



**Verified Carbon  
Standard**

# GUANGXI HUANJIANG IFM (CONVERSION OF LOGGED TO PROTECTED FOREST) PROJECT



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|                          |                                                                                                                                                             |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Title</b>     | Guangxi Huanjiang IFM (conversion of logged to protected forest) Project                                                                                    |
| <b>Version</b>           | 06                                                                                                                                                          |
| <b>Report ID</b>         |                                                                                                                                                             |
| <b>Date of Issue</b>     | 27-Jan-2023                                                                                                                                                 |
| <b>Project ID</b>        | 2327                                                                                                                                                        |
| <b>Monitoring Period</b> | 01-Jul-2016 to 31-Dec-2020                                                                                                                                  |
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# 1 PROJECT DETAILS

## 1.1 Summary Description of the Implementation Status of the Project

The Guangxi Huanjiang IFM (conversion of logged to protected forest) Project (hereafter “the project activity”) is implemented in Huanjiang Maonan Autonomous County, Hechi City, Guangxi Zhuang Autonomous Region of China by Huanjiang Maonan Autonomous County Huashan Forestry Investment Co., Ltd, the geo-coordinate of the project is 107°51'E~108°43'E and 24°44'N~25°33'N, which includes the Improved Forest Management (IFM) of the forests in the conversion of logged to protected forest.

The area of the project activity is 9,346.72 ha, including 1,306 subcompartments spreading over Huashan forest farm, Chuanshan Town, Dongxing Town, Luoyang Town, Minglun Town, Shuiyuan Town, Si'en Town, Da'an Township, Lonyan Township, Tiancai Township, Xianan Township, Xunle Township, Changmei Township of Huanjiang Maonan Autonomous County. All these forests are state-owned forests or privately-owned or collective-owned, and have the legal right to forest ownership. All the owners authorized the project proponent to access the project to their behalf. The species involved in the project are Broad-leaved tree (e.g. *Castanopsis hystrix*, Oak, *Schima Wallichii*, Acacia, Other soft Broad-leaved tree, etc), Chinese fir and *Pinus massoniana*. The forest of the project was older plantations or natural forest under managing. The age of Broad-leaved tree was 17-87, Chinese fir was 13-59, *Pinus massoniana* was 13-52. Before the implantation of the project, the usual type of management was clearcutting.

Before the implementation of the project activity, the trees are logged based on a valid and verifiable government-approved timber management plan for harvesting the project area. The implementation of the project activity converses the trees to protected forest to reduce the GHG emissions for about 1,669,732 tCO<sub>2</sub>e in 20 years, the average annual emission reduction is 83,486 tCO<sub>2</sub>e and Verified Carbon Units with buffer deduction is about 1,285,683 tCO<sub>2</sub>e in 20 years, and average annual VCU with buffer deduction is 64,284 tCO<sub>2</sub>e. The project generate 707,901 tCO<sub>2</sub>e emission reductions within the crediting period from 01-Jul-2016 to 31-Dec-2020 with the average annual emission reductions of 157,311tCO<sub>2</sub>e. And total GHG emission reductions or removals with buffer deduction is about 545,081 tCO<sub>2</sub>e within the crediting period from 01-Jul-2016 to 31-Dec-2020, the average annual GHG emission reductions or removals with buffer deduction is 121,129 tCO<sub>2</sub>e.

The project activity will contribute to the environment (biodiversity conservation, rocky desertification prevention and soil erosion control), thus contribute to sustainable development.

## 1.2 Sectoral Scope and Project Type

Sectoral scope 14 (AFOLU)

Improved Forest Management: Logged to Protected Forest (LtPF)

This project is not relevant to the grouped project; there is no new instance of the project activity. And, the project consists of a single project activity instance.

### 1.3 Project Proponent

|                          |                                                                         |
|--------------------------|-------------------------------------------------------------------------|
| <b>Organization name</b> | Huanjiang Maonan Autonomous County Huashan Forestry Investment Co., Ltd |
| <b>Contact person</b>    | Tan Hongtao                                                             |
| <b>Title</b>             | General Manager                                                         |
| <b>Address</b>           | No.45 Qiaoxi Road, Si'en Township, Huanjiang Maonan Autonomous County   |
| <b>Telephone</b>         | +86 18977823339                                                         |
| <b>Email</b>             | hjl8870101@163.com                                                      |

### 1.4 Other Entities Involved in the Project

|                          |                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Organization name</b> | Guangzhou Guangtan Carbon Emission Development & Investment Co., Ltd                                                        |
| <b>Role</b>              | Authorized Representative                                                                                                   |
| <b>Contact person</b>    | Qian Jian                                                                                                                   |
| <b>Title</b>             | Vise General Manager                                                                                                        |
| <b>Address</b>           | Room 801, Pearl River International Building, No.112 Yuehua Road, Yuexiu District, Guangzhou, Guangdong Province, P.R.China |
| <b>Telephone</b>         | +86 20 83173681                                                                                                             |
| <b>Email</b>             | info@gzguangtan.com                                                                                                         |

