLs and their Resolutions .....		35
1.	<b>Clarification (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 2)</b> .....	35
2.	<b>Non-Conformance Report (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 15)</b> .....	35
3.	<b>Non-Conformance Report (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 39)</b> .....	35
4.	<b>Non-Conformance Report (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 45)</b> .....	36
5.	<b>Clarification (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 152)</b> .....	36
6.	<b>Non-Conformance Report (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 182)</b> .....	37
7.	<b>Non-Conformance Report (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 183)</b> .....	37
8.	<b>Non-Conformance Report (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 184)</b> .....	38
9.	<b>Non-Conformance Report (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 185)</b> .....	38
10.	<b>Non-Conformance Report (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 190)</b> .....	39
11.	<b>Clarification (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 192)</b> .....	39
12.	<b>Clarification (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 193)</b> .....	40
13.	<b>Clarification (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 196)</b> .....	40
14.	<b>Clarification (2013_08_06 Kariba REDD+ Re-Validation, VM0009, line 197)</b> .....	40

15. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 197)..... 41

16. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 197)..... 42

17. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 198) ..... 42

18. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 198)..... 43

19. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 202) ..... 43

20. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 203) ..... 44

21. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 205)..... 44

22. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 206)..... 44

23. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 210) ..... 45

24. Opportunity for Improvement (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 218) 45

25. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 218)..... 46

26. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 218) .... 47

27. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 218)..... 48

28. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 226)..... 48

29. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 226) ..... 49

30. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 228)..... 49

31. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 228) ..... 50

32. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 230) ..... 50

33. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 232) ..... 50

34. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 248)..... 51

35. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 250)..... 52

36. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 252)..... 52

37. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 256)..... 53

38. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 274) ..... 53

39. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 277)..... 54

40. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 279)..... 55

41. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 281)..... 55

42. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 283)..... 56

43. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 285)..... 56

44. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 287)..... 57

45. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 289)..... 57

46. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 323) ..... 58

47. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 326) ..... 58

48. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 330) ..... 59

49. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 342) ..... 59

50. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 342) ..... 60

51. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 342) ..... 60

52. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 347) ..... 61

53. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 351) ..... 61

54. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 355) ..... 62

55. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 360) ..... 62

56. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 378)..... 63

57. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 407)..... 63

58. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 409)..... 63

59. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 418)..... 64

60. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 422)..... 65

61. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 424)..... 65

62. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 468)..... 66

63. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, Standard 3.3, line 159) ..... 66

64. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, Standard 3.3, line 194) ..... 67

Appendix B – Documents Received and Reviewed ..... 68

## 1 INTRODUCTION

### 1.1 Objective

The validation objective for this project included an assessment of compliance with VCS Version 3, the selected methodology, and the likelihood that implementation of the planned GHG project would result in the GHG emission removal enhancements as stated by the project developer (ISO 14064-3:2006). This validation assessed the GHG emission removals through an AFOLU project – specifically, a REDD+ project.

### 1.2 Scope and Criteria

The scope of the validation included: the GHG project and baseline scenarios; physical infrastructure, activities, technologies and processes of the GHG project; GHG sources, sinks, and/or reservoirs; types of GHGs; time periods covered. The geographic validation scope was defined by the project boundary, which includes the carbon reservoir types, management activities, growth and yield models, inventory program, and contract periods. The scope of the Kariba REDD+ Project was outlined by the project developer prior to the validation initiation and is re-defined as follows:

Baseline Scenario	Conversion of forestland to cropland/grazing for small-scale subsistence farming, logging of timber for domestic use, fuelwood collection, poaching, forest fires, and traditional beekeeping.
Activities/Technologies/Processes	REDD+ (REDD/AUDD, improved socioeconomics and improved agriculture)
Sources/Sinks/Reservoirs	Above and below-ground biomass, soil carbon, long-lived wood products, and standing deadwood
GHG Type	CO <sub>2</sub>
Time Period	Crediting Period: 30 years, beginning on 01 July 2011 and ending on 30 June 2041
Project Boundary	Northwestern Zimbabwe, in the jurisdiction of four Rural District Councils (RDCs) located in the provinces of Matabeleland North, Midlands, Mashonaland West and Mashonaland Central.  The RDC project areas are: Binga = 157,652.50 ha Nyaminyami = 226,341.46 ha Hurungwe = 131,480.28 ha Mbire = 269,513.10 ha  Total Project area = approximately 784,987 ha.

### 1.3 Level of assurance

The level of assurance was used to determine the depth of detail that the validator placed in the Validation and Sampling Plan to determine if there are any errors, omissions, or misrepresentations (ISO 14064-3:2006). ESI assessed the project (general principles, data, sampling descriptions, documentation, calculations, etc.) to provide reasonable assurance to meet the Project Level requirements of the VCS Program. The evidence used to achieve a reasonable level of assurance is specified in the following sections.



## 1.4 Summary Description of the Project

“The *Kariba REDD+ Project* is located in northwestern Zimbabwe, partly along the southern shore of Lake Kariba, the largest artificial lake in the world by volume. The project area of 784,987 hectares of forest (consisting of woodland and open woodland) spans four provinces: Matabeleland North, Midlands, Mashonaland West and Mashonaland Central. The project is administered by four Rural District Councils (RDCs): Binga, Nyaminyami, Hurungwe and Mbire.

“The project is community-based and consists of implementation of activities in conjunction with the local population.”<sup>3</sup> The project is utilizing VCS Methodology VM0009: Methodology for Avoided Mosaic Deforestation of Tropical Forests (v1.1) and is expected to generate more than 196 million GHG emission reductions [in above- and below-ground living tree and non-tree biomass, standing deadwood, and Soil Organic Carbon (SOC)] during its lifetime.

The reduction in deforestation “will be achieved through a series of activities that are designed to significantly improve the livelihoods of locals, such as improved agriculture, beekeeping, fuelwood plantations and fire management. In addition, a significant share of the project’s carbon income will be invested in general activities that promote and guarantee project sustainability. The project’s Community and Project Sustainability Fund is structured to benefit whole communities, specifically the poorest members of society. The fund will be used to improve health and education in the project area with its long-term activities.

“The project area lies within the Zambezi biome of the Zambezi basin. The major ecosystem includes Mopane and Miombo woodland. The project area is an important wildlife area, showing significant populations of African elephants, lions, impalas, hippos, buffalo, leopard and crocodiles, along with a wide variety of birds, including the IUCN red list vulnerable species Southern Ground Hornbill, Lappet-faced Vulture, and White-headed Vulture.”<sup>4</sup>

“In the past, the natural resources of the project areas supported significant populations of wildlife, including elephants, which, in turn, supported a variety of tourism and safari activities. However, the economic and political crises over the past decade led to a decrease in tourism. Poaching also escalated in the project area. As a result, wildlife populations have been severely reduced.

There is no significant income to offset the cost of the activities to mitigate deforestation without carbon revenues. In the absence of active protection that creates sustainable economic alternatives for communities, the land in the project area will be cleared for non-sustainable alternative land-use scenarios.”<sup>5</sup>

The validator confirmed that the project start date is 01 July 2011, and the project crediting period is 30 years (through 30 June 2041). Although, the project activities designed to provide financial benefits to the community are expected to be sustained far beyond the 30-year crediting period.

## 2 VALIDATION PROCESS

### 2.1 Method and Criteria

Our Validation process closely follows the *VCS Standard*; *VCS Program Guide*; *Agriculture, Forestry and Other Land Use (AFOLU) Requirements*; ISO14064-3 and ISO 14065, and ESI’s Management System and Management System Manual (v13), Section V.2. For this validation, the sample size for the desktop portion of the validation included a complete review of the PD and supporting documents.

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<sup>3</sup> South Pole Carbon Asset Management Ltd., op.cit.

<sup>4</sup> ibid

<sup>5</sup> ibid

The field validation included both an onsite and aerial review of the project and reference region (please refer to Section 2.4 of this report below for additional information). These areas were visited and observed to allow a review of a sufficient sample to meet a reasonable level of assurance, as directed by the professional judgment of the Lead Validator. Additionally, the validator randomly observed forested and non-forested areas for consistency with the results of the cumulative deforestation model.

The validation criteria followed the guidance documents provided by VCS and included the following: VCS Program Guide (04 October 2012, v3.4), VCS Standard (04 October 2012, v3.3), Program Definitions (04 October 2012, v3.4), AFOLU Requirements (04 October 2012, v3.3), AFOLU Non-Permanence Risk Tool (04 October 2012, v3.2), and the VCS Methodology VM0009 v1.1.

A validation report was previously issued by ESI on 29 September 2012. VCS retracted the previous validation on the basis that the first step in building the cumulative deforestation model (CDM) (observing historical deforestation in the reference area over the reference period) did not adhere to the requirements of the methodology and did not qualify as a deviation. Specifically, the previous PD proposed a wall-to-wall automated classification to build step one of the CDM, whereas the methodology recommends a point grid approach with visual inspection of forest/non-forest for each point. The Project Proponents have now provided a revised PD and supporting documentation which corrects the first step in the CDM to be consistent with the methodology.

## 2.2 Document Review

A detailed review of all project documentation was conducted to ensure consistency with, and identify any deviation from VCS program requirements (VCS, Version 3 and associated updates), and the VCS methodology VM0009 v1.1. Initial review focused on the PD and included an examination of the project details, data and parameters, quantification of GHG emission reductions and removals, and supporting documents.

Please see Appendix B for a complete list of documents and files provided by the client and reviewed by ESI during validation, including any items associated with the risk analysis.

## 2.3 Interviews

The onsite validation site visit occurred between 27 April and 02 May 2012. Onsite interviews and informal discussions were conducted with project staff and members and leaders of the community. During most interviews, the underlying negative comment received was that the community members wanted the project activities to begin sooner, demonstrating their eagerness and willingness to participate in the project and share in the economic benefits. No other negative comments were received, and information provided in the PD was supported. Meetings included discussions with:

- Members of Carbon Green Investments (27 April – 02 May 2012)
- Member of South Pole Carbon Asset Management Ltd. (27 April – 02 May 2012)
- Member of Black Crystal Consulting (27 April – 02 May 2012)
- Gokwe Council and Community Members at Community Center (27 April 2012)
- Mbire District Council Chairman of Ward 4 (28 April 2012)
- Mbire Council Game Scout (28 April 2012)
- Hurungwe Liaison Officer (30 April 2012)
- Hurungwe Council and Community Representative (30 April 2012)
- Hurungwe Natural Resources Officer (30 April 2012)
- Nyaminyami Council Game Scout (01 May 2012)
- Binga Community and Council Members (01 May 2012)

The interviews confirmed with reasonable assurance that no community members will be negatively affected by the project and that the community members were eagerly anticipating participation in project activities.

## 2.4 Site Inspections

The validation site inspection conducted during 27 April to 02 May 2012 included onsite visits to the Gokwe Reference Area and each RDC jurisdiction (Binga, Nyaminyami, Hurungwe, and Mbire). In addition, over the span of 5 days, a series of aerial flyovers in a fixed-wing aircraft were undertaken bisecting the major project areas with the goal of viewing the majority of project and reference lands from the plane. Because the project had not yet undertaken monitoring activities, the validators did not resample field inventory plots. However, the validators requested that the project team demonstrate the inventory methodology on one sample plot. The demonstration indicated that the inventory was sound and able to be replicated by the field teams.

The validators completed ground-truthing of the project strata to compare to PD descriptions, in addition to aerial correlation while in the air. The points taken were selected to allow a review of a sufficient sample to provide the necessary sample size to meet a reasonable level of assurance, as directed by the professional judgment of the Lead Validator.

During the field review of the project, the following aspects of the project were assessed:

- pre-project/baseline conditions, as evidenced by current condition of the project/reference areas (as the effects/benefits of the project have not been fully implemented in the project areas), and evidence of the on-going activities that lead to deforestation;
- current project conditions, including reported tree species and forest cover types, reported growth characteristics (diameter, or similar), and implementation of inventory plan/monitoring prior to monitoring being fully completed;
- forested and non-forested areas for consistency with the results of the cumulative deforestation model; and
- potential for leakage on the reference area.

## 2.5 Resolution of Any Material Discrepancy

During the validation process, there was a risk that potential errors, omissions, and misrepresentations would be found. The actions taken when errors, omissions, and misrepresentations were found included: notifying the client of the issue(s) identified, and expanding our review to the extent that satisfied the Lead Validator's professional judgment.

During the course of the initial validation, two-hundred and nine (209) Non-Conformance Requests (NCRs) and/or Clarification Requests (CLs) were identified. Additionally, in 2013 during the re-validation, sixty four (64) additional NCRs/CLs were issued. All NCRs/CLs were satisfactorily addressed. The NCRs/CLs provided necessary clarity to ensure the project was in compliance with the requirements of the VCS Standard (v3.3) for GHG projects. For a complete list of all NCRs/CLs and their resolutions, please refer to Appendix A.

### 3 VALIDATION FINDINGS

#### 3.1 Project Design

The scope of the *Kariba REDD+ Project* was outlined in Section 1.2 of this report. This project is seeking registration under VCS Version 3 as a REDD+ project and has been developed in compliance with the AFOLU Requirements (04 October 2012, v3.3). Additionally, the project is in compliance with the VCS Methodology VM0009 v1.1.

##### 3.1.1 Project Proponent and Other Entities

Project Proponent	Point of contact	Roles/ Responsibility	Contact Details
Carbon Green Investments (Guernsey)	Robert Hume	Financing and implementation	18-20 Le Pollet Street St. Peter Port Guernsey UK, GY1 1WH

In addition to the Project Proponents, there are other individuals and organizations that will play an operative role in the project. These parties are presented below:

Other Entities	Point of contact	Roles/ Responsibility	Contact Details
South Pole Carbon Asset Management (South Pole)	Tilmann Silber	South Pole elaborates and oversees the development of appropriate project design and monitoring techniques in line with the guidelines of the VCS and CCBS. South Pole is a globally active carbon project developer and consultant with a long and successful track record working on forestry-based carbon projects.	Technoparkstrasse 1 8005 Zurich Switzerland Phone: +41 43 501 35 50 Fax: +41 43 501 35 99 www.southpolecarbon.com
Environment Africa (EA)	N/A	EA implements activities that protect forested wilderness areas. EA is an NGO working in Southern Africa, which contributes its expertise and experience to the community engagement side of the project	www.environmentafrica.org
Black Crystal Consulting (Black Crystal)	Susan Childes	Black Crystal supports the biodiversity component of the project and is involved in the on-the-ground assessment of carbon stocks. It is a Zimbabwean environmental consultancy agency with a long track	http://blackcrystal.co.zw/
Environmental Services, Inc. (ESI)	Shawn McMahon	Lead Validator	Environmental Services, Inc. 3800 Clermont St., NW North Lawrence, OH 44666 United States of America Phone: +1-330-833-9941

##### 3.1.2 Project Start Date

The project start date is 01 July 2011 – the approximate date on which the implementation of the management structure and activities addressing the deforestation drivers (protection plans) and the associated investments were initiated.

As stated in the PD<sup>6</sup>, “these investments refer to research, fieldwork and capacities provided by Black Crystal and EA, as well as further management and protection work such as reporting, communication, capacity building and control activities. In addition, all bilateral agreements for the verified emission reductions between CGI and the RDCs were signed, before the project start date, in March 2011 (for Binga, Hurungwe, Mbire and Nyaminyami).”

The validator confirmed the signing of the bilateral agreements occurred in March of 2011, but the project start date more closely correlated with when the financial investments were undertaken, as well as when available (cloud-free) aerial imagery was available to support the modeling. The validator believed the later start date was a conservative assertion, in accordance with the principles of VCS.

**3.1.3 Project Crediting Period**

The project crediting period for this project is 30 years, beginning on 01 July 2011 and ending on 30 June 2041.

**3.1.4 Project scale and estimated GHG emission reductions or removals**

<b>Project</b>	No
<b>Large Project</b>	Yes

Estimated GHG emission reductions for the *Kariba REDD+ Project* are listed below<sup>7</sup>:

Years	Estimated GHG emission reductions or removals (tCO <sub>2</sub> e)
2012	6,896,913
2013	7,030,303
2014	7,187,083
2015	7,365,343
2016	7,414,472
2017	7,431,841
2018	7,423,208
2019	7,393,285
2020	7,345,932
2021	7,284,309
2022	7,211,002
2023	7,128,129

<sup>6</sup> South Pole Carbon Asset Management Ltd., op.cit.

<sup>7</sup> Please note that 2011 and 2012 ERTs have been combined for simplicity.

2024	7,037,423
2025	6,940,306
2026	6,837,939
2027	6,731,274
2028	6,621,089
2029	6,508,024
2030	6,392,599
2031	6,275,243
2032	6,156,306
2033	6,036,074
2034	5,914,783
2035	5,792,623
2036	5,669,753
2037	5,546,302
2038	5,422,374
2039	5,298,056
2040	5,173,419
2041	5,048,521
Total estimated ERs	196,513,929
Total number of crediting years	30
Average annual ERs	6,550,464

### 3.1.5 Project Activities

The validation affirmed the following project activity assertions of the PD. “This project will lead to the protection of both unlogged forest and previously logged forest that has the regenerative capacity to reach a mature, ‘old growth’ state.”<sup>8</sup>

The project provided supporting documentation that the economic benefits of the *Kariba REDD+ Project* will be perpetuated, and current costs are budgeted and covered by the project.<sup>9</sup> The following project activities are included in the plan and will be implemented to meet the deforestation drivers, and to ultimately achieve GHG emission reductions, throughout the life of the project<sup>10</sup>:

#### Improved Agriculture

<sup>8</sup> South Pole Carbon Asset Management Ltd., op.cit.

<sup>9</sup> “Kariba\_Redd\_final\_Budget\_from\_-\_DGomo\_30.12.2011(2)-3.xls”; “120524\_timeline project activities.xls”; “29th\_financials.xlsx”; “111114\_finance facility.pdf”; “120430\_finance facility.pdf”; “Transactions 2012.pdf”

<sup>10</sup> South Pole Carbon Asset Management Ltd., op.cit.

Access to technology and investment in rural subsistence farming is largely absent in the project area. The *Kariba REDD+ Project* includes a program aimed at improving rural agricultural productivity through provision of inputs and equipment, maintenance, and establishment of infrastructure, as well as training of local farmers.

The *Kariba REDD+ Project* will promote conservation agriculture techniques that have the potential to increase the agricultural output of given plots and, thus, reduce the need for rotational agriculture. Techniques applied in conservation agriculture include planting basins, use of organic manure, precision planting, moisture conservation through mulching and making the most of the first rains, as well as minimal use of inorganic fertilizers. To promote conservational agriculture, training sessions will be held following the FAO's Farmer Field School approach. Inputs such as tools and seeds will be provided.

Where tobacco cultivation is a major driver of deforestation, mainly in the Hurungwe RDC, the project will promote the use of alternative high-value crops such as garlic and chili. This will reduce the demand for wood used in the tobacco curing process. Chili and garlic will be promoted by the provision of seeds and tools as well as training on cultivation, marketing, and how to minimize post-harvest losses.

To further increase agricultural production, community gardens will be established. This will be completed where water is available from boreholes. For protection against wildlife, community gardens will be fenced. As the community gardens are cultivated quite intensively, they are expected to contribute significantly to food production, thus reducing pressure on the forest from the expansion of subsistence farming. Where necessary, boreholes will be newly established or maintained. The management of boreholes is seen as an opportunity to make agriculture on existing plots more attractive than on newly deforested plots where no boreholes are available.

### **Beekeeping**

Beekeeping adds value to standing forests and enables locals to generate income streams that do not cause deforestation. Selected wards in the *Kariba REDD+ Project* RDCs will pioneer the beekeeping project activity and will act as reference wards during a scaling-up phase that will involve all of the wards. On the ground, beekeeping activities include workshops on the construction of beehives and assistance in processing and marketing the produced honey within regional markets. A processing center will be set up in the medium term of 3-5 years. The project partner, EA, is experienced in promoting sustainable honey production, constructing processing centers for honey, and marketing honey.

From the perspective of locals, beekeeping will increase the value of the standing forest. The nectar of a tree that is located within a radius of two km from a hive increases the value of a tree. Trees with nectar that are located within an area of 1,200 ha per location of hives tend to be protected. Beehives can be constructed using waste wood from sawmills in the region. "Cultivated" beehives can produce 15 - 30 kg per harvest and up to three harvests per year, which can generate incomes of \$500 to \$1,000 USD/year. The honey-processing centres can add further value to beekeeping through the production of wax and candles, and more efficient honey extraction can be achieved with a honey extractor.

### **Fuelwood plantations**

The establishment of sustainably-managed fuelwood plantations has the potential to reduce the pressure on natural forests and improve the livelihoods of locals because labor force becomes available that would otherwise be needed to collect fuelwood.

The tree planting project activity will aim to create an alternative source of fuelwood for tobacco curing and household use. In the Hurungwe district, the project will work with the tobacco companies. These companies will provide seeds of the fast-growing eucalyptus tree (*Eucalyptus*



*robusta*, *E. tereticornis*), but will not provide other necessary hardware (e.g. planting pockets) and training on how to do the nurseries, planting and management of the trees.

The project will also promote the multipurpose tree *Moringa* (*Moringa oleifera*) for nutritional purposes. Some of the multipurpose trees will be planted in irrigation schemes and community gardening projects. Communities will be trained in tree planting and seedling production as precursors for the actual tree planting. The trees to be planted are fast growing in nature and can give good firewood in five years; they are also beneficial in that they have a very high coppicing capacity. Planting trees will have additional mitigation benefits for the climate, but this is not planned to be accounted for in this project.

### **Social Forestry – Indigenous Knowledge Systems**

The indigenous knowledge in forest conservation and management will be documented and shared across the project areas. The areas and trees that are of value to indigenous peoples will be recognized and mapped. This will enhance the conservation efforts of the forest resources. The mapping exercise will also highlight areas with abundant non-timber forest product resources that the communities consider for income generation. These include fruits, murara and thatch grass. The communities will be trained in sustainable harvesting, processing and marketing. This will enhance conservation because the communities will get more tangible benefits from their resources.

### **Fire management**

Fires are native to dry Miombo woodlands during the dry season, but have increased due to anthropogenic fires associated with poaching and opening new fields for subsistence agriculture. Tourists may also be responsible for some fires. Fire breaks next to roads and along the RDC's Safari concession boundary in the south towards settled areas (e.g., Binga and Hurungwe) will be established and maintained by setting controlled fires (i.e. low intensity) at the start of the dry season to avoid the spread of high intensity dry season fires. Firebreaks will be intermittently established at the eastern/southern side of roads and, in the following year, on the western/northern side of roads. The controlled fires burn the vegetation covering the soil, but not the trees.

Fire management will reduce the degradation of the forest, allow the forest to recuperate and stop and reverse (slowly) soil carbon loss. To maximize carbon benefits of fire management, fire management should begin in areas with carbon-rich soils and in areas with fairly non-impacted forestlands. Controlled burning is therefore an important activity in keeping bush fire damage to a minimum. The best way to conduct a controlled burn or cold fire is to burn the wet grass in the early months (March to May) as soon as the grass can burn. This creates a "cold" burn, which burns very little vegetation except grass. Grass, if burned at the right time, is not completely burnt. This allows a fresh flush of green grass to rejuvenate, giving more grazing grass for the fauna and creating an inherent firebreak that is supposed to stop "hot fires" later in the season. Controlled burning will be carried out by the project's on-the-ground-management teams (see below). Additionally, awareness campaigns will be implemented, and other training on fire-making, firefighting and management will be conducted.

### **Alternative and sustainable building materials (brickmaking)**

The local communities typically use wood to build their huts or burn bricks from clay soil, which also requires substantial amounts of wood. This results in more deforestation and degradation of forest resources. The project will promote the Hydraform technology as an alternative, which requires less wood resources. To get this project activity started, a Hydraform molding machine is purchased and will be used for the project. This will be operated by local youths, thereby creating new income generation opportunities.



### On the Ground Management teams

The *Kariba REDD+ Project* will be present within the local communities via its On-the-Ground-Management (OGM) teams. OGM teams will include one team leader, two trackers, one community game scout, one National Parks scout (when necessary for anti-poaching follow ups), and one camp attendant. All team members will be recruited locally. The Project Proponent will have a strong influence on the selection of team leaders to ensure their reliability. There will be one OGM team per RDC, where they have a steady office/camp that will also serve as a contact point for the local population. The OGM teams will be in charge of:

- Maintaining technical equipment (e.g. water pumps) if provided by the project
- Fire prevention via “cold fires” and firefighting where possible (see above)
- Patrolling the area to prevent illegal deforestation
- Carrying out the project monitor requirements according to the applied standards
- Maintaining roads to ensure accessibility of the project area
- Facilitating the relations to the local authorities
- Receiving feedback and grievances from the local communities

### Community and Project Sustainability Fund

A significant share of the project’s carbon income will be invested in general activities that promote and guarantee project sustainability. The project’s Community and Project Sustainability Fund is structured to benefit whole communities, specifically including the poorest members of society. The fund will be used to improve health and education in the project area due to long term activities. The project is being undertaken on communal lands and as such it is imperative that the people within these communities can improve their livelihood security via the project. The Project Proponents feel that this aspect of the revenue distribution is of utmost importance.

A Board will decide upon the use of the Community and Project Sustainability Fund’s resources. The Board will be comprised of Carbon Green Africa (CGA) Trust members in conjunction with selected members of the Community and Council from each RDC. Oversight will be given by the Project Proponent to ensure all VCS criteria are met and funds are reaching their required targets. The fund will be used to improve health and education in the project area (see below).

### Health

Health improvements will include the following:

- Targeted clinics will have all required improvements made and basic amenities will be brought up to an acceptable standard. New buildings will be constructed where applicable.
- Availability, quality and number of healthcare practitioners per clinic will be assessed and salaries of the practitioners will be reviewed and subsidized where required.
- Targeted clinics will be stocked with required basic drugs and dressings etc. so that the majority of common illnesses/injuries can be treated immediately.
- A “Healthcare Officer” will be appointed to assess, monitor and manage this initiative. The Healthcare Officer will report to Board of Community Fund who will direct funds accordingly.

### Education

Education improvements will include the following:

- Targeted schools will have all required improvements made, and basic amenities (e.g., roofing, desks, windows, stationary, books, food) will be brought up to an acceptable standard. New buildings will be constructed where applicable.
- Numbers, distribution and salaries of teachers will be assessed and subsidized when necessary, ensuring an acceptable pupil/teacher ratio.
- Targeted schools will have a bursary initiative to subsidize all pupils' fees. For example, the Community Fund will pay some pupils' fees, enabling many children to come to school that might not be able to come otherwise due to financial constraints. In turn this will relieve families of financial pressure associated with sending their children to school and will maximize attendance.
- Climate change and environmental conservation topics will be added to the curriculum and careers within the sector/project will be encouraged after leaving school.
- In order to assess and monitor, an "Education Officer" will be appointed to manage this initiative. The Education Officer will report to the Board of the Community Fund who will direct funds accordingly.

### Newsletter

During the project lifetime, the Project Proponent will publish a newsletter, which is foreseen to be issued on a quarterly basis. The newsletter will be in English as well as the local languages (Shona and Tonga). Topics covered by the newsletter will include the following:

- General information and progress of the project
- Topics of environmental awareness and education
- Grievances regarding the project and responses by the Project Proponent
- Job advertisements as part of the project's local recruitment procedure
- Other topics to be agreed upon in cooperation with the local RDC administration

The newsletter will be printed in Harare (the capital city of Zimbabwe) and delivered via the OGM teams. It will be made available in the RDC offices, and in central points in each ward, such as schools and clinics.

### Further Considerations

The project activities to stop deforestation and degradation are designed to be financially self-sufficient in the long run. By opening new sources of income, and after initial investments have been made and capacity reaches a certain level, the local population will perpetuate the project activities because it will be in their self-interest to do so.<sup>11</sup> Thus, it is expected that project activities will continue far beyond the lifetime of the project (30 years beginning 01 July 2012 and ending 30 June 2041).

#### 3.1.6 Project Location

"The *Kariba REDD+ Project* is located in northwestern Zimbabwe, partly along the southern shore of Lake Kariba, the largest artificial lake in the world by volume. The project area consists of 784,987 hectares of forest (consisting of woodland and open woodland) and spans four provinces: Matabeleland North, Midlands, Mashonaland West and Mashonaland Central. The project is administered by four RDCs: Binga, Nyaminyami, Hurungwe and Mbire."<sup>12</sup>

<sup>11</sup> South Pole Carbon Asset Management Ltd., op.cit.

<sup>12</sup> South Pole Carbon Asset Management Ltd., op.cit.

Each RDC is described below<sup>13</sup>:

### **Binga**

The Binga RDC area is located in the Matabeleland North province. It has a forest cover of 157,652.50 hectares and encompasses a prime wildlife area that includes 22 kilometers of Lake Kariba's shoreline. It serves as a corridor, connecting the Chizarira National Park, the Omay South Wildlife Area and the Matusadona National Park. The resulting area makes for a vast and contiguous wildlife area that is roughly 900,000 ha in size.

### **Nyaminyami**

The Nyaminyami RDC area lies in the district of Kariba in the province of Mashonaland West. The Nyaminyami forest covers 226,341.46 ha and connects the Matusadona National Park with the Charara Safari Area. It shares borders with the Binga RDC area. Ecotourism is popular in Nyaminyami, and the most popular ecotourism destination is the shore of Lake Kariba, with its several fishing and safari camps.

### **Hurungwe**

The Hurungwe RDC lies in a remote, rural part of the province of Mashonaland West. It is adjacent to Mana Pools National Park and has a forest cover of 131,480.28 ha.

### **Mbire**

The Mbire forest area covers 269,513.1 ha within the province of Mashonaland Central. It serves as a stepping-stone between Mana Pools National Park in the northwest and the Umfurudzi Safari Area in the southeast.”

As required by VCS, a kml file has been provided that defines the extent of the geographic area of the project (both woodland and open woodland), and this is shown in the project description.

## **3.1.7 Project compliance with applicable laws, statutes and other regulatory frameworks**

All relevant information on the Project's compliance with laws, statutes, and other regulatory frameworks can be found in Section 1.11 of the PD. The Project Proponent declares that all of the laws, rules and decrees stated there, apply to the whole geographic region considered for the project activity. Compliance with these laws was confirmed to a reasonable level of assurance during validation. The RDCs administering the project are government entities instituted and given their authority by the highest level of Zimbabwean government. The agreements that have been signed as part of the project are legally binding. No violation of laws as a result of the project activities was observed during the site visit.

## **3.1.8 Ownership and other programs**

### **3.1.8.1 Right of use**

The validation activities confirmed that all of the areas which are to be protected as part of the project activity are segments of a larger property (RDCs) for which the Project Proponent has been legally granted the carbon rights.

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<sup>13</sup> *ibid.*

Contracts exist establishing the *Kariba REDD+ Project* as the common project of the Project Proponent and the local RDCs. These contracts give CGI the rights to develop, establish, and market the project with support of the RDCs and establish benefit-sharing of the carbon revenues (see Section 1.8 of the PD). Copies of the contracts are separately provided to the auditor.<sup>14</sup> Documentation of these items has been reviewed and validated.

### 3.1.8.2 Emissions trading programs and other binding limits

No emission reductions generated by the project are part of an emissions trading program.

### 3.1.8.3 Participation under other GHG programs

The project has not been registered and is not seeking registration under any other GHG programs.

### 3.1.8.4 Other forms of environmental credit sought or received

The project has not created wetland mitigation, water quality, air pollution, other non-VCS GHG emission reduction, or any another form of environmental credit.

### 3.1.8.5 Rejection by other GHG programs

The project has neither applied to receive credits from, nor has it been rejected by any other GHG program.

## 3.1.9 Additional information relevant to the project

### 3.1.9.1 Eligibility criteria for grouped projects

The project is not a grouped project.

### 3.1.9.2 Leakage management for AFOLU projects

No leakage of emissions is expected from the *Kariba REDD+ Project*. Both activity shifting and market leakage were assessed as part of the project. Activity shifting leakage is managed by applying and monitoring a leakage belt around the project area. Additionally, the project actively assists the local population in increasing the efficiency of their agricultural activities on already existing agricultural fields. Increased agricultural output will make shifting of plots to outside the project area highly unlikely. The low mobility of the local populations, the vast extent of the project area, and their centralized location within the project area also contribute to the unlikelihood of activity shifting leakage.

The fuelwood plantation component of the project activity is designed to mitigate the market leakage risk. By establishing sustainably managed woodlots within the project area, the wood resource needs of the local communities will be provided without causing forest deforestation/degradation. The long-term presence of the *Kariba REDD+ Project* team in the area ensures appropriate support in developing this long-term solution for the provision of sustainable wood products.

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<sup>14</sup> South Pole Carbon Asset Management Ltd., op.cit.

Despite this low probability of leakage to occur, the leakage belt area will be sampled prior to the end of each monitoring period. To reduce uncertainty in leakage measurement, the field protocol for sampling forest degradation and trainings will be implemented.<sup>15</sup>

Additionally, the VCS AFOLU Non-Permanence Risk Analysis yielded a risk rating of 16.5% for the *Kariba REDD+ Project*. This rating of 16.5% signifies that the Project Proponent must hold a minimum of 16.5% of annually awarded credits in a pooled AFOLU buffer account. Annex 1 of the PD demonstrates the use of this tool. It is estimated that a minimum of 32,424,798 credits will be held in the pooled AFOLU buffer account over the life of the project. This risk score will be re-evaluated at each future verification event, as required by VCS.

The validator reviewed the Non-Permanence Risk Analysis and found it to be accurate and in line with the requirements set out in the VCS AFOLU Non-Permanence Risk Tool (04 October 2012, v3.2). The assessment of each factor is kept separately in the Validator's internal findings.

### 3.1.9.3 Commercially Sensitive Information

As requested by the Project Proponent, the following documents were classified as Commercially Sensitive information and will be excluded from the publicly issued PD:

- 130816\_Kariba Benefit sharing.pdf
- Cash Flow 2012-2041.pdf

These documents are financial in nature, and the validator confirmed that they met the definition of Commercially Sensitive from the VCS Program Definitions (04 October 2012, v3.4)

### 3.1.9.4 Further Information

There is no further additional information that would have a bearing on the eligibility of the project relating to net GHG emissions reductions or removals, or quantification of net GHG emissions reductions or removals, which has not been included in the PD and its supporting documentation.

## 3.2 Application of Methodology

### 3.2.1 Title and Reference

The project is applying the VCS Methodology VM0009: Methodology for Avoided Mosaic Deforestation of Tropical Forests (v1.1).

### 3.2.2 Applicability

The validation confirmed the project met the following applicability conditions of VM0009:

“1. This methodology was developed for avoiding deforestation and assumes that degradation and deforestation occur as a result of land use conversion to agriculture for the cultivation of non-perennial (annual) crops rather than for commercial timber harvest. This methodology may be used if all the drivers and agents of deforestation are consistent with those described in section 6 of this methodology.”

The drivers and agents of deforestation are consistent with those described in section 6 of VM0009. As stated by the PD<sup>16</sup>, “Deforestation agents are members of the

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<sup>15</sup> 121130\_SOP Leakage Area Data Collection.pdf

<sup>16</sup> South Pole Carbon Asset Management Ltd., op.cit.

communities and local poachers who are causing fires. Deforestation is mainly driven by socio-economic interests and because of the need for woody construction material for settlements.” Were it not for the project and carbon financing, the lands are expected to continue to undergo conversion of forestland to cropland/grazing for small-scale subsistence farming, logging of timber for domestic use, fuelwood collection, poaching, forest fires, and traditional beekeeping.

The primary subsistence activities (expected to continually degrade the forests without the project) for each of the four areas included in the project are as follows<sup>17</sup>:

### **Binga**

The main crops are maize and millet, while some areas also produce cotton, cassava and groundnuts. Irrigation schemes are few. Cattle and goats are reared. Traditional fishing helps in providing additional food.

### **Hurungwe**

The main crops grown in the area are maize, tobacco, cotton, groundnuts, sunflower and soybeans. The district has established and functional irrigation schemes. Livestock reared by the communities include cattle, goats, donkeys, sheep, pigs and horses.