Guangzhou Guangtan Carbon Emission Development & Investment Co., Ltd is a company specializing in developing AFOLU projects, established by a team that has been engaged in AFOLU projects for many years on 02-Jun-2016. The team's success cases include Facilitating Reforestation for Guangxi Watershed Management in Pearl River Basin Project (CDM), Guangxi Daguishan Afforestation Project (CCER), Inner Mongolia Keyihe IFM (conversion of logged to protected forest) Project (VCS), etc. As the project proponent, Huanjiang Maonan Autonomous County Huashan Forestry Investment Co., Ltd need commission a profession company to apply the emission reductions from their IFM project activity using

VCS standard, so Huanjiang Maonan Autonomous County Huashan Forestry Investment Co., Ltd commissioned Guangzhou Guangtan Carbon Emission Development & Investment Co., Ltd. According to the communication agreement signed by Guangzhou Guangtan Carbon Emission Development & Investment Co., Ltd and Huanjiang Maonan Autonomous County Huashan Forestry Investment Co., Ltd, Guangzhou Guangtan Carbon Emission Development & Investment Co., Ltd is the Authorized Representative who is authorized to communicate and transact with Verra on behalf of Huanjiang Maonan Autonomous County Huashan Forestry Investment Co., Ltd,

The Authorized Representative is authorized to undertake the following scope of activities on behalf of the Registry Users with regard to the registration of the Project in, and submission of Project-related data to, the Registry:

- (a) communicating with and providing instructions to Verra;
- (b) registering Project in the Authorized Representative's Registry Account;
- (c) submitting the Project's activity and reports to the Registry;
- (d) requesting issuance of Instruments;
- (e) making transfers of Instruments;
- (f) making payments on behalf of Registry Users; and
- (g) submitting, discussing, amending and doing any other such necessary thing in relation to reports and documents required from Project Proponents under the Operative Documents as set out and amended from time to time on Verra's website.

The project proponent will abide by any direction duly issued by Verra to the Authorized Representative.

## 1.5 Project Start Date

The project start date is 01-Jul-2016.<sup>1</sup>

This is according to the Notice of Guangxi Huanjiang IFM (Conversion of Logged to Protected Forest) Project issued by Huangjiang Maonan Autonomous County Forestry Bureau on 28-Dec-2015. The Notice stipulated that in order to implement Guangxi Huanjiang IFM (conversion of logged to protected forest) Project, commercial logging would be strictly forbidden and forest protection would be implemented from 01-July-2016. Since the project start date, the project activity includes the Improved Forest Management (IFM) of the forests are all converted to protected forests and prevent any commercial logging.

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<sup>1</sup> This is according to the Notice of Guangxi Huanjiang IFM (Conversion of Logged to Protected Forest) Project issued by Huanjiang Maonan Autonomous County Forestry Bureau on December 28, 2015