### **Mbire**

The main crops are maize, sorghum, millet, cowpeas, pumpkins, bananas, cotton and vegetables. Cattle, goats, sheep, pigs, poultry and donkeys are reared. Farmers also do a lot of fishing in the Zambezi, Manyame, Msengezi and Angwa rivers.

### **Nyaminyami**

The main crops grown are sorghum, millet, maize cotton and vegetables. Cattle, donkeys, goats, sheep and chicken are also reared. In addition, farmers are also fishing.

“2. Once forest is converted to agriculture in the reference and leakage areas that conversion is permanent and the land is not allowed to return to forest. This excludes use of this methodology for Swidden or other traditional forest cultivation activities that clear one area to farm for a year or two, and then move on and leave that area to return to forest over decades. It does not exclude converted areas where selective fields within a farm or agricultural area are abandoned due to soil depletion or are left fallow to recover but are continuously under agricultural or other anthropogenic use, and will not return to forest.”

“There is no shifting cultivation in the area. Lands in the project, reference, and leakage areas will not return to forest land after being left fallow. This is primarily due to crop rotation. Any coppicing is constantly cut out until all below ground biomass dies out, the stumps are burnt to below ground level.”<sup>18</sup>

The fact that the land will not return to forest is further supported by the Communal Lands Act. In PART III, Section 8, subsection 2b it is stated that the RDC shall grant consent to persons who according to the customary law of the community have traditionally and continuously occupied and used land in the concerned area. Therefore, once land has

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<sup>17</sup> ibid

<sup>18</sup> South Pole Carbon Asset Management Ltd., op.cit.

been allocated to a family it remains so in perpetuity and is therefore continuously under agricultural or other anthropogenic use, and will not convert to forest.<sup>19</sup>

“3. Forest land in the project area has qualified as forest as defined by FAO 2010 or that of the definition of forest set by the residing Designated National Authority (DNA) for the project country for a minimum of 10 years prior to the project start date (VCS, 2008).”

A definition of forest has not been set by the DNA for Zimbabwe. However, both “open woodlands” and “woodlands” in the project area qualifies as forest as defined by FAO 2010. That is, the areas have the potential to grow to more than 5 meters of height and to attain a canopy cover greater than ten percent at maturity. “Woodland” and “open woodland” are forest classifications commonly used in the project area.

“4. No biomass is harvested for use in long-lived wood products in the project area under the with-project scenario. Therefore, carbon sequestered in long-lived wood products under the project during any monitoring period may be accounted for as zero.”

The only harvesting that will occur as part of the project is associated with the fuelwood plantations. The carbon sequestered on long-lived wood products will counted as zero throughout the life of the project.

“5. If the soil carbon pool is selected and the default mean rate of soil carbon loss is selected, then the project must be located in a tropical or semi-arid tropical region.”

The project is located in a tropical or semi-arid tropical region. The default mean rate of soil carbon loss will be utilized for *ex ante* estimates. Scientific studies will be employed during monitoring in order to obtain project-specific *ex post* soil carbon loss estimates.

“6. Foreign agents of deforestation, if any, are unlikely to shift their activities outside the leakage area.”

There are no foreign agents of deforestation associated with this project.

“7. The project area shall not contain organic or peat soils.”

The project will not take place on organic or peat soils.

“8. A reference area can be delineated meeting the requirements described in section 6.3.1 of this methodology including the minimum size requirement.”

The reference area has a size of 206 percent of the project area, has 100.67 percent of the size of the forest in the project area, and meets the similarity conditions.

“9. As of the project start date, historic imagery of the reference region exists with sufficient coverage to meet the requirements of section 6.4.2 of this methodology.”

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<sup>19</sup> “Copy of Communal lands act 2.pdf”



Historic imagery with minimum cloud cover from five time steps was provided. Every point has double coverage (being observable in two of the five images).

“10. Project activities are planned or implemented to mitigate deforestation by addressing the agents and drivers of deforestation as described in section 10.1 of this methodology.”

Based on the results of the Participatory Rural Appraisal (PRA), the project activities detailed in Section 3.1.5 above will be implemented to mitigate deforestation by addressing the agents and drivers of deforestation. Supporting documents provided a detailed work plan and budget allocation for project activities.

“11. The Project Proponents have access to the leakage area to sample forest degradation (see section 10.3.2).”

The ground teams have the ability and permission to access the leakage areas to enter and sample forest degradation. Prior to implementing any “on-the-ground” monitoring, OGM teams will inform the RDCs and any other lease owners that field measurements will be occurring and obtain the necessary clearance. The validator did not observe any obstacles to accessing the leakage areas during the site visit, and monitoring of the leakage areas will follow the minimum sampling requirements of VM0009 v1.1.

“12. If the lag period for the cumulative leakage model is estimated after the project start date but before the end of the first monitoring period (see section 10.3.3), then activity-shifting leakage has not occurred prior to the estimation of the lag period.”

The lag period for the cumulative leakage model will be estimated after the project start date and before the end of the first monitoring period. As justified in Section 3.9.1.2 above, it is assumed that no activity-shifting leakage will have occurred prior to the estimation of the lag period.

“13. Project areas shall not include land designated for legally sanctioned logging activities.”

No land within the project area is designated for legally sanctioned logging activities. Confirmation of this can be found in the supporting documents.<sup>20</sup>

### 3.2.3 *Project Boundary*

#### **Spatial Boundary**

The spatial boundary of the project is “the forest cover of the most recent remote sensing imagery at project start date.”<sup>21</sup> That is, within the RDCs of Binga, Nyaminyami, Hurungwe, and Mbire, Project Proponents used remote sensing techniques to stratify into “Woodland” and “Open Woodland” cover types. Because both cover types meet the FAO’s definition of a forest, they will be used as the project boundary. The areas within the project boundary, stratified by cover type are shown below:

<sup>20</sup> “Binga Logging letter.pdf,” “Mbire RDC-2 logging letter.pdf,” “Nyaminyami logging letter.pdf,” and “Hurungwe logging letter.pdf”

<sup>21</sup> South Pole Carbon Asset Management Ltd., op.cit.



RDC	Woodland Area (ha)	Open Woodland Area (ha)	Total
Binga	55,749	101,903	157,652
Hurungwe	64,087	67,393	131,480
Mbire	46,287	223,226	269,513
Nyaminyami	109,936	116,405	226,341
<b>Total</b>	<b>276,059</b>	<b>508,928</b>	<b>784,987</b>

The cover type areas and RDC jurisdiction boundaries are shown on the maps included in the PD. Additionally, the supporting kml file and ArcView shapefiles were provided to the validator. All spatial boundaries were correlated during the site visit and confirmed through in-office geospatial analysis.

#### Temporal Boundary

The temporal boundary of the project is defined by the project crediting period, which is 30 years (beginning on 01 July 2011 and ending on 30 June 2041).

#### Greenhouse Gases

As per VM0009, carbon dioxide (CO<sub>2</sub>) was selected as a source for greenhouse gas emissions from deforestation and degradation in the project and baseline scenarios.

#### Carbon Pools

The carbon pools selected for inclusion in the *Kariba REDD+ Project* are listed below:

Pool	Required?	Included in Project?	Justification
Above-ground large tree biomass	Yes	Yes	Major pool considered
Above-ground small tree biomass	Yes	Yes	Major pool considered
Above-ground non-tree biomass	Optional	Yes	Major pool considered
Below-ground large tree biomass	Optional	Yes	Major pool considered
Below-ground small tree biomass	Optional	Yes	Major pool considered

Below-ground non-tree biomass	Optional	Yes	Major pool considered
Litter	No	No	Conservatively excluded
Standing dead wood	Optional	Yes	Major pool considered
Lying dead wood	Optional	No	Conservatively excluded
Soil	Optional	Yes	Major pool considered
Long-lived wood products	Yes	Yes	N/A

Justification for all pools selected (or not selected) for inclusion in project accounting and monitoring have been validated.

**3.2.4 Baseline Scenario**

Based on validator research, review of project documents, and site visits conducted, the findings support the justification that the baseline land use scenario without the project will be continuation of pre-project land-use, including: conversion of forestland to cropland/grazing for small-scale subsistence farming, logging of timber for domestic use, fuelwood collection, poaching, forest fires, and traditional beekeeping.

“Forests areas are transformed for agricultural purposes (subsistence agriculture). Further deforestation and degradation occur because of the use of fuelwood for households and tobacco curing, timber for poles used in the construction of homes, garden fencing, traditional beekeeping, and fires. Fires are frequent and often occur between June - October. Fires result in the loss of the forest in those non-agricultural areas that are still accessible to hunter-poachers.

Within the project area, the population densities are relatively sparse. Greater than 95 percent of the inhabitants are rural dwellers, living on their farms, which are widely distributed over the area. Poaching, especially of black rhinos and elephants, is a continuing problem and has resulted in severe losses of animals despite protection efforts.”<sup>22</sup>

The specific baseline scenarios for each of the individual carbon pools, as validated and required by VM0009 are<sup>23</sup>:

**Above and Below-ground Small/large Trees and Non-trees**

The dry forest land of the project area, as well as the surrounding reference/leakage area, is characterized by small-to-large sized trees. The above and below-ground portion of small/large trees and non-trees is assumed to be removed, burned or converted to fuelwood. When forest land is converted to agriculture, all the larger trees, with the exception of Baobabs (which have cultural values), are chopped by an axe and burned at the base until the tree eventually falls.

The fire smolders in the stump below the ground surface destroying the main root system. Any coppicing is repeatedly chopped or burned so that remaining biomass dies out. Also, any seedlings from seeds blown in are weeded out. The OGM team leaders have a combined

<sup>22</sup> South Pole Carbon Asset Management Ltd., op.cit

<sup>23</sup> South Pole Carbon Asset Management Ltd., op.cit.

experience of 30 years in the project areas and have not seen any stumps in a field. Therefore, large trees will not be differentiated from small trees for this project. As a result, the Project Proponent contends that it is common practice in this region to burn the stumps out, and therefore selects the proportion of below-ground biomass removed from all trees in the baseline as 100 percent. The validator also did not observe any stumps during the site visit.

### Standing Deadwood

Standing deadwood is assumed to be completely removed, burned or converted to fuelwood as a result of land conversion to agriculture. Standing dead trees are categorized into two decomposition classes: trees with branches and twigs that resemble live trees (class I), and trees that show loss of twigs, branches or bole mass (class II). The carbon stock of trees in decay class I is estimated using the equation developed for live trees. The carbon stock of decay class II is estimated as the biomass in the remaining bole only.

### Long-Lived Wood Products

There is no harvest of commercial timber from the project area in the baseline, nor for wood carving, furniture, etc. The only potential harvest of wood products under the baseline would be for building materials for local village huts. For example, in Binga the community members indicated that they used an average of 80 poles to build one hut, and a household had an average of four such houses. Structural material of the houses has to be replaced frequently (on average every 3 years) due to the environmental influences such as termites. No carbon proportion remains therefore in long-lived wood products.

### General

Identifying and quantifying the baseline scenario for a REDD+ project under the VCS-approved methodology VM0009 requires several steps. They are as follows:

1. Conducting a PRA
2. Analyzing the agents of deforestation
3. Delineating the reference area
4. Defining the reference period
5. Using the “cumulative deforestation model” to predict percent deforestation in the future, using past observations
6. Using the “soil carbon loss model” to predict the decay of carbon in soil under the baseline scenario
7. Application of both baseline models based on each individual carbon pool scenario in the baseline<sup>24</sup>

All of the required documentation was provided to the validator regarding these steps in the PD and supporting documents. Processes and application methods were validated to be in conformance with the VCS Methodology VM0009.

As required by VCS and VM0009, the baseline will be re-evaluated every ten years.

#### 3.2.5 Additionality

The methodology requires the use of the latest version of the “Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities;” details of its use for the *Kariba REDD+ project* can be found in the Section 2.5 of the PD.

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<sup>24</sup> VCS Methodology VM0009

The validator confirmed that the identified alternative land use scenarios (subsistence farming, logging of timber for domestic use, fuelwood collection, poaching, traditional beekeeping, and forest fires) are credible and/or legal land uses and represent what would be most likely to occur without the project.

Ultimately, natural, healthy, and productive forest growth in the project area without the implementation of a VCS REDD+ project is prevented due primarily to large financial barriers to independently protect the forests from deforestation and degradation. The project activities required to mitigate deforestation in the area cost the Project Proponent a significant amount of money annually and undoubtedly represent a financial barrier.

Currently, there are no other registered VCS REDD+ projects in the RDCs of Binga, Nyaminyami, Hurungwe, and Mbire. Similar projects designed to protect wilderness areas in Africa and to provide sustainable development support for rural African communities have occurred principally through funding by Governments and/or donor agencies. However, is not common practice for private companies that are not donor funded to protect forested wilderness in Africa without carbon finance. Moreover, the project activities to stop deforestation and degradation are designed to be financially self-sufficient in the long run and will continue far beyond the lifetime of the project (e.g., 100 years or more). Thus, the proposed REDD+ project activity is not the baseline scenario, and it is additional.<sup>25</sup>

### 3.2.6 Quantification of GHG Emission Reductions and Removals

#### 3.2.6.1 Quantification of baseline emissions

The validator has confirmed that baseline net GHG removals by sinks have been estimated in accordance with the VM0009 Baseline Emissions Section (Section 8). The procedure for quantifying baseline emissions or removals entails the use of “cumulative deforestation to predict deforestation based on the selected carbon pools measured in the project area. The “soil carbon loss model” is used in conjunction with the “cumulative deforestation model” to quantify SOC baseline emissions. Evidence of the use of these models is available in the supporting documents.

For the *Kariba REDD+ Project*, the avoided baseline emissions for each included pool are presented below. These avoided emissions will be achieved through a combination of growth of living tree and non-tree biomass, as well as changes in the SOC pool.

Above ground Biomass	Below ground Biomass	Soil Organic Carbon
99,947,999 tCO <sub>2</sub>	41,978,160 tCO <sub>2</sub>	54,587,771 tCO <sub>2</sub>

#### 3.2.6.2 Quantification of project emissions

The validator has confirmed that project emissions have been estimated in accordance with VM0009 Section 9. For the *Kariba REDD+ Project*, there are no emissions expected from the burning of woody biomass as a result of project activities in the project area. Thus, the project

<sup>25</sup> South Pole Carbon Asset Management Ltd., op.cit.

emissions are estimated to be zero throughout the life of the project. This will be continually monitored and confirmed during future verification events.

The Project Proponent is aware that revisions to project emissions values will be required should significant forest fires occur during the project crediting period. Any fire boundaries will be monitored by the Project Proponent, and the project area will be re-stratified as applicable.

### 3.2.6.3 Quantification of leakage

As previously mentioned, no activity shifting or market leakage of emissions is expected from the *Kariba REDD+ Project*. Nonetheless, the Project Proponents followed the steps outlined in Section 10 of VCS Methodology VM0009. These include:

1. Delineating the leakage area
2. Applying the “cumulative leakage model” to estimate future leakage.

All of the required documentation was provided to the validator regarding these steps in the PD (see section 3.3) and supporting documents. Processes and application methods were validated to be in conformance with the VCS Methodology VM0009.

The results of these processes provided an annual leakage estimate of zero (0) for the project throughout its lifetime.

“Should deforestation and degradation (forest carbon stock loss) monitored in the leakage area exceed forest carbon stock loss predicted by the leakage model, the amount of excess forest carbon stock loss will be deducted from net emission reductions claimed at the end of the first monitoring period.”<sup>26</sup>

Leakage management strategies to be employed in the *Kariba REDD+ Project* are described in Section 3.1.9.2 above.

### 3.2.6.4 Summary of GHG emission reductions or removals

The validator confirmed “Net GHG Emission Reductions and Removals have been estimated in accordance with VM0009 Section 11. The results of this determine that net GHG Emission Reductions or Removals for the 30-year project crediting period are estimated to total 196,513,929 tCO<sub>2</sub>e. Annual net GHG emission reductions are presented below (PD, Section 3.4):

Years	Estimated baseline emissions or removals (tCO <sub>2</sub> e)	Confidence deduction (tCO <sub>2</sub> e)	Estimated project emissions or removals (tCO <sub>2</sub> e)	Estimated leakage emissions (tCO <sub>2</sub> e)	Estimated net GHG emission reductions or removals (tCO <sub>2</sub> e)
2012	6,896,913	0	0	0	6,896,913
2013	7,030,303	0	0	0	7,030,303

<sup>26</sup> South Pole Carbon Asset Management Ltd., op.cit.

2014	7,187,083	0	0	0	7,187,083
2015	7,365,343	0	0	0	7,365,343
2016	7,414,472	0	0	0	7,414,472
2017	7,431,841	0	0	0	7,431,841
2018	7,423,208	0	0	0	7,423,208
2019	7,393,285	0	0	0	7,393,285
2020	7,345,932	0	0	0	7,345,932
2021	7,284,309	0	0	0	7,284,309
2022	7,211,002	0	0	0	7,211,002
2023	7,128,129	0	0	0	7,128,129
2024	7,037,423	0	0	0	7,037,423
2025	6,940,306	0	0	0	6,940,306
2026	6,837,939	0	0	0	6,837,939
2027	6,731,274	0	0	0	6,731,274
2028	6,621,089	0	0	0	6,621,089
2029	6,508,024	0	0	0	6,508,024
2030	6,392,599	0	0	0	6,392,599
2031	6,275,243	0	0	0	6,275,243
2032	6,156,306	0	0	0	6,156,306
2033	6,036,074	0	0	0	6,036,074
2034	5,914,783	0	0	0	5,914,783
2035	5,792,623	0	0	0	5,792,623
2036	5,669,753	0	0	0	5,669,753
2037	5,546,302	0	0	0	5,546,302
2038	5,422,374	0	0	0	5,422,374
2039	5,298,056	0	0	0	5,298,056
2040	5,173,419	0	0	0	5,173,419

2041	5,048,521	0	0	0	5,048,521
<b>Total</b>	<b>196,513,929</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>196,513,929</b>

### 3.2.6.5 Uncertainties associated with the calculation of emissions

The validator confirmed that all uncertainties associated with the calculations of *ex ante* emissions were accounted for accordingly in the use of the “cumulative deforestation” and “soil carbon loss” models described in VCS Methodology VM0009. No additional deductions for uncertainties are required. The validator confirmed that the Project Proponent followed the principles in the “Guidelines on conservative choice and application of default data in estimation of the net anthropogenic GHG removals by sink” to ensure results were conservative. To ensure that carbon stocks are estimated in a way that is accurate, verifiable, transparent, and consistent across measurement periods, the Project Proponent has established and documented clear Standard Operating Procedures (SOPs) and procedures for ensuring data quality (as per VM0009, Section 13.11). These were validated to meet the requirements of VM0009. The SOPs are outlined in Section 4.3.8 of the PD and the supporting documents.<sup>27</sup>

Additionally, to ensure the net anthropogenic GHG removals by sinks will be measured and monitored precisely, credibly, verifiably, and transparently, “per IPCC 2006GL guidance, the monitoring plan includes a Quality Assurance/Quality Control (QA/QC) plan to control for errors in measurement and data analysis. The QA/QC plan is described in Section 4.3.6 of the PD and is designed to contribute “significantly to increasing efficiency and decreasing the amount of errors” in measurements and monitoring processes over the life of the project.<sup>28</sup>

### 3.2.7 Methodology Deviations

The *Kariba REDD+ Project* attempted to utilize a toolbar created by the VM0009 Methodology Developer to assist in creation of a random grid to assess deforestation in the reference period. When using the toolbar, a bug was encountered that only allowed the Project Developer to create a grid with 700 points. Because the *Kariba REDD+ Project* required significantly more than 700 points for its grid, the Project Developer created an approach that “stacked” 6 systematic grids (of ~700 points each), and then moved each grid to a different starting point that ensured there were no overlapping points or pixel window. Although this approach did not perfectly match either the systematic or random point system depicted in Section 6.4.3 of VM0009, the validator believes that it represents a non-biased distribution of points, as there would be no way to move points in an equally spaced grid to favour the project over a 1,907,410-hectare reference area. The validator believes this meets the criteria for VCS Methodology Deviations in that it relates to “measurement” of the forest area in the reference region, and it does not “negatively impact the conservativeness of the quantification of GHG emissions reductions or removals” (Section 3.5.1 of the VCS Standard).

Additionally, Equation 7 of VM0009 requires the inputs of covariate data. Since data-availability in the area is very limited, only population was available as a potential covariate. The Project Developers showed this parameter to be classified as highly insignificant. Thus, population was not included in Equation 7, and the CDM was modelled without covariates. The validator also concurred that this was an accurate analysis and did not “negatively impact the conservativeness of the quantification of GHG emissions reductions or removals” (Section 3.5.1 of the VCS Standard).

<sup>27</sup> “120118\_Soil carbon Guidance\_small sample.pdf” and “130724\_SOP for Tree Data Collection Final

<sup>28</sup> South Pole Carbon Asset Management Ltd., op.cit.



### 3.2.8 Monitoring Plan

The following are the primary data and parameters that were monitored prior to, and made available and assessed during validation:

- Location of project area
- Boundary of project area
- Area of project area/plots
- Ownership of the project area
- Baseline trees/shrubs
- Baseline/project strata
- Number of trees
- Biomass allometric equations, coefficients, ratios and parameters
- Leakage calculations
- Risk calculations
- Total CO<sub>2</sub>

The monitoring plan procedures and equipment were comprehensive and were found to be applicable to the parameters monitored. They were appropriately designed and provided reasonable assurance that the avoided emissions from GHG sources, sinks, and reservoirs was (baseline) and will be (project scenario) accurately assessed. In accordance with the conditions of the approved baseline and monitoring methodology VM0009, project emissions were considered insignificant and therefore not included. The Project Proponent is responsible for the registration, monitoring, measurement, and reporting of avoided emissions, within the timeframe required by VCS REDD+ AFOLU requirements.

### 3.3 Environmental Impact

In addition to the avoidance of millions of tons of carbon emissions and the positive socioeconomic impact, the *Kariba REDD+ Project* also creates several other environmental co-benefits – the most significant being increased and enhanced wildlife habitat.

The validation confirmed the likelihood that the project will generate increased and enhanced wildlife habitat for many important wildlife species.

As previously mentioned, the project area is imperative for wildlife, having significant populations of many important species. In addition to a reduction in poaching that the project is expected to generate, the forests that will be protected by the project will “serve as a corridor between existing national parks, namely Mana Pools, Matusadona and Chizarira national parks, to assure connectivity. By providing a corridor for wildlife, the project will have a positive impact on biodiversity not only within the project area but also outside the project area.”<sup>29</sup> This positive impact could include improvement of the habitat conditions for ICUN Critically Endangered (CR), Endangered (EN), and Vulnerable (VU) species, including:

- Black rhino (CR)
- African wild dog (EN)
- Lion (VU)
- Southern ground hornbill (VU)
- Common hippo (VU)
- African elephant (VU)
- Cheetah (VU)
- Lappet-faced vulture (VU)
- White-headed vulture (VU)

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<sup>29</sup> South Pole Carbon Asset Management Ltd., op.cit.



The continuation of forests that would otherwise be cleared should also contribute to enhanced water quality and aquatic fauna, as well as improved forest structure, health, and productivity in the project area.

Finally, the validator validated that the *Kariba REDD+ Project* is acceptable under the Climate, Community & Biodiversity (CCB) Project Design Standards on 08 February 2012.

**3.4 Comments by stakeholders**

The validation confirmed that comments from stakeholders were appropriately documented and were found to be overwhelmingly positive. “At the end of each stakeholder consultation, the community leaders asked the floor if people wanted the project to go ahead of which there were chorus to the affirmative. The communities however wanted some of the projects to start being implemented as soon as possible even before the final validation of the project. All the chiefs pledged to give support for the success of the project.

To guarantee an ongoing communication a grievance procedure was implemented as part of the project. The procedure includes four different options to the communities, by which they provide potential grievances regarding the project in written or verbal form: directly to the Project Proponent, via the OGM teams, via the Liaison Officer or via the RDC. By providing four different options, they attempted to “widen the net” to include the views of all stakeholders. The Project Proponent is committed to provide a written response to any grievance with 30 days. Furthermore, all grievances and feedback will be published in our quarterly newsletter that will be distributed to the stakeholders in the project area.”<sup>30</sup>

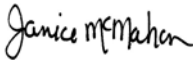
The results of the stakeholder consultation meetings very closely correlated to the consensus in the interviews conducted during the validation site visit.

**4 VALIDATION CONCLUSION**

ESI confirms all validation activities, including objectives, scope and criteria, level of assurance and the PD’s adherence to the selected methodology, and VCS Version 3 (and updates) as documented in this report are complete. ESI concludes without any qualifications or limiting conditions that the *Kariba REDD+ Project* dated 16 August 2013 (Version 11) meets the requirements of the VCS.

Report Submitted to:	Verified Carbon Standard Association 1730 Rhode Island Ave. NW, Suite 803, Washington, D.C. 20036  Carbon Green Investments (Guernsey) 18-20 Le Pollet Street St. Peter Port Guernsey UK, GY1 1WH
Report Submitted by:	Environmental Services, Inc. - Corporate Office 7220 Financial Way, Suite 100 Jacksonville, Florida 32256
ESI Lead Validator Name and Signature	 Shawn McMahon Lead Validator

<sup>30</sup> South Pole Carbon Asset Management Ltd., op.cit.

ESI Division Regional Technical Manager Name and Signature	  Janice McMahon Vice President and Forestry, Carbon and GHG Division Regional Technical Manager
Date:	19 August 2013

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APPENDIX A - SUMMARY OF NCRS/CLS AND THEIR RESOLUTIONS

1. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 2)

Validation	
<b>VCS Criteria:</b> VCS VM0009, v1.1 – Document Clarity and Readability	
<b>Evidence Used to Assess Conformance:</b> PD	
<b>Findings:</b> The methodology component is littered with typos and incomprehensible statements due to proofreading after changes were made in PD revision.	
<b>Clarification (CL):</b> Please proofread and clarify PD in the methodology to ensure readability.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
The general readability has been improved. During this, the document has also been updated to the most current PD template (v.3.1). Most significant change here was the restructuring of the table showing included GHGs in section 2.3.	
<b>Evidence used to close CL:</b> Readability of the document has been improved. Addressed.	
<b>Date CL closed:</b>	12 August 2013

2. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 15)

Validation	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 4 Applicability Conditions - 11. The project proponents have access to the leakage area to sample forest degradation (see section 10.3.2).	
<b>Evidence Used to Assess Conformance:</b> Section 2.2	
<b>Findings:</b> The revised PD removed the statement that the access to the leakage areas is always given due to aerial imagery.	
<b>Non-conformance report (NCR):</b> As the revised PD removed the statement that the access to the leakage areas is always given due to aerial imagery, please demonstrate how this is now being met.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Statement clarified. As shown by leakage sample plot establishment and verification site visit, ground access completely given. Satellite imagery is still available but no longer used to monitor the leakage area.	
<b>Evidence used to close NCR:</b> The PD has been modified to include language indicating that ground access is given. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

3. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 39)

Validation	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 5.2 Defining the Temporal Boundaries –	
<ul style="list-style-type: none"> <li>• The start date of the project.</li> <li>• The start date of the project crediting period.</li> <li>• The length if the project crediting period.</li> <li>• The dates and periodicity of baseline revision and monitoring periods. Baseline reevaluation after the project start date and monitoring must conform to the current VCS standard.</li> </ul>	
<b>Evidence Used to Assess Conformance:</b> Sections 1.5, 1.6	

<b>Findings:</b> The dates for monitoring/crediting periods and baseline re-evaluation have not been included in the PD, as required by the methodology.	
<b>Non-conformance report (NCR):</b> During first validation, Project Developer stated it was not possible to determine dates for monitoring/crediting periods and baseline re-evaluation. However, that is now possible and should be included in Section 1.6 of PD.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
This is now clarified.	
<b>Evidence used to close NCR:</b> The PD now includes language stating the dates of baseline re-evaluation and crediting periods. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**4. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 45)**

Validation	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 5.2 Defining the Temporal Boundaries, PD Requirements: Temporal Project - 3. The dates for mandatory baseline reevaluation after the project start date.	
<b>Evidence Used to Assess Conformance:</b> PD Section 1.6	
<b>Findings:</b> The date for baseline reevaluation has not been included as required by the methodology.	
<b>Non-conformance report (NCR):</b> Please include the specific baseline reevaluation date as required by the methodology.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
This is now clarified in section 1.6 of the PD.	
<b>Evidence used to close NCR:</b> The dates of the mandatory baseline reevaluation have been included in the PD. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**5. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 152)**

Validation	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.3.1 Delineating the Reference Area - a. Topographic constraints to deforestation (slope, aspect, elevation); b. Land use and/or land cover constraints to deforestation; c. Access points that may constrain deforestation; d. Areas of limited soil productivity; e. Proximity to important markets; f. Proximity to important resources (water, electricity, transportation); and g. Ownership/tenure boundaries that constrain deforestation (government holdings, private holdings and reserves).	
<b>Evidence Used to Assess Conformance:</b> PD Section 2.4.3.1; "Black Crystal Capability March 2012.pdf"	
<b>Findings:</b> Section 2.4.3.1 has some changes to elevation language and inclusion of Hurungwe in data.	
<b>Clarification (CL):</b> Please explain the revisions to Table 10 for removal of Hurungwe Reference area, and further explain why the elevation difference discussion was removed	

from the subsequent paragraph.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
<p>The earlier version of the reference area included historically deforested within the project-RDCs (outside project forest area). This was possible due to the exact remote sensing mapping and in line with VM0015 requirements. This has now changed following VM0009 approach, the forest state observations are only done in the large polygons on the reference area (submitted as shapefile). Hurungwe does not have its "own" reference area polygon. So as the historically deforested parts within Hurungwe are no longer in the reference region (see earlier version above) it does not contribute to the reference region with its elevation data anymore. The new presented numbers for mean elevation of project and reference area represent the new mean of the "2011 forested project area" &amp; the reference area of the three larger polygons.</p>		
<p><b>Evidence used to close CL:</b> Due to the Project switching back to the original methodology, the inclusion of a small portion of pixels for Hurungwe Reference Area was no longer feasible, as it did not allow for the grid system to work. Also, since Chris reviewed the reference area under the revised project and found no issues, this can be considered Addressed.</p>		
<b>Date CL closed:</b>	12 August 2013	

**6. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 182)**

<b>Validation</b>		
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.2 Building the Cumulative - This fulfillment of this requirement can be demonstrated by aligning a dot grid of points over the reference area using a GIS. Then, for each co-registered image in the system, those grid points that fall over the cloud-free, visible portion of each image are copied to a new file. This is done for all images and produces the same number of shape files as number of images. All derived shape files are then merged to form a single file.</p>		
<p><b>Evidence Used to Assess Conformance:</b> 130618_Kariba 5th submission\PD\supporting docs\GIS files\Baseline (Point sample)\Submission Point Sample</p>		
<p><b>Findings:</b> A single shapefile is required by the methodology with one row and each file. This has not been included in the PD.</p>		
<p><b>Non-conformance report (NCR):</b> Please provide a single shapefile as required by the methodology. There should a single shapefile with one row for each point and columns that contain all the attributes for each point for all time steps.</p>		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
<p>As discussed with auditor such a shapefile is no PD requirement. This same outputs have been created automatically in are submitted in excel table form (sample tables and double coverage tables).</p>		
<p><b>Evidence used to close NCR:</b> The excel tables are sufficient, based on discussion with proponent the shapefile is not explicitly required in the PD.</p>		
<b>Date NCR closed:</b>	12 August 2013	

**7. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 183)**

<b>Validation</b>		
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.2 Building the Cumulative - One of the attributes for each point in the merged file should contain a count of corresponding time periods on which</p>		

it falls. For example, if one particular grid point was observed to fall onto the cloud-free portions of six images, then the attribute count of that point in the merged shape file would be six.	
<b>Evidence Used to Assess Conformance:</b> 130618_Kariba 5th submission\PD\supporting docs\GIS files\Baseline (Point sample)\Submission Point Sample	
<b>Findings:</b> A single shapefile is required by the methodology with one row and each file. This has not been included in the PD. Attributes of the 'Double_Coverage' shapefile needs clarification.	
<b>Non-conformance report (NCR):</b> A merged shapefile was not provided. The attributes of the 'Double_Coverage' shapefile need to be explained, because the column headings and attribute values currently do not make sense.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
As discussed with auditor such a shapefile is no PD requirement. This same outputs have been created automatically in are submitted in excel table form (sample tables and double coverage tables).	
<b>Evidence used to close NCR:</b> Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**8. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 184)**

Validation	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.2 Building the Cumulative - In the merged file, those points with a count less than two should be discarded (hence the remaining points in the merged file representing "double-coverage").	
<b>Evidence Used to Assess Conformance:</b> 130618_Kariba 5th submission\PD\supporting docs\GIS files\Baseline (Point sample)\Submission Point Sample	
<b>Findings:</b> There should a single shapefile with one row for each point and columns that contain all the attributes for each point for all time steps. This allows for the determination of double coverage.	
<b>Non-conformance report (NCR):</b> Please provide a single shapefile as required by the methodology. There should a single shapefile with one row for each point and columns that contain all the attributes for each point for all time steps.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
We provide a table of double coverage quantifying that every point as double coverage and therefore none had to be discarded.	
<b>Evidence used to close NCR:</b> The double coverage table addresses points that should be discarded. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**9. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 185)**

Validation	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.2 Building the Cumulative - The number of remaining points should comprise at least 90% of the total number of points within the reference area.	
<b>Evidence Used to Assess Conformance:</b> 130618_Kariba 5th submission\PD\supporting docs\GIS files\Baseline (Point sample)\Submission Point Sample	
<b>Findings:</b> There should a single shapefile with one row for each point and columns that	

contain all the attributes for each point for all time steps. This allows for the determination of double coverage.	
<b>Non-conformance report (NCR):</b> Please provide a single shapefile as required by the methodology. There should be a single shapefile with one row for each point and columns that contain all the attributes for each point for all time steps.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
We provide a table of double coverage quantifying that every point has double coverage and therefore none had to be discarded.	
<b>Evidence used to close NCR:</b> Examination of the double coverage table confirms that at least 90% of the total points have double coverage. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**10. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 190)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.2 Building the Cumulative - The project description must include a map of the reference region showing the area of "double-coverage".	
<b>Evidence Used to Assess Conformance:</b> PD General	
<b>Findings:</b> The project description does not include a map of the reference region showing the area of double coverage.	
<b>Non-conformance report (NCR):</b> Please include a map of the reference area showing the area of double-coverage in the PD.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Included in Map 14 of PD in section 2.4.4.	
<b>Evidence used to close NCR:</b> The map has now been included. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**11. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 192)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.3 Determining Sample Size - A pilot sample of points is distributed across the reference area either randomly or systematically on a grid to estimate the ultimate sample size required to fit the cumulative deforestation model (for an example, see Figure 4). The pilot sample should be large enough to obtain a rough estimate of the population variance. Depending on the size of the reference area and the prevalence of deforestation during the reference period, a good minimum sample size is approximately 100 points in the reference area.	
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1, 130617_Forest state observations pilot sample.xlsx	
<b>Findings:</b> PD states that 327 points were distributed over the reference area for the pilot sample. The sample appears reasonable, as it is greater than 1/10th of the total sample population. Footnote 35 explains how a rectangular grid could not be achieved, so 5 grids were created. There appears to be room for biased picking of overall points assigned. Also, Kyle Holland's name should not be in PD.	
<b>Clarification (CL):</b> Please provide documentation of the conversation with the methodology developer to the validator. Please omit his name from the PD. Please explain how a sub-sample of the final grid points (between the 5 grids) was randomly selected.	



<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Footnote 35 was deleted and discussion moved to deviation section of PD. Emails had been provided.	
<b>Evidence used to close CL:</b> Deviation discussion sufficiently addresses the NCR. Addressed.	
<b>Date CL closed:</b>	12 August 2013

12. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 193)

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.3 Determining Sample Size - If a grid is used, then it must feature a random origin.	
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1	
<b>Findings:</b> It is unclear if a random origin is used for the point grid process.	
<b>Clarification (CL):</b> As indicated in PD footnote 35, please provide the documentation from the methodology developer on your implementation of a random origin.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Footnote 35 was deleted and discussion moved to deviation section of PD. Emails had been provided.	
<b>Evidence used to close CL:</b> Deviation discussion sufficiently addresses. Addressed.	
<b>Date CL closed:</b>	12 August 2013

13. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 196)

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.3 Determining Sample Size - For each image, record the number of points that fall on the cloud-free portion in a list. Next, for each point, sort its table by image date from oldest to most-recent (for example see Figure 5). Discard those points for which the first forestation entry in the table is 1 (forest absent); deforestation cannot be observed without initially observing forest. Each row in each table for each non-discarded point is now an observation as defined by equation [1].	
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1 and 2.4.4.2	
<b>Findings:</b> 898 points were discarded. Clarification is needed in the PD.	
<b>Clarification (CL):</b> It appears that there are only 1,707 forested points in the 2000 image, so there were 898 discarded points. Please clarify PD Section 2.4.4.2.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Clarified in PD section 2.4.4.2. In the new full sample of 3187 points, 1116 have been discarded as being non-forest in 2000 imagery.	
<b>Evidence used to close CL:</b> The PD has been clarified. Addressed.	
<b>Date CL closed:</b>	12 August 2013

14. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 197)

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.3 Determining Sample Size - For each row, calculate	



an observation weight using equation [5] for each state observation where #(observations at xi, yi) is the number of rows in the table and #(observations at ti) is the number of points recorded in the list for the image with its image date.		
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1 ,130617_Forest state observations pilot sample.xlsx		
<b>Findings:</b> This component is not specifically addressed in the PD. It appears that this calculation was performed by the WWC toolbar. VVB calculated values do not match those provided in excel file.		
<b>Clarification (CL):</b> Please clarify in the PD how these values are obtained.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
Weight calculation was re-done manually following method agreed with auditor. In the forest state observation table automatically only PIDs appear that have been a) Forest in 2000 & b) are observed in a given time step. E.g. PID 2 is forest in 2000, but not observed in 2003. It therefore only appears in the forest state list for 2000, 2006, 2009 & 2011. This is because only points fulfilling condition a) & b) have a chance to change from Forest to Non-Forest in that observation and receive state '1' and thus contribute to the result of equation [17].		
<b>Evidence used to close CL:</b> Re-calculation of weight for pilot has been performed correctly. Proponent has included all points in the pilot study for the calculation. Weight values have been corrected in the pilot sample. Addressed.		
<b>Date CL closed:</b>	12 August 2013	

15. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 197)

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.3 Determining Sample Size - For each row, calculate an observation weight using equation [5] for each state observation where #(observations at xi, yi) is the number of rows in the table and #(observations at ti) is the number of points recorded in the list for the image with its image date.		
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1 ,130617_Forest state observations pilot sample.xlsx		
<b>Findings:</b> This component is not specifically addressed in the PD. It appears that this calculation was performed by the WWC toolbar. VVB calculated values do not match those provided in excel file.		
<b>Clarification (CL):</b> Please explain why points that are forested in the initial time step are not included for all subsequent time steps, as prescribed by the methodology.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
Weight calculation was re-done manually following method agreed with auditor. In the forest state observation table automatically only PIDs appear that have been a) Forest in 2000 & b) are observed in a given time step. E.g. PID 2 is forest in 2000, but not observed in 2003. It therefore only appears in the forest state list for 2000, 2006, 2009 & 2011. This is because only points fulfilling condition a) & b) have a chance to change from Forest to Non-Forest in that observation and receive state '1' and thus contribute to the result of equation [17].		
<b>Evidence used to close CL:</b> Re-calculation of weight for pilot have been performed		

correctly. Proponent has included all points in the pilot study for the calculation. Weight values have been corrected in the pilot sample. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**16. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 197)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.3 Determining Sample Size - For each row, calculate an observation weight using equation [5] for each state observation where #(observations at xi, yi) is the number of rows in the table and #(observations at ti) is the number of points recorded in the list for the image with its image date.	
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1 ,130617_Forest state observations pilot sample.xlsx	
<b>Findings:</b> This component is not specifically addressed in the PD. It appears that this calculation was performed by the WWC toolbar. VVB calculated values do not match those provided in excel file.	
<b>Clarification (CL):</b> Please verify that weight values are correctly calculated as VVB calculations differ from those provided in excel file.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Weight calculation was re-done manually following method agreed with auditor. In the forest state observation table automatically only PIDs appear that have been a) Forest in 2000 & b) are observed in a given time step. E.g. PID 2 is forest in 2000, but not observed in 2003. It therefore only appears in the forest state list for 2000, 2006, 2009 & 2011. This is because only points fulfilling condition a) & b) have a chance to change from Forest to Non-Forest in that observation and receive state '1' and thus contribute to the result of equation [17].	
<b>Evidence used to close CL:</b> Re-calculation of weight for pilot have been performed correctly. Proponent has included all points in the pilot study for the calculation. Weight values have been corrected in the pilot sample. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**17. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 198)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.3 Determining Sample Size - Next, for each remaining table – one for each non-discarded point – aggregate its rows into a single master table. For each row in the master table, normalize its weight by dividing each weight by the sum of all weights, so that all the weights add to one. The master table may still include locations in the reference area that do not experience deforestation during the reference period. The master table, constructed from the pilot sample, contains rows that correspond to observations of forest state, observation times and weights.	
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1 ,130617_Forest state observations pilot sample.xlsx	
<b>Findings:</b> This component is not specifically addressed in the PD. The weights do not appear to have been normalized in the excel file as described in the methodology.	
<b>Non-conformance report (NCR):</b> Please normalize weights according to the approach specified in the methodology.	

<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
Weight calculation was re-done manually following method agreed with auditor.	
<b>Evidence used to close NCR:</b> New weight calculations have been verified correctly for the pilot sample. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**18. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 198)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.3 Determining Sample Size - Next, for each remaining table – one for each non-discarded point – aggregate its rows into a single master table. For each row in the master table, normalize its weight by dividing each weight by the sum of all weights, so that all the weights add to one. The master table may still include locations in the reference area that do not experience deforestation during the reference period. The master table, constructed from the pilot sample, contains rows that correspond to observations of forest state, observation times and weights.	
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1 ,130617_Forest state observations pilot sample.xlsx	
<b>Findings:</b> This component is not specifically addressed in the PD. The weights do not appear to have been normalized in the excel file as described in the methodology.	
<b>Clarification (CL):</b> Please describe the methodological process in the PD.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
Weight calculation was re-done manually following method agreed with auditor.	
<b>Evidence used to close CL:</b> New weight calculations have been verified correctly for the pilot sample. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**19. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 202)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.4 Sampling Deforestation - Sampling deforestation to fit the cumulative deforestation model is similar to the procedure for estimating sample size using a pilot sample, except that the deforestation sample size must be at least $\hat{n}$ . The observed state vector, time vector and the weight vector used to fit the model comprise columns of the master table.	
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.1 ,130617_Forest state observations pilot sample.xlsx	
<b>Findings:</b> The procedure followed has a parallel approach to the above pilot study area. Similarly, it shares the same miscues in the application of the methodology.	
<b>Non-conformance report (NCR):</b> Please correct the full sample approach in line with NCRs and CLs requested for the pilot study.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
Weight calculation was re-done manually following method agreed with auditor. In the forest state observation table automatically only PIDs appear that have been a) Forest in 2000 &	

b) are observed in a given time step. E.g. PID 2 is forest in 2000, but not observed in 2003. It therefore only appears in the forest state list for 2000, 2006, 2009 & 2011. This is because only points fulfilling condition a) & b) have a chance to change from Forest to Non-Forest in that observation and receive state '1' and thus contribute to the result of equation [17].

**Evidence used to close NCR:** Response calculations of the full sample were initially in error. This has been addressed with the project proponent. A new calculation of the document was provided and has been examined. This new document has been correctly calculated.  
Addressed.

<b>Date NCR closed:</b>	12 August 2013
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**20. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 203)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.4 Sampling Deforestation - The project description must include a map of the reference region showing the sample point locations.	
<b>Evidence Used to Assess Conformance:</b> PD General	
<b>Findings:</b> A map of the reference region showing sample point locations is not included, as required by the methodology.	
<b>Non-conformance report (NCR):</b> Please include a map of the reference region showing the sample point locations in the PD.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Included in Map 14 of PD in section 2.4.4.	
<b>Evidence used to close NCR:</b> The inclusion of the map satisfies the NCR. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**21. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 205)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.5 Discarded Sample Points - When sampling deforestation in the reference area, some sample points are discarded because their initial observations were non-forest; deforestation cannot be observed without initially observing forest. These points should be discarded indefinitely and should not be used in the leakage assessment or in any baseline reevaluations.	
<b>Evidence Used to Assess Conformance:</b> PD Section 2.4.4.1 & Section 2.4.4.2, 130617_Forest state observations pilot sample.xlsx	
<b>Findings:</b> 898 points were discarded. Clarification is needed in the PD.	
<b>Clarification (CL):</b> It appears that there are only 1,707 forested points in the 2000 image, so there were 898 discarded points. Please clarify PD Section 2.4.4.2.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Clarified in PD section 2.4.4.2. In the new full sample of 3187 points, 1116 have been discarded as being non-forest in 2000 imagery.	
<b>Evidence used to close CL:</b> This issue seems to be correctly addressed. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**22. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 206)**

<b>Validation</b>	
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<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.5 Discarded Sample Points - Likewise, these points should not be considered when estimating the minimum sample size.	
<b>Evidence Used to Assess Conformance:</b> PD Section 2.4.4.1 & Section 2.4.4.2, 130617_Forest state observations pilot sample.xlsx	
<b>Findings:</b> It is unclear if the discarded points were considered when estimating sample size.	
<b>Clarification (CL):</b> Please clarify whether the discarded points were considered when estimating sample size.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Clarified in PD section 2.4.4.2. In the new full sample of 3187 points, 1116 have been discarded as being non-forest in 2000 imagery.	
<b>Evidence used to close CL:</b> This issue seems to be correctly addressed. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**23. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 210)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.6 Minimizing Uncertainty - Observation data should be checked for inconsistencies. For example, observations of forest state over time at any one point in space probably do not transition from forest to non-forest, and then back to forest during the reference period (for an example, see Figure 6). A list of "impossible" or "unlikely" forest state transitions should be developed, and each point that matches the criteria should be reexamined.	
<b>Evidence Used to Assess Conformance:</b> PD 2.4.4.2	
<b>Findings:</b> Twenty grid points were identified as having undergone unlikely transitions.	
<b>Non-conformance report (NCR):</b> Twenty grid points were identified as having undergone unlikely transitions. Please see the 'UnlikelyTransitions.shp' shapefile for these locations.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Newly submitted full sample of 3187 points has been evaluated for unlikely transitions. Including 20 locations marked by auditor have been corrected. Actually it's neither a PD requirement to submit an Unlikely Transitions shapefile, nor is it a requirement to have a sample completely free of Unlikely Transitions - as long as there are not systematic errors. So in our understanding, even if there would be an unlikely transition left, this would not qualify as a non-conformance.	
<b>Evidence used to close NCR:</b> Addressed: CD performed spot-check to confirm FR's assertion that unlikely transition points had been corrected	
<b>Date NCR closed:</b>	12 August 2013

**24. Opportunity for Improvement (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 218)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.7 Model Fitting and Selection - The model is fit using IRLS with an initial weight vector $w$ that corrects for spatial and temporal artifacts from sampling historic imagery (see Venables & Ripley, 2002 for information on model fitting with IRLS). Given all possible covariates, select the best subset of covariates using AIC as a measure of fit. For information on model selection see Davidson (2003) and Freedman (2009). The fit model should be plotted with forest state over time and the project start date (for an example see Figure 8). Once selected and fit, the cumulative deforestation model $\hat{is}$	



defined by equation [16].		
<b>Evidence Used to Assess Conformance:</b> Sect 2.4.4.4 of PD		
<b>Findings:</b> Unclear where model runs are located, only a summary of the runs are described in the PD. Was IRLS method used in determining that population was not required or was that solely based on the linear predictor method? Uncertain if the results could be different if the entire component was evaluated in the non-linear method. Plot does not include forest state over time as shown in the methodology.		
<b>Opportunity for Improvement (OFI):</b> Please provide modeling run data, used to justify the decisions described in the PD.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
We provide modeling data run in spreadsheet "130724_Connection Observed Deforested Area & Population" how the observed cumulative deforested area are connected to population data 1992-2002 census extrapolated for the years of the reference period 2000-2011. It was not necessary to run a lowest AIC analysis to select the applicable subset of covariate data, because population is the only covariate with multi-temporal data points applicable. This was discussed and accepted in the first validation and has not changed. Logistical model is shown to fit observed deforestation data better when parameterized only with deforestation vs time directly, without the population data covariate shown to be insignificant. Points included into Figure 2 in PD.		
<b>Evidence used to close FI:</b> OFI has been satisfied. Addressed.		
<b>Date OFI closed:</b>	12 August 2013	

**25. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 218)**

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.7 Model Fitting and Selection - The model is fit using IRLS with an initial weight vector $w$ that corrects for spatial and temporal artifacts from sampling historic imagery (see Venables & Ripley, 2002 for information on model fitting with IRLS). Given all possible covariates, select the best subset of covariates using AIC as a measure of fit. For information on model selection see Davidson (2003) and Freedman (2009). The fit model should be plotted with forest state over time and the project start date (for an example see Figure 8). Once selected and fit, the cumulative deforestation model $\hat{}$ is defined by equation [16].		
<b>Evidence Used to Assess Conformance:</b> Sect 2.4.4.4 of PD		
<b>Findings:</b> Unclear where model runs are located, only a summary of the runs are described in the PD. Was IRLS method used in determining that population was not required or was that solely based on the linear predictor method? Uncertain if the results could be different if the entire component was evaluated in the non-linear method. Plot does not include forest state over time as shown in the methodology.		
<b>Clarification (CL):</b> Please clarify if covariate values were removed due to non-significance in the full non-linear run or a linear model iteration. If the latter, justify this approach.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	

<p>We provide modeling data run in spreadsheet "130724_Connection Observed Deforested Area &amp; Population" how the observed cumulative deforested area are connected to population data 1992-2002 census extrapolated for the years of the reference period 2000-2011.</p> <p>It was not necessary to run a lowest AIC analysis to select the applicable subset of covariate data, because population is the only covariate with multi-temporal data points applicable. This was discussed and accepted in the first validation and has not changed.</p> <p>Logistical model is shown to fit observed deforestation data better when parameterized only with deforestation vs time directly, without the population data covariate shown to be insignificant.</p> <p>Points included into Figure 2 in PD.</p>	
<p><b>Evidence used to close CL:</b> Has been discussed with the client and after an examination of the material appears to be correctly applied. Addressed.</p>	
<p><b>Date CL closed:</b></p>	<p>12 August 2013</p>

**26. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 218)**

<p><b>Validation</b></p>		
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.7 Model Fitting and Selection - The model is fit using IRLS with an initial weight vector <math>w</math> that corrects for spatial and temporal artifacts from sampling historic imagery (see Venables &amp; Ripley, 2002 for information on model fitting with IRLS). Given all possible covariates, select the best subset of covariates using AIC as a measure of fit. For information on model selection see Davidson (2003) and Freedman (2009). The fit model should be plotted with forest state over time and the project start date (for an example see Figure 8). Once selected and fit, the cumulative deforestation model <math>\hat{}</math> is defined by equation [16].</p>		
<p><b>Evidence Used to Assess Conformance:</b> Sect 2.4.4.4 of PD</p>		
<p><b>Findings:</b> Unclear where model runs are located, only a summary of the runs are described in the PD.</p> <p>Was IRLS method used in determining that population was not required or was that solely based on the linear predictor method? Uncertain if the results could be different if the entire component was evaluated in the non-linear method.</p> <p>Plot does not include forest state over time as shown in the methodology.</p>		
<p><b>Non-conformance report (NCR):</b> Please include forest state in figure 2, as prescribed by the methodology.</p>		
<p><b>Date issued:</b></p>	<p>19 July 2013</p>	
<p><b>Project proponent response/actions:</b></p>	<p><b>Date Received:</b></p>	<p>02 August 2013</p>
<p>We provide modeling data run in spreadsheet "130724_Connection Observed Deforested Area &amp; Population" how the observed cumulative deforested area are connected to population data 1992-2002 census extrapolated for the years of the reference period 2000-2011.</p> <p>It was not necessary to run a lowest AIC analysis to select the applicable subset of covariate data, because population is the only covariate with multi-temporal data points applicable. This was discussed and accepted in the first validation and has not changed.</p> <p>Logistical model is shown to fit observed deforestation data better when parameterized only with deforestation vs time directly, without the population data covariate shown to be insignificant.</p> <p>Points included into Figure 2 in PD.</p>		
<p><b>Evidence used to close NCR:</b> Has been included in the PD. Addressed.</p>		
<p><b>Date NCR closed:</b></p>	<p>12 August 2013</p>	



27. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 218)

Validation	
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.8 Predicting Cumulative Deforestation, PD Requirements, Linear Prediction of Deforestation - 1. The selected rate, according to the notation depicted in [7].</p> <p>2. The prediction of (<math>\hat{}</math>) for the end date of the current monitoring period.</p> <p>3. A table of cumulative deforestation used for previous monitoring periods either from equation [16], or the selected linear rate. The cumulative deforestation model should only be refit during a baseline reevaluation (see section 6.7).</p> <p>4. A graph of <math>\hat{}</math> from the project start date to the end date of the current monitoring period, including points representing cumulative deforestation for previous monitoring periods used to determine baseline emissions either from equation [16] or the selected linear rate.</p>	
<p><b>Evidence Used to Assess Conformance:</b> Sect 2.4.4.4 of PD, 130621_CDM and Leakage Model_V3.xlsx</p>	
<p><b>Findings:</b> It appears that equation 7 was performed using multiple linear regression and not IWLS.</p>	
<p><b>Clarification (CL):</b> It appears that equation 7 was performed using multiple linear regression and not IWLS. Please correct the PD to be in-line with that approach.</p>	
<p><b>Date issued:</b></p>	<p>12 August 2013</p>
<p><b>Project proponent response/actions:</b></p>	<p><b>Date Received:</b> 02 August 2013</p>
<p>Section 2.4.4.4 is now updated and refers to the use of a multiple linear regression.</p>	
<p><b>Evidence used to close CL:</b> The incorrect approach has been removed. Addressed.</p>	
<p><b>Date CL closed:</b></p>	<p>13 August 2013</p>

28. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 226)

Validation	
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.8 Predicting Cumulative Deforestation, PD Requirements, Linear Prediction of Deforestation - 1. The selected rate, according to the notation depicted in [7].</p> <p>2. The prediction of (<math>\hat{}</math>) for the end date of the current monitoring period.</p> <p>3. A table of cumulative deforestation used for previous monitoring periods either from equation [16], or the selected linear rate. The cumulative deforestation model should only be refit during a baseline reevaluation (see section 6.7).</p> <p>4. A graph of <math>\hat{}</math> from the project start date to the end date of the current monitoring period, including points representing cumulative deforestation for previous monitoring periods used to determine baseline emissions either from equation [16] or the selected linear rate.</p>	
<p><b>Evidence Used to Assess Conformance:</b> Sect 2.4.4.4 of PD, 130621_CDM and Leakage Model_V3.xlsx</p>	
<p><b>Findings:</b> The current rate notation is not in line with that of equation 7 of the methodology.</p>	
<p><b>Clarification (CL):</b> Please describe the selected rate based on the notation of equation 7 of the methodology.</p>	
<p><b>Date issued:</b></p>	<p>19 July 2013</p>
<p><b>Project proponent response/actions:</b></p>	<p><b>Date Received:</b> 02 August 2013</p>
<p>The selected rate is no formulated analogue to equation 7 in section 2.4.4.4.</p> <p>The prediction in of Fdf at the end of each monitoring period is included in section 2.4.4.5 including table 13.</p>	
<p><b>Evidence used to close CL:</b> This has been adjusted accordingly. Addressed.</p>	
<p><b>Date CL closed:</b></p>	<p>12 August 2013</p>

**29. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 226)**

<b>Validation</b>	
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.8 Predicting Cumulative Deforestation, PD Requirements, Linear Prediction of Deforestation - 1. The selected rate, according to the notation depicted in [7].</p> <p>2. The prediction of (<math>\hat{}</math>) for the end date of the current monitoring period.</p> <p>3. A table of cumulative deforestation used for previous monitoring periods either from equation [16], or the selected linear rate. The cumulative deforestation model should only be refit during a baseline reevaluation (see section 6.7).</p> <p>4. A graph of <math>\hat{}</math> from the project start date to the end date of the current monitoring period, including points representing cumulative deforestation for previous monitoring periods used to determine baseline emissions either from equation [16] or the selected linear rate.</p>	
<p><b>Evidence Used to Assess Conformance:</b> Sect 2.4.4.4 of PD, 130621_CDM and Leakage Model_V3.xlsx</p>	
<p><b>Findings:</b> The prediction of Fdf for the end date of the monitoring period in the PD is not included, as required by the methodology.</p>	
<p><b>Non-conformance report (NCR):</b> Please include a prediction of Fdf for the end date of the monitoring period in the PD, per the methodology requirements.</p>	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
<p>The selected rate is no formulated analogue to equation 7 in section 2.4.4.4.</p> <p>The prediction in of Fdf at the end of each monitoring period is included in section 2.4.4.5 including table 13.</p>	
<p><b>Evidence used to close NCR:</b> This material has been included. Addressed.</p>	
<b>Date NCR closed:</b>	12 August 2013

**30. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 228)**

<b>Validation</b>	
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.9 Estimating Uncertainty in the Cumulative Deforestation Model - Uncertainty in the cumulative deforestation model is estimated from the sample of observed forest states and is used to determine the confidence deduction (see section 11.1). A Horvitz-Thompson estimator of the standard deviation of observed state <math>\hat{}</math> in the reference region is given in equation [17] where corresponds to the observed forest state, to the normalized weight for the observation, the total number of state observations and the set of all observations made. An approximate estimate of uncertainty at the 95% confidence level is given by [15].</p>	
<p><b>Evidence Used to Assess Conformance:</b> 2.4.4.6 of the PD</p>	
<p><b>Findings:</b> No explicit mention of equation 17 is described in the PD.</p> <p>It appears that equation 17 is not being calculated using normalized weights, as required by the methodology.</p> <p>With the above exceptions it appears that equation 15 is being correctly applied.</p>	
<p><b>Clarification (CL):</b> Please clarify the use of equation 17 in the calculation of uncertainty.</p>	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
<p>Weight calculation was re-done manually following method agreed with auditor. Using eq 17 based on normalized, correct weights now.</p>	
<p><b>Evidence used to close CL:</b> Equation 17 has been included in the PD.</p>	
<b>Date CL closed:</b>	12 August 2013

**31. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 228)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.4.9 Estimating Uncertainty in the Cumulative Deforestation Model - Uncertainty in the cumulative deforestation model is estimated from the sample of observed forest states and is used to determine the confidence deduction (see section 11.1). A Horvitz-Thompson estimator of the standard deviation of observed state $\hat{s}$ in the reference region is given in equation [17] where corresponds to the observed forest state, to the normalized weight for the observation, the total number of state observations and the set of all observations made. An approximate estimate of uncertainty at the 95% confidence level is given by [15].	
<b>Evidence Used to Assess Conformance:</b> 2.4.4.6 of the PD	
<b>Findings:</b> No explicit mention of equation 17 is described in the PD. It appears that equation 17 is not being calculated using normalized weights, as required by the methodology. With the above exceptions it appears that equation 15 is being correctly applied.	
<b>Non-conformance report (NCR):</b> Please calculate equation 17 using normalized weights, per the methodology.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
Weight calculation was re-done manually following method agreed with auditor. Using eq 17 based on normalized, correct weights now.	
<b>Evidence used to close NCR:</b> This has been correctly performed in the excel sheets and is now reflected correctly in the PD calculation. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**32. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 230)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Estimating Uncertainty in the Cumulative Deforestation Model - The project description must include the following: 1. List of values used for variables in determining the uncertainty in the cumulative deforestation model as they relate to equations [15] and [17]. 2. The quantified uncertainty in the cumulative deforestation model.	
<b>Evidence Used to Assess Conformance:</b> 2.4.4.6 of the PD	
<b>Findings:</b> There is no list of values used for variables in determining uncertainty.	
<b>Non-conformance report (NCR):</b> Please included a list of values used for variables in determining the uncertainty in the cumulative deforestation model as they relate to equations [15] and [17].	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
This is now clarified in section 2.4.4.6.	
<b>Evidence used to close NCR:</b> This has been performed. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**33. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 232)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 6.5 Soil Carbon Loss Model - In addition to cumulative deforestation, the baseline scenario ("without-project" scenario) includes the estimated loss of organic carbon from soil over time in the project area as a result of land conversion to	

<p>agriculture. The soil carbon loss model is either parameterized from observations of soil carbon in the reference area or taken from literature. If neither method is available, the proponent may use a conservative default model presented below. The parameterized model predicts the proportion of carbon loss over a period of time given field observations, and is the preferred method, as it is the most accurate and realistic option.</p>		
<p><b>Evidence Used to Assess Conformance:</b> Page 39, Section 5</p>		
<p><b>Findings:</b> Soil is not included in the first verification period.</p>		
<p><b>Non-conformance report (NCR):</b> Under Section 2.4.5.1 of the PD, please include the phrase ', where soil is an included pool.' at the very end of the section, since the information will not be provided upon first verification. It appears that once Tracked Changes are removed, the boxes in Sections 2.4.5.5 and 2.4.5.6 showing the usage of Equations 13 and 19 (respectively) are not visible. Please correct.</p>		
<p><b>Date issued:</b></p>	<p>19 July 2013</p>	
<p><b>Project proponent response/actions:</b></p>		
<p><b>Date Received:</b></p>	<p>02 August 2013</p>	
<p>Included sentence in section 2.4.5.1. Reverse change in Section 2.4.5.6. Included additional sentence in section 2.4.5.6, which also referred to first verification. Section 2.4.5.5 was fully re-done and now provides a theoretical soil carbon decay model, which will be updated using measured field data at the first monitoring period where soil carbon is included. For the calculations, refer to the spreadsheet "130722_Soil carbon model ex_ante.xlsx", provided in the supporting documents.</p>		
<p><b>Non-conformance report (NCR):</b> The last sentence in section 2.4.5.1 is unclear in the timing.</p>		
<p><b>Date issued:</b></p>	<p>12 August 2013</p>	
<p><b>Project proponent response/actions:</b></p>		
<p><b>Date Received:</b></p>	<p>13 August 2013</p>	
<p>Clarified that mentioned soil requirements "will be provided upon the first verification where soil is an included carbon pool." This is also clarified in two other instances where the formulation appeared (2.4.5.5 &amp; 2.4.5.6).</p>		
<p><b>Evidence used to close NCR:</b> The statement has been clarified to address the issue. Addressed.</p>		
<p><b>Date NCR closed:</b></p>	<p>13 August 2013</p>	

**34. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 248)**

<p><b>Validation</b></p>		
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Selecting the Proportion of Below-ground Biomass, 6.6.5 Scenario for Below-ground Small - The below-ground portions of small trees are assumed to be completely removed, burned or converted to fuel wood as a result of land conversion to agriculture. The baseline scenario for below-ground small trees is directly related to the cumulative deforestation model which predicts the proportion deforestation over time.</p>		
<p><b>Evidence Used to Assess Conformance:</b> Section 3 &amp; "120328_KARIBA ER Calc_auditors_yvl.xls"</p>		
<p><b>Findings:</b> May still be using default data</p>		
<p><b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.</p>		

<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> The carbon source values used for the calculation of ex ante have been modified in the PD to reflect the current approach given the availability of monitoring data. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**35. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 250)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Selecting the Proportion of Below-ground Biomass, 6.6.6 Scenario for below-ground non-trees - The below-ground portions of non-trees are assumed to be completely removed, burned or converted to fuel wood as a result of land conversion to agriculture. The baseline scenario for below-ground non-trees is directly related to the cumulative deforestation model which predicts the proportion deforestation over time.	
<b>Evidence Used to Assess Conformance:</b> Section 3 & "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**36. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 252)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Selecting the Proportion of Below-ground Biomass, 6.6.7 Scenario for Standing Deadwood - Standing deadwood is assumed to be completely removed, burned or converted to fuel wood as a result of land conversion to agriculture. The baseline scenario for standing deadwood is directly related to the cumulative deforestation model which predicts the proportion deforestation over time.	
<b>Evidence Used to Assess Conformance:</b> Section 3 & "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	



<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**37. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 256)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Selecting the Proportion of Below-ground Biomass, 6.6.9 Scenario for Soil - Soil is assumed to lose its organic carbon over time as a result of agriculture (E. Davidson & Ackerman, 1993). The baseline scenario for soil carbon is directly related to the cumulative deforestation model which predicts the proportion deforestation over time and the soil carbon loss model which predicts the loss of organic soil carbon over time.	
<b>Evidence Used to Assess Conformance:</b> Section 3 & "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> Equations are based on default lambda of 0.20. Monitoring values will be used after soil is measured in the field in a future verification period.	
<b>Date CL closed:</b>	12 August 2013

**38. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 274)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements, baseline emissions - The project description must include the following: 1. Estimates of baseline emissions for each selected carbon pool.	
<b>Evidence Used to Assess Conformance:</b> PD section 3.1, Spreadsheet "120328_KARIBA ER Calc_auditors_yvl.xls"; Table 15	
<b>Findings:</b> During initial validation, the validator requested an estimate of baseline emissions (ex ante) for each of the selected carbon pools. The response was that defaults were used, so these were not broken out. However, now that validation and verification is occurring simultaneously, please update Table 15 of provide the location of the ex ante breakdown for each carbon pool.	
<b>Non-conformance report (NCR):</b> During initial validation, the validator requested an estimate of baseline emissions (ex ante) for each of the selected carbon pools. The	

response was that defaults were used, so these were not broken out. However, now that validation and verification is occurring simultaneously, please update Table 15 of provide the location of the ex ante breakdown for each carbon pool.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated., Table 15 is updated		
<b>Non-conformance report (NCR):</b> Table 15 has been updated; however these values have not been separated by carbon pool.		
<b>Date issued:</b>	12 August 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	13 August 2013	
Please note that the relevant table is labeled "table 18". The separation by carbon pools is now provided in the updated excel spreadsheet "130813_KARIBA ER Calc_Ex-ante_V5.xlsx" and summarized in Table 16 of the PD. The language in section 3.4 is now updated accordingly.		
<b>Evidence used to close NCR:</b> The table has been separated into carbon pools. Addressed.		
<b>Date NCR closed:</b>	13 August 2013	

**39. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 277)**

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, 8.1 Estimating Emissions from Above-ground Large Tree Biomass - For any given monitoring period, emissions from above-ground large tree biomass are estimated as a proportion of measured carbon in above-ground large tree biomass at the end point in time of the monitoring period. Measured carbon at period in above-ground large tree biomass is (see section 13.5.1). This proportion is estimated by the cumulative deforestation model at the end time of the monitoring period (see section 6.4.8). Emissions from above-ground large tree biomass are estimated as [21].		
<b>Evidence Used to Assess Conformance:</b> PD Sections 3.1 and 4.3.7; Spreadsheet "120328_KARIBA ER Calc_auditors_yvl.xls"		
<b>Findings:</b> May still be using default equations in ex ante estimate		
<b>Clarification (CL):</b> Please clarify if the project developer is still using default equations in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.		
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.		
<b>Date CL closed:</b>	12 August 2013	



40. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 279)

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 8.2 Estimating Emissions from Above-ground Small Tree Biomass - For any monitoring period, emissions from above-ground small tree biomass are estimated as a proportion of measured carbon in above-ground small tree biomass at the end point in time of the monitoring period. Measured carbon at period in above-ground small tree biomass is (see section 13.5.2). This proportion $\hat{}$ is estimated by the cumulative deforestation model at the end time of the monitoring period (see section 6.4.8). Emissions from above-ground small tree biomass are estimated as [22].	
<b>Evidence Used to Assess Conformance:</b> Spreadsheet "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.	
<b>Date CL closed:</b>	12 August 2013

41. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 281)

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 8.3 Estimating Emissions from Above-ground Non-tree Biomass - For any monitoring period, emissions from above-ground non-tree biomass are estimated as a proportion of measured carbon in above-ground non-tree biomass at the end point in time of the monitoring period. Measured carbon at period in above-ground non-tree biomass is (see section 13.5.3). This proportion $\hat{}$ is estimated by the cumulative deforestation model at the end time of the monitoring period (see section 6.4.8). Emissions from above-ground non-tree biomass are estimated as [23].	
<b>Evidence Used to Assess Conformance:</b> Spreadsheet "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.	

<b>Date CL closed:</b>	12 August 2013
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**42. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 283)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 8.4 Estimating Emissions from Below-ground Large Tree Biomass - For any monitoring period, emissions from below-ground large tree biomass are estimated as a proportion of measured carbon in below-ground large tree biomass at the end point in time of the monitoring period. Measured carbon at period in below-ground large tree biomass is (see section 13.6.1). This proportion $\hat{}$ is estimated by the cumulative deforestation model at the end time of the monitoring period (see section 6.4.8). Emissions from below-ground large tree biomass are estimated as [24] where is the proportion of below-ground large tree biomass removed as a result of land conversion to agriculture. The project proponent must select this proportion as described in 6.6.4.	
<b>Evidence Used to Assess Conformance:</b> Spreadsheet "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**43. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 285)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 8.5 Estimating Emissions from Below-ground Small Tree Biomass - For any monitoring period, emissions from below-ground small tree biomass are estimated as a proportion of measured carbon in below-ground small tree biomass at the end point in time of the monitoring period. Measured carbon at period in below-ground small tree biomass is (see section 13.6.2). This proportion $\hat{}$ is estimated by the cumulative deforestation model at the end time of the monitoring period (see section 6.4.8). Emissions from below-ground small tree biomass are estimated as [25]. It is assumed that all below-ground small tree biomass is immediately lost as a result of land conversion to agriculture.	
<b>Evidence Used to Assess Conformance:</b> Spreadsheet "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for	

biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**44. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 287)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 8.6 Estimating Emissions from Below-ground Non-tree Biomass - For any monitoring period, emissions from below-ground non-tree biomass are estimated as a proportion of measured carbon in below-ground non-tree biomass at the end point in time of the monitoring period. Measured carbon at period in below-ground non-tree biomass is (see section 13.6.3). This proportion is estimated by the cumulative deforestation model at the end time of the monitoring period (see section 6.4.8). Emissions from below-ground non-tree biomass are estimated as [26]. It is assumed that all below-ground non-tree biomass is immediately lost as a result of land conversion to agriculture.	
<b>Evidence Used to Assess Conformance:</b> Spreadsheet "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.	
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**45. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 289)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 8.7 Estimating Emissions from Standing Dead Wood - For any monitoring period, emissions from standing dead wood are estimated as a proportion of measured carbon in standing dead wood at the end point in time of the monitoring period. Measured carbon at period in standing dead wood is (see section 13.7). This proportion is estimated by the cumulative deforestation model at the end time of the monitoring period (see section 6.4.8). Emissions from standing dead wood are estimated as [27].	
<b>Evidence Used to Assess Conformance:</b> Spreadsheet "120328_KARIBA ER Calc_auditors_yvl.xls"	
<b>Findings:</b> May still be using default data	
<b>Clarification (CL):</b> Please clarify if the project developer is still using default data in the PD when measured data is available; if so, please describe why this would still be allowable and appropriate.	
<b>Date issued:</b>	19 July 2013

<b>Project proponent response/actions:</b>	<b>Date Received:</b>	02 August 2013
The ex-ante calculations have now been fully updated, including real measured data for biomass. For soil carbon, literature values are still used. The updated calculations are provided in spreadsheet "130730_KARIBA ER Calc_Ex-ante_V4.xlsx" in the supporting documents. The corresponding tables in the PD are now also updated.		
<b>Evidence used to close CL:</b> Default equations have been updated with monitoring data. Addressed.		
<b>Date CL closed:</b>	12 August 2013	

**46. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 323)**

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Delineation of the Leakage Area - The project description must include the following information with respect to the leakage area:		
<ol style="list-style-type: none"> <li>1. A map of the delineated boundaries.</li> <li>2. A thematic map or image of the leakage area showing that it was entirely forested as of the project start date.</li> <li>3. The size of the forested portion of the project area and the size of the leakage area.</li> <li>4. A narrative describing the rationale for selection of leakage area boundaries.</li> </ol>		
<b>Evidence Used to Assess Conformance:</b> PD Sect 3.3.3		
<b>Findings:</b> Items 1, 3, & 4 are addressed in the PD. Please provide a thematic map or image of the leakage area showing that it was entirely forested as of the project start date.		
<b>Non-conformance report (NCR):</b> Please provide a thematic map or image of the leakage area showing that it was entirely forested as of the project start date.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b> 02 August 2013		
Included as Map 15 in PD section 3.3.		
<b>Evidence used to close NCR:</b> This has been included. Addressed.		
<b>Date NCR closed:</b>	12 August 2013	

**47. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 326)**

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, 10.3 The Leakage Model - Upon baseline reevaluation, the leakage model is updated to reflect the new cumulative deforestation model (see section 6.7). The lag period in the leakage model remains unchanged after baseline reevaluation.		
<b>Evidence Used to Assess Conformance:</b> Section 2.4.3.1; Section 3.3.2		
<b>Findings:</b> Unable to find this component.		
<b>Non-conformance report (NCR):</b> Please include details to the update of the leakage model when the baseline model is reevaluated.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b> 02 August 2013		
The following sentence is now included in section 3.3.3: "The leakage model will be updated when the baseline is re-evaluated (cf. section 1.6)."		
<b>Evidence used to close NCR:</b> The required statement has been included. Addressed.		
<b>Date NCR closed:</b>	12 August 2013	

**48. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 330)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 10.3.2 Sampling Degradation and Deforestation in the Leakage Area - The leakage area must be sampled prior to the end of the first monitoring period in order to estimate the lag period for the leakage model and at every subsequent monitoring period in order to estimate actual emissions due to leakage. Within the leakage area, randomly select a sample of point locations with uniform probability with a sample size $\hat{n}$ determined by equation [10]. These point locations become the northeast corners of the fixed-area plots used to estimate degradation and deforestation in the leakage area permanently throughout the project lifetime. Select plot dimensions so that each plot area is at least two hectares. The dimensions of all plots should be the same. Visit these plots to observe the proportion degradation using the following ordinal scale. Record a factor (i.e. 0.2, 0.4, etc.) corresponding to the observed above-ground biomass that is absent as evidenced by presence of stumps for each plot area.	
<b>Evidence Used to Assess Conformance:</b> PD 3.3	
<b>Findings:</b> Pending correct calculation of the standard deviation of the deforestation state. It is unclear in the PD where the calculation for the number of sample plots equation 10 is described.	
<b>Non-conformance report (NCR):</b> Please include details on the calculation of the number of leakage sample plots required (equation 10).	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
The calculation of the sample size of leakage plots is now included in section 3.3.3 of the PD.	
<b>Evidence used to close NCR:</b> The calculation has been added to the PD. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**49. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 342)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Sampling Deforestation and Degradation to Build the Leakage Model - The project description must include the following: 1. The sample size $\hat{n}$ . 2. The dimensions of the sample plots. 3. A map of the leakage area showing the sample plot locations. 4. A table of plot data showing the observed factors. 5. A protocol for field sampling of degradation and deforestation. 6. Procedure for training of field collection teams. 7. Documentation of training for field collection teams.	
<b>Evidence Used to Assess Conformance:</b> Section 2.4.3.2; Section 3.3	
<b>Findings:</b> The PD does not contain the sample size Mle as required by the methodology. Dimensions of sample plots are 2.1 ha. There is no map showing the leakage sample plot locations. There is no table of plot data showing the observed factors.	
<b>Non-conformance report (NCR):</b> Please include the sample size of leakage plots Mle in the PD as described in the methodology.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
The calculation of the sample size of leakage plots is now included in section 3.3.3 of the PD.	



<b>Evidence used to close NCR:</b> The sample size of to the leakage plots has been included. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**50. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 342)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Sampling Deforestation and Degradation to Build the Leakage Model - The project description must include the following: 1. The sample size ^. 2. The dimensions of the sample plots. 3. A map of the leakage area showing the sample plot locations. 4. A table of plot data showing the observed factors. 5. A protocol for field sampling of degradation and deforestation. 6. Procedure for training of field collection teams. 7. Documentation of training for field collection teams.	
<b>Evidence Used to Assess Conformance:</b> Section 2.4.3.2; Section 3.3	
<b>Findings:</b> The PD does not contain the sample size Mle as required by the methodology. Dimensions of sample plots are 2.1 ha. There is no map showing the leakage sample plot locations. There is no table of plot data showing the observed factors.	
<b>Non-conformance report (NCR):</b> Please include a map in the PD showing the leakage area and sample plots within that area.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
Map 15 in section 3.3 is now updated to show the location of the 50 leakage sampling points.	
<b>Evidence used to close NCR:</b> The leakage area plot map has been added to include leakage area and sample plot locations. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**51. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 342)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Sampling Deforestation and Degradation to Build the Leakage Model - The project description must include the following: 1. The sample size ^. 2. The dimensions of the sample plots. 3. A map of the leakage area showing the sample plot locations. 4. A table of plot data showing the observed factors. 5. A protocol for field sampling of degradation and deforestation. 6. Procedure for training of field collection teams. 7. Documentation of training for field collection teams.	
<b>Evidence Used to Assess Conformance:</b> Section 2.4.3.2; Section 3.3	
<b>Findings:</b> The PD does not contain the sample size Mle as required by the methodology. Dimensions of sample plots are 2.1 ha. There is no map showing the leakage sample plot locations. There is no table of plot data showing the observed factors.	
<b>Non-conformance report (NCR):</b> Please include a table of plot data showing the observed factors, as prescribed by the methodology.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013

A table of plot data of the first monitoring period is now included in section 3.3.3.	
<b>Evidence used to close NCR:</b> The table of initial observations has been included. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**52. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 347)**

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Fitting the Leakage Model - The project description must include the following: 1. The estimated lag period.		
<b>Evidence Used to Assess Conformance:</b> PD Section 3.3.2		
<b>Findings:</b> The PD does not include the lag period as required by the methodology.		
<b>Non-conformance report (NCR):</b> Please include the lag period in the PD as required by the methodology.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
The calculation of the lag period is now included in section 3.3.3 of the PD.		
<b>Evidence used to close NCR:</b> This has been added as required. Addressed.		
<b>Date NCR closed:</b>	12 August 2013	

**53. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 351)**

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Fitting the Leakage Model - Depending on the relative value of the leakage predicted by the model and the results of the field-observed samples at the end of the current monitoring period, the leakage factor should be calculated in one of three ways. In the first monitoring period, the leakage factor is calculated as the difference between the mean of the field-observed leakage sample and the prediction of the leakage model as illustrated in example (b) below and in Figure 12. In subsequent monitoring periods, the leakage factor is calculated as the difference between the mean of the leakage sample and whichever is greater: the prediction of the leakage model or the results of the leakage sample at the previous monitoring period. This is necessary to avoid double counting when predicting deforestation and degradation based on a cumulative model, and is illustrated by example (c) below and in Figure 12. Any time the results of the field-observed leakage sample lies below the prediction of the leakage model, the leakage factor is zero (example (d) below and in Figure 12). From the leakage factor, quantify leakage emissions as equation [32].		
<b>Evidence Used to Assess Conformance:</b> Section 3.3.2		
<b>Findings:</b> There is no discussion in the PD on the calculations of the leakage factor at the end of the first monitoring period.		
<b>Non-conformance report (NCR):</b> Please include the method for the calculation of the leakage factor at the end of the first monitoring period as described in the methodology. See figure 12 (b) for an example.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
This is now clarified in section 3.3.4 of the PD. In line with the methodology, it is assumed that no leakage has occurred during the first monitoring period. The leakage factor will be calculated from the next monitoring period onwards. Please also refer to similar PDs (e.g. section 10.4 of the Kasigau II PD:		



https://vcsprojectdatabase2.apx.com/myModule/ProjectDoc/Project_ViewFile.asp?FileID=6495&IDKEY=f98klasmf8jflkasf8098afnasfkj98f0a9sfsakjflsakjf8dk8956605).	
<b>Evidence used to close NCR:</b> A discussion of the calculation of leakage factor in future monitoring periods has been included. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**54. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 355)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Estimating the Leakage Factor and Emissions From Leakage - The project description must include the following: 1. The estimated cumulative degradation and deforestation predicted by the leakage model, (^^), 2. The estimated cumulative deforestation and a degradation in the leakage area, ^, 3. The leakage factor, ^, 4. The estimated emissions from leakage.	
<b>Evidence Used to Assess Conformance:</b> Section 2.4.3.1; Section 3.3	
<b>Findings:</b> The estimated cumulative deforestation and a degradation in the leakage area is not present in the PD.	
<b>Non-conformance report (NCR):</b> Please include the estimated cumulative deforestation and degradation in the leakage area in the PD, as prescribed by the methodology. (See PD Requirements: Estimating the Leakage Factor and Emissions From Leakage).	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	02 August 2013
The fully updated leakage model is now included in section 3.3 of the PD.	
<b>Evidence used to close NCR:</b> This information has been updated. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

**55. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 360)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, PD Requirements: Quantification of NERs - The project description must include the following: 1. Estimates for each component of the quantified NERs; 2. The total quantified NERs; and 3. The number of quantified NERs to be allocated to the buffer pool.	
<b>Evidence Used to Assess Conformance:</b> Section 3.4	
<b>Findings:</b> NERs applied to the buffer pool are not included in the PD, as required by the methodology.	
<b>Non-conformance report (NCR):</b> Please include within the PD the number or quantified NERs to be allocated to the buffer pool.	
<b>Date issued:</b>	12 August 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	12 August 2013
The quantified allocation of NERs to the buffer pool is now included in section 3.4. On this occasion, the risk assessment in the PD annex has been updated to reflect what has been discussed related to verification (Project Management b) changed from 0 to 2).	
<b>Evidence used to close NCR:</b> NERs applied to the buffer pool have been included in section 3.4 of the PD.	
<b>Date NCR closed:</b>	12 August 2013

56. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 378)

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 12 Data and Parameters Not Monitored - See Appendix B, list of variables, for a complete list of all variables, data and parameters and a description of the frequency of monitoring for each.	
<b>Evidence Used to Assess Conformance:</b> General PD	
<b>Findings:</b> Data and parameters not monitored are not explicitly included in the PD, as required by the methodology.	
<b>Clarification (CL):</b> Per phone call on 18 July 2013, a statement that ensures the project will monitor all data and parameters listed in appendix B should be sufficient instead of individually listing each table and parameter in the PD.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 19 July 2013
As list of parameters available at validation is now provided in Annex 3 in the separate document "130722_Annex 3_Parameters at Validation.docx". For all parameters to be monitored, a reference to the methodology is included in section 4.2 of the PD.	
<b>Evidence used to close CL:</b> Parameters have been included in Appendix III. Addressed.	
<b>Date CL closed:</b>	12 August 2013

57. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 407)

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 13.5.1 Estimating Carbon in Above-ground Large Trees - 1. Estimate the carbon stock per unit area in each plot, , as equation [45] where is the predicted carbon stock for the large tree in plot , stratum as given by equation [50]. 2. Use to calculate the total carbon stock in above-ground large trees as equation [44] and standard error <sup>^</sup> of the carbon stock in above-ground large trees as equation [47] where <sup>^</sup> is equation [46]. (Refer to Page 75)	
<b>Evidence Used to Assess Conformance:</b> PD Section 4.3.7	
<b>Findings:</b> PD does not address the variance of the above-ground large trees carbon stock equation 46.	
<b>Clarification (CL):</b> Please include the variance of the above-ground large trees carbon stock equation 46, as required by the methodology.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 02 August 2013
A full reference to equation 46 has now been included in section 4.3.8 of the methodology.	
<b>Clarification (CL):</b> Unable to find mention of equation 46 in section 4.3.8 as described in the response.	
<b>Date issued:</b>	12 August 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 13 August 2013
Equation 46 is now referenced in section 4.3.8.	
<b>Evidence used to close CL:</b> Equation 46 has been added to the PD. Addressed.	
<b>Date CL closed:</b>	13 August 2013

58. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 409)

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 13.5.2 Estimating Carbon in Above-ground Small Trees	

<p>- 1. Estimate the carbon stock per unit area in each plot, as equation [45] where is the predicted carbon stock for the small tree in plot, stratum as given by equation [50].                  2. Use to calculate the total carbon stock in above-ground small trees as equation [44] and standard error<sup>^</sup> of the carbon stock in above-ground large trees as equation [47] where<sup>^</sup> is equation [46]. (Refer to Page 76)</p>		
<b>Evidence Used to Assess Conformance:</b> PD Section 4.3.7		
<b>Findings:</b> PD does not address the variance of the above-ground small trees carbon stock equation 46.		
<b>Clarification (CL):</b> Please include the variance of the above-ground small trees carbon stock equation 46, as required by the methodology.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
A full reference to equation 46 has now been included in section 4.3.8 of the methodology.		
<b>Clarification (CL):</b> Unable to find mention of equation 46 in section 4.3.8 as described in the response.		
<b>Date issued:</b>	12 August 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	13 August 2013	
Equation 46 is now referenced in section 4.3.8.		
<b>Evidence used to close CL:</b> Equation 46 has been added to the PD. Addressed.		
<b>Date CL closed:</b>	13 August 2013	

**59. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 418)**

<b>Validation</b>		
<p><b>VCS Criteria:</b> VCS VM0009, v1.1, Allometric Equation Method - 1. Estimate the carbon stock per unit area in each plot, , as equation [45] where is equation [54] for the shrub in plot , stratum.                  2. Use to estimate the total carbon stock in above-ground non-tree biomass as equation [44] and standard error<sup>^</sup> of the carbon stock in above-ground non-trees as equation [47] where<sup>^</sup> is equation [46].</p>		
<b>Evidence Used to Assess Conformance:</b> PD Section 4.3.7		
<b>Findings:</b> PD does not address the variance of the above-ground non-tree biomass carbon stock, equation 46.		
<b>Clarification (CL):</b> Please include the variance of the above-ground non-tree carbon stock equation 46, as required by the methodology.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
A full reference to equation 46 has now been included in section 4.3.8 of the methodology.		
<b>Clarification (CL):</b> Unable to find mention of equation 46 in section 4.3.8 as described in the response.		
<b>Date issued:</b>	12 August 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	13 August 2013	
Equation 46 is now referenced in section 4.3.8.		

<b>Evidence used to close CL:</b> Equation 46 has been added to the PD. Addressed.	
<b>Date CL closed:</b>	13 August 2013

**60. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 422)**

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, 13.6.1 Estimating Carbon in Below-ground Large Trees - 1. Estimate the carbon stock per unit area in each plot, as equation [45] where is the product of , the root to shoot ratio for species and equation [50] for the large tree in plot , stratum. 2. Use to calculate the total carbon stock in below-ground large trees as equation [44] and standard error <sup>^</sup> of the carbon stock in below-ground large trees as equation [47] where <sup>^</sup> is equation [46].		
<b>Evidence Used to Assess Conformance:</b> 4.3		
<b>Findings:</b> PD does not address the variance of the below-ground large trees biomass carbon stock, equation 46.		
<b>Clarification (CL):</b> Please include the variance of the below-ground large trees carbon stock equation 46, as required by the methodology.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
A full reference to equation 46 has now been included in section 4.3.8 of the methodology.		
<b>Clarification (CL):</b> Unable to find mention of equation 46 in section 4.3.8 as described in the response.		
<b>Date issued:</b>	12 August 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	13 August 2013	
Equation 46 is now referenced in section 4.3.8.		
<b>Evidence used to close CL:</b> Equation 46 has been added to the PD. Addressed.		
<b>Date CL closed:</b>	13 August 2013	

**61. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 424)**

<b>Validation</b>		
<b>VCS Criteria:</b> VCS VM0009, v1.1, 13.6.2 Estimating Carbon in Below-ground Small Trees - 1. Estimate the carbon stock per unit area in each plot, as equation [45] where is the product of , the root to shoot ratio for species and equation [50] for the small tree in plot , stratum. 2. Use to calculate the total carbon stock in below-ground small trees as equation [44] and standard error <sup>^</sup> of the carbon stock in below-ground small trees as equation [47] where <sup>^</sup> is equation [46].		
<b>Evidence Used to Assess Conformance:</b> 4.3		
<b>Findings:</b> PD does not address the variance of the below-ground small trees biomass carbon stock, equation 46.		
<b>Clarification (CL):</b> Please include the variance of the below-ground small trees carbon stock equation 46, as required by the methodology.		
<b>Date issued:</b>	19 July 2013	
<b>Project proponent response/actions:</b>		
<b>Date Received:</b>	02 August 2013	
A full reference to equation 46 has now been included in section 4.3.8 of the methodology.		
<b>Clarification (CL):</b> Unable to find mention of equation 46 in section 4.3.8 as described in the response.		

<b>Date issued:</b>	12 August 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	13 August 2013
Equation 46 is now referenced in section 4.3.8.	
<b>Evidence used to close CL:</b> Equation 46 has been added to the PD. Addressed.	
<b>Date CL closed:</b>	13 August 2013

**62. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, VM0009, line 468)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS VM0009, v1.1, 14 Data and Parameters Monitored - See Appendix B, list of variables, for a complete list of all variables, data and parameters and a description of the frequency of monitoring for each.	
<b>Evidence Used to Assess Conformance:</b> General PD	
<b>Findings:</b> Data and parameters monitored are not explicitly included in the PD, as required by the methodology.	
<b>Clarification (CL):</b> Per phone call on 18 July 2013, a statement that ensures the project will monitor all data and parameters listed in appendix B should be sufficient instead of individually listing each table and parameter in the PD.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	19 July 2013
As list of parameters available at validation is now provided in Annex 3 in the separate document "130722_Annex 3_Parameters at Validation.docx". For all parameters to be monitored, a reference to the methodology is included in section 4.2 of the PD.	
<b>Evidence used to close CL:</b> Parameters have been included in Appendix III. Addressed.	
<b>Date CL closed:</b>	12 August 2013

**63. Non-Conformance Report (2013\_08\_06 Kariba REDD+ Re-Validation, Standard 3.3, line 159)**

<b>Validation</b>	
<b>VCS Criteria:</b> VCS Standard 3.3 Requirements, 3.17.1 Data and Parameters - Data and parameters used for the quantification of GHG emission reductions and/or removals shall be provided in accordance with the methodology.	
<b>Evidence Used to Assess Conformance:</b> PD Section 4.1	
<b>Findings:</b> The data and parameters given in Section 4.1 do not match what is required in Appendix B of the Methodology. Because the project is no longer deviating, these should match, with minor exceptions.	
<b>Non-conformance report (NCR):</b> The data and parameters given in Section 4.1 do not match what is required in Appendix B of the Methodology. Because the project is no longer deviating, these should match, with minor exceptions. Please address.	
<b>Date issued:</b>	19 July 2013
<b>Project proponent response/actions:</b>	
<b>Date Received:</b>	19 July 2013
As list of parameters available at validation is now provided in Annex 3 in the separate document "130722_Annex 3_Parameters at Validation.docx". For all parameters to be monitored, a reference to the methodology is included in section 4.2 of the PD.	
<b>Evidence used to close NCR:</b> The list of parameters in Annex 3 now included in the PD satisfies the requirement. Addressed.	
<b>Date NCR closed:</b>	12 August 2013

64. Clarification (2013\_08\_06 Kariba REDD+ Re-Validation, Standard 3.3, line 194)

<b>Validation</b>	
<p><b>VCS Criteria:</b> VCS Standard 3.3 Requirements, 4.1.6 Where methodologies mandate the use of specific models to simulate processes that generate GHG emissions (ie, the project proponent is not permitted to use other models), the following applies, given the note below:</p> <ol style="list-style-type: none"> <li>1) Models shall be publicly available, though not necessarily free of charge, from a reputable and recognized source (eg, the model developer’s website, IPCC or government agency).</li> <li>2) Model parameters shall be determined based upon studies by appropriately qualified experts that identify the parameters as important drivers of the model output variable(s).</li> <li>3) Models shall have been appropriately reviewed and tested (eg, ground-truthed using empirical data or results compared against results of similar models) by a recognized, competent organization, or an appropriate peer review group.</li> <li>4) All plausible sources of model uncertainty, such as structural uncertainty or parameter uncertainty, shall be assessed using recognized statistical approaches such as those described in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1, Chapter 3.</li> <li>5) Models shall have comprehensive and appropriate requirements for estimating uncertainty in keeping with IPCC or other appropriate guidance, and the model shall be calibrated by parameters such as geographic location and local climate data.</li> <li>6) Models shall apply conservative factors to discount for model uncertainty (in accordance with the requirements set out in Section 4.1.4), and shall use conservative assumptions and parameters that are likely to underestimate, rather than overestimate, the GHG emission reductions or removals.</li> </ol> <p>Note – The criteria set out in (2)-(6) above are targeted at more complex models. For simple models, certain of these criteria may not be appropriate, or necessary to the integrity of the methodology. Such criteria may be disregarded, though the onus is upon the methodology developer to demonstrate that they are not appropriate or necessary.</p>	
<b>Evidence Used to Assess Conformance:</b> General PD	
<b>Findings:</b> The uncertainty of models used by the proponent needs to be addressed by the proponent for clarification.	
<b>Clarification (CL):</b> Please clarify a response to 4.)All plausible sources of model uncertainty, such as structural uncertainty or parameter uncertainty, shall be assessed using recognized statistical approaches such as those described in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1, Chapter 3.	
<b>Date issued:</b>	12 August 2013
<b>Project proponent response/actions:</b>	<b>Date Received:</b> 13 August 2013
The only own models that the project applies which are not fully defined by the methodology are the allometric equations. The selection of allometric equations follows section 13.13 of the methodology. All applied allometric equations are taken from peer-reviewed literature that has been conducted in the geographic proximity of the project area. This satisfies the VCS Standard requirements as set out in section 3.1.4 and 4.1.6.	
<b>Evidence used to close CL:</b> All of the proponents allometric equations have been peer reviewed. This along with uncertainty discussed in the models allows for the reasonable assurance that plausible sources of model uncertainty have been addressed. Addressed.	
<b>Date CL closed:</b>	13 August 2013



APPENDIX B – DOCUMENTS RECEIVED AND REVIEWED

Documents received 03/29/2012

- 120328\_Kariba\_Remote\_Sensing\_PD\_Annex.doc
- 120328\_Kariba VCS PD.docx
- 120328 Annex

Documents received 04/16/2012

- WorkPapEnvSci\_2011\_05.pdf
- 120321\_email VCS on AFOLU 3.2.png
- 120328\_Kariba VCS PD.docx
- 120328\_Kariba\_Remote\_Sensing\_PD\_Annex.doc

Documents received 04/17/12

- 20120417\_Kariba\_Remote\_Sensing\_GLOSSARY.pdf

Documents received 04/20/2012

- BINGA edited kml.kml
- HURUNGWE 1.kml
- MBIRE EDITED kml.kml
- NyamiNyami edited kml.kml

Documents received 04/23/2012

- Kariba\_Map\_Plots\_West.PNG
- Kariba\_Map\_Plots\_East.PNG

Documents received 04/24/2012

- Project-Area\_Forests.rar
- 120328\_Annex
- Kariba\_ground truth points
- Kariba-Project-Area\_Forests
- Maps
- Kariba\_ground truth points.rar
- Kariba\_List\_Ground truth points.xlsx
- 120320\_PROCEDURE MANUAL FOR TREE DATA COLLECTION FINAL.pdf

Documents received 05/02/2012

- NyamiNyami\_Gokwe\_Confusion\_Matrix.rar
- Binga\_Confusion\_Matrix
- Hurungwe\_Confusion\_Matrix
- Mbire\_Confusion\_Matrix
- NyamiNyami\_Gokwe\_Confusion\_Matrix
- Binga\_Confusion\_Matrix.rar
- Hurungwe\_Confusion\_Matrix.rar
- Mbire\_Confusion\_Matrix.rar

Documents received 05/24/12

- Hurungwe2011\_Forest\_NEW.kml
- Hrungrwe2011\_Forest\_KML\_SHP.rar
- Hrungrwe2011\_Forest\_NEW.dbf
- Hrungrwe2011\_Forest\_NEW.prj
- Hrungrwe2011\_Forest\_NEW.qpj
- Hrungrwe2011\_Forest\_NEW.shp
- Hrungrwe2011\_Forest\_NEW.shx

Documents received 06/20/2012

- KML & Shapefiles.zip
- 119,200,201,202
- 199
- 120423\_Maps
- 120502\_Accuracy
- KML & Shapefiles
- 5,28.zip
- 7.zip
- 34.zip
- 36.zip
- 37.zip
- 40.zip
- 43,46.zip
- 50,51.zip
- 67.zip
- 68, 72 & 74.zip
- 69.zip
- 110,131,191.zip
- 119,200,201,202.zip
- 122.zip
- 164,165.zip
- 197.zip
- 199.zip
- 120423\_Maps.zip
- 120502\_Accuracy.zip
- 120510\_Cumulative Deforestation Model.zip
- 120620\_Kariba VCS PD.docx
- 120620\_Kariba VCS PD\_track&change.docx
- 120620\_Kariba\_REDD+\_FINAL\_NCRs CLs\_16\_May\_2012.xlsx
- 120620\_Leakage.zip
- Ex-ante calculation.zip

Documents received 06/26/2012

- Addition to PD methodology annex for remote sensing.pdf

Documents received 07/22/12

- NyamiNyami\_Forest\_v2.0.rar
- Repair class

Documents received 07/23/12

- Point 6 - Landsat.jpgw
- Point 6 - Google Earth.JPG
- Point 6 - Landsat.jpg

Documents received 07/26/2012

- 120726\_SP\_Explanation\_NyamiNyami.pdf

Documents received 07/27/2012

- visual validation.rar
- 200\_points\_regular\_random\_grid KML.kml



- 250ha\_buffers\_KML.kml
- Project+Reference PolygonsKML.kml
- visual validation KML files.zip

Document received 07/31/12

- Shawn 05th of June\_Landsat2011.png
- concern\_shawn\_bingas.KML
- Kariba\_Leakage\_Area\_KML.kml
- Kariba\_Leakage\_Area\_KML.rar
- Shawn 05th of June\_Example.png
- Shawn 05th of June\_Example\_Classification.png
- Shawn 05th of June\_Example\_GE2007.png
- Shawn 05th of June\_Landsat2003.png
- Shawn 05th of June\_Landsat2009.png

Documents received 08/07/2012

- Shrubland\_Biomass Plot.rar
- SAM\_0247.AVI

Documents received 08/15/2012

- Gokwe\_North\_SE\_KML.kml
- 120815\_Binga\_Reclassification\_Accuracy
- 120815\_Binga\_Reclassification\_Accuracy.zip
- Gokwe\_North\_SE.jpg

Documents received 08/21/2012

- Model.zip
- 208
- GIS files
- 58.zip
- 68, 72 & 74.zip
- 197.zip
- 199.zip
- 201,202.zip
- 208.zip
- 120821\_Kariba VCS PD\_track&change.docx
- 120821\_KaribaREDD\_NCRs.xlsx
- Ex-ante calculation.zip
- GIS files.zip
- Leakage,article.zip

Documents received 08/23/2012

- 120821\_Kariba VCS PD\_track&change.docx
- 120821\_Kariba VCS PD.docx

Documents received 08/30/2012

- KARIBA FOREST COVERS.zip
- 120820\_KARIBA ER Calc\_auditors.xls
- 120830\_CDM\_Kariba.xlsx

Documents received 09/04/2012

- PROJ\_DESC\_562\_31JAN2011.pdf

Documents received 09/07/2012

- NCR 148.zip

- MACOSX
- 55
- 59
- 197
- CDM
- Ex-ante calculation
- NCR 29
- NCR 99
- NCR 148
- 59.zip
- 197.zip
- 2012\_08\_31\_KaribaREDD+\_Round3\_NCRsCLs\_Final\_SP 120907.xlsx
- 120907\_Kariba VCS PD.docx
- 120907\_Kariba VCS PD\_track&change.docx
- CDM.zip
- Ex-ante calculation.zip
- NCR 29.zip
- NCR 99.zip

Documents received 09/18/2012

- Kariba Map draft.PNG
- Kariba Map draft 2 - lines same color.PNG

Documents received 09/19/2012

- NCR 148.zip
- 2012\_17\_09\_KaribaREDD+\_Round4\_NCRsCLs\_Final\_SP.xlsx
- 120919\_Kariba VCS PD\_FINAL.docx
- NCR 67.zip

Documents received 09/24/2012

- NCR 148.zip
- Appendix contracts 30 years
- NCR 67
- NCR 148
- 2012\_17\_09\_KaribaREDD+\_Round4\_NCRsCLs\_Final\_SP.xlsx
- 120923\_Kariba VCS PD\_FINAL.docx

Documents received 09/28/2012

- 120929\_Kariba VCS PD\_FINAL\_v1.docx
- 120929\_KARIBA ER Calc\_auditors.xls
- 120929\_Kariba VCS PD\_FINAL.docx

Documents received 09/29/2012

- 120929\_Kariba VCS PD\_FINAL\_v2.docx
- 120929\_KARIBA ER Calc\_auditors.xls

Documents received 06/06/2013

- 130606\_Topics ESI call\_tsi.docx

Documents received 06/12/2013

- 130612\_Description approach\_final.docx

Documents received 06/17/2013

- 130612\_Description approach\_final.docx

Documents received 06/18/2013

- 2006\_GeoTIFF\_imagery.rar
- Submission\_Point\_Sample.rar
- example\_screenshots.rar
- MR
  - 130617\_MR\_Kariba\_M1\_V5.docx
  - 130617\_CDM\_and\_Leakage\_Model\_V3.xlsx
  - 130617\_KARIBA\_ER\_MP\_1\_V6.xls
- PD
  - 130618\_Kariba\_VCS\_PD\_V7.docx
  - 130618\_Kariba\_Forest\_Map\_SOPs.docx
  - GIS\_files
  - 130617\_Forest\_state\_observations\_full\_sample.xlsx
  - 130617\_Forest\_state\_observations\_pilot\_sample.xlsx
  - 130618\_KARIBA\_ER\_Calc\_Ex-ante\_V2.xls

Documents received 06/19/2013

- \IMG.pdf

Documents received 06/21/2013

- 130620\_Leakage\_plots\_and\_lag\_factor\_V4.xls

Documents received 06/26/2013

- Biomass\_supplement\_(60)\_maps.rar
- 130626\_Proposal\_for\_improving\_Kariba\_REDD\_plot\_network\_final.docx

Documents received 07/03/2013

- Re\_Sampling\_points\_call.msg
- 130703\_Sample\_size\_change\_detection\_final.xlsx

Documents received 07/04/2013

- Re\_Clarification\_of\_change\_detection\_and\_allocation\_of\_biomass\_plots.msg
- 130704\_Sample\_size\_change\_detection\_final\_v2.xlsx

Documents received 07/08/2013

- Submission\_Point\_Sample.rar
- How\_to\_use\_the\_Wildlife\_Works\_toolbar.pdf
- Merge\_Grid\_2000-2011.rar
- Re\_Call\_agenda.msg

Documents received 07/09/2013

- Re\_Clarification\_of\_change\_detection\_and\_allocation\_of\_biomass\_plots.msg

- 130709\_Sample\_size\_change\_detection\_final\_v3.xlsx

Documents received 07/20/2013

- Mbire\_170\_71\_2000.rar
- PD
  - 130621\_Kariba\_VCS\_PD\_V7.docx
  - 130621\_KARIBA\_ER\_Calc\_Ex-ante\_V2.xls
  - GIS\_files
  - 130617\_Forest\_state\_observations\_full\_sample.xlsx
  - 130617\_Forest\_state\_observations\_pilot\_sample.xlsx
  - 130618\_Kariba\_Forest\_Map\_SOPs.docx

- 130621\_Kariba\_5<sup>th</sup>\_submission

- MR
  - MP(WORKING)\_130621\_KARIBA\_ER\_MP\_1\_V6.xls
  - 130620\_Leakage\_plots\_and\_lag\_factor\_V4.xls
  - 130621\_CDM\_and\_Leakage\_Model\_V3.xlsx
  - 130621\_KARIBA\_ER\_MP\_1\_V6.xls
  - 130621\_MR\_Kariba\_M1\_V5.docx

- PD
  - 130621\_Kariba\_VCS\_PD\_V7.docx
  - 130621\_KARIBA\_ER\_Calc\_Ex-ante\_V2.xls
  - 130621\_Kariba\_5th\_submission\PD\supporting\_docs\GIS\_files
  - 130617\_Forest\_state\_observations\_full\_sample.xlsx
  - 130617\_Forest\_state\_observations\_pilot\_sample.xlsx
  - 130618\_Kariba\_Forest\_Map\_SOPs.docx

Documents received 07/12/2013

- Pilot\_Sample.rar
- \How\_to\_use\_the\_Wildlife\_Works\_toolbar.pdf

Documents received 07/17/2013

- weight\_calculation.xlsx
- 1307\_17\_Forest\_state\_observations\_pilot\_sample.xlsx
- Kariba\_Adding\_random\_points\_to\_forest\_state.pdf

- Kariba\_How was the 2605 point grid created.pdf
- Documents received 07/18/2013
  - Step01 - Additional Grid.PNG
  - closest case.PNG
  - Leakage Area Map.png
  - New points-blue.PNG
- Documents received 07/19/2013
  - \example\_3187\_point\_grid.rar
- Documents received 07/23/2013
  - 130723\_significance\_test\_VIG.docx
  - 130722\_models\_fitted\_data\_used\_FR.docx
  - 130723\_equation7\_without\_pop.docx
- Documents received 07/31/2013
  - PD
    - ESI\_130730\_2013\_07\_18\_KaribaREDD+\_Preliminary\_Re-Validation\_NCRs\_REPLY.xlsx
    - 130730\_2013\_07\_18\_KaribaREDD+\_Preliminary\_Re-Validation\_NCRs\_REPLY.xlsx
    - 130731\_CDM and Leakage Model\_V5.xlsx
    - 130731\_Kariba VCS PD\_V9.docx
    - 130731\_Leakage plots and lag factor\_V5.xls
    - 130730\_KARIBA ER Calc\_Ex-ante\_V4.xlsx
    - 121130\_SOP leakage area data collection.pdf
    - 121130\_Leakage plot data sheet.xls
    - 130731\_models\_fitted\_data\_used.docx
    - 130731\_Connection Observed Deforested Area & Population.xlsx
- Documents received 08/02/2013
  - 130723\_equation7\_without\_pop.docx
  - 130624 Kariba 6<sup>th</sup> submission re-validation
    - 130724\_Kariba VCS PD\_V8.docx
    - 130722\_Annex 3\_Parameters at Validation.docx
    - 130723\_CDM and Leakage Model\_V4.xlsx
    - 130724\_2013\_07\_18\_KaribaREDD+\_Preliminary\_Re-Validation\_NCRs\_REPLY.xlsx
    - Walker & Desanker 2004.pdf
- 130722\_Forest state observations full sample\_FR.xlsx
- 130722\_Forest state observations pilot sample.xlsx
- 130722\_Soil carbon model ex\_ante.xlsx
- 130723\_KARIBA ER Calc\_Ex-ante\_V3.xlsx
- 130724\_SOP FOR TREE DATA COLLECTION FINAL.doc
- 130724\_Connection Observed Deforested Area & Population.xlsx
- Database\_STATGRAPHICS
- 30722\_models\_fitted\_data\_used.docx
- 130723\_Answer to the auditor\_FR.docx
- GIS & Forest State Observations
  - Full Sample
  - Pilot Sample
- 130802 Updated PD (full sample correction)
  - 130802\_Kariba VCS PD\_V9.docx
  - 130802\_Annex 3\_Parameters at Validation.docx
  - 130802\_Leakage plots and lag factor\_V5.xls
  - 130802\_Forest state observations full sample.xlsx
- Documents received 08/16/2013
  - PD
    - 130816\_Kariba Benefit sharing.pdf
    - 130816\_Kariba VCS PD\_V11.docx
    - 130816\_Kariba VCS PD\_V11.pdf