## 1.6 Project Crediting Period

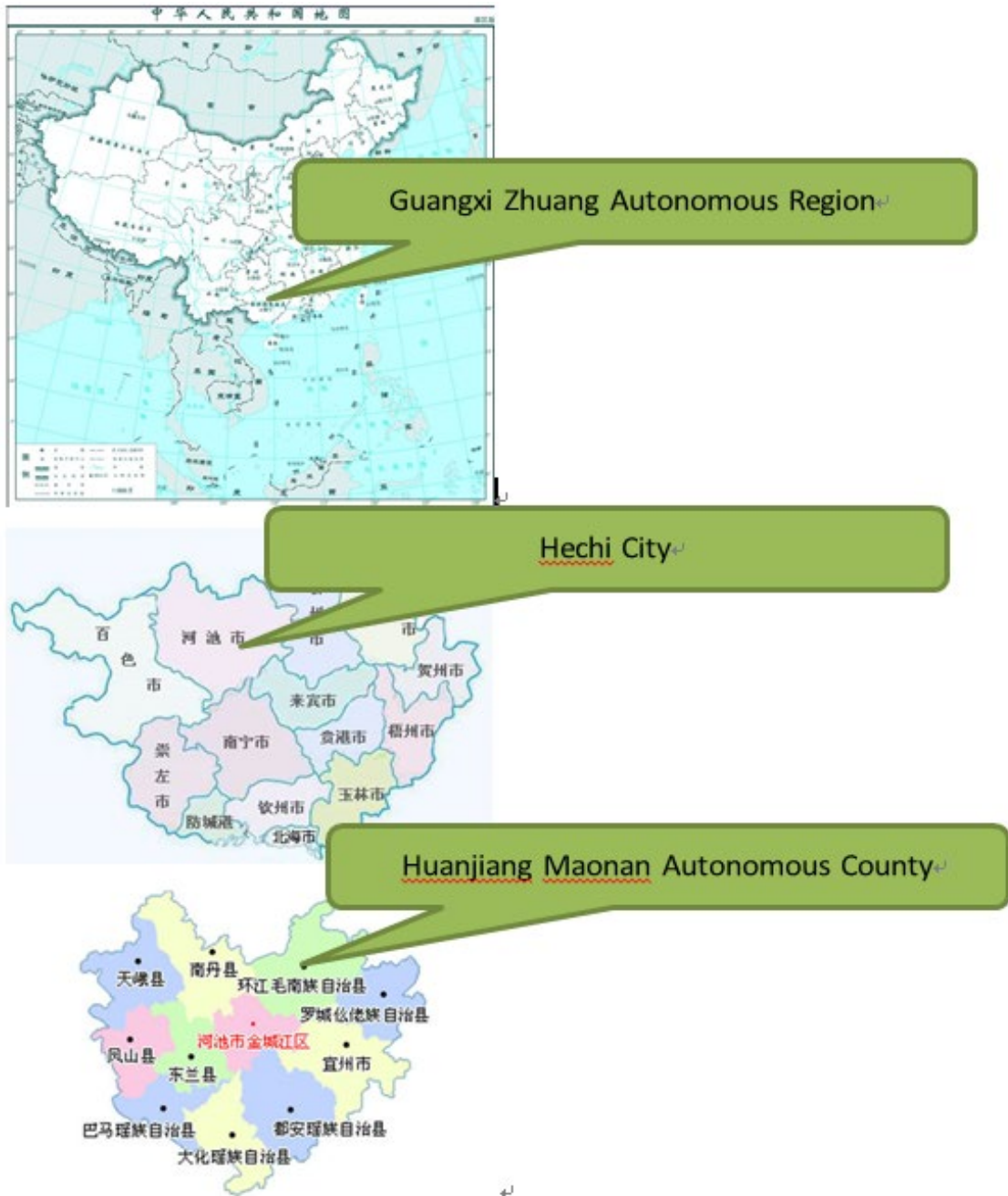
According to VCS Standard version 4.1, the start date of the project activity is 01-July-2016, which is indicated in the notice on the forbidding commercial logging was issued by Huangjiang Maonan Autonomous County Forestry Bureau on 28-December-2015. It is indicated in this notice issued by local forest authority that from 01-July-2016 the commercial timber harvest was strictly forbidden within the project boundary. Therefore, the project crediting period is from 01-July-2016 to 30-June-2036 with the total length of 20 years, indicated in the VCS development consultation and service agreement.

According to the owner's forest ownership document, each owner had more than 60 years of ownership of forest in the project site since the project started. Therefore, the project lifetime can be considered as at least 30 years base on conservative principles.

## 1.7 Project Location

The project is located in Huanjiang Maonan Autonomous County, Hechi City, Guangxi Zhuang Autonomous Region of P.R.China. The geo-coordinate range of the project is  $107^{\circ}51'E \sim 108^{\circ}43'E$  and  $24^{\circ}44'N \sim 25^{\circ}33'N$ . There are 1,306 subcompartments spreading over Huashan forest farm, Chuanshan Town, Dongxing Town, Luoyang Town, Minglun Town, Shuiyuan Town, Si'en Town, Da'an Township, Lonyan Township, Tiancai Township, Xianan Township, Xunle Township, Changmei Township of Huanjiang Maonan Autonomous County.

The schematic diagram of the location of the project is shown in figure 1 below:





- Tool for “AFOLU Non-Permanence Risk Analysis”, V4.0

## 1.9 Participation under other GHG Programs

### 1.9.1 Projects Registered (or seeking registration) under Other GHG Program(s)

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

### 1.9.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

## 1.10 Other Forms of Credit

### 1.10.1 Projects Registered (or seeking registration) under Other GHG Program(s)

N/A

### 1.10.2 Projects Rejected by Other GHG Programs

The project has neither intends to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program, nor any such credit has been or will be cancelled from the relevant program.

## 1.11 Sustainable Development

The Project contributes to achieving sustainable development goals in the following aspects:

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>The project area is located in Huanjiang Maonan Autonomous County, 9,346.72 ha of forest is to be protected. The project will generate GHG emission removals and mitigate climate change. During the monitoring period, it was estimated that the project generated GHG emission removals of 707,901 tCO<sub>2</sub>e over a GHG within the crediting period from 01-Jul-2016 to 31-Dec-2020. Accounting Period of 4.5 years, with average annual GHG emission removals of 157,311 tCO<sub>2</sub>e. Through this project, it is possible to demonstrate that China is taking specific afforestation activities to achieve sustainable development climate action goals</p>                                                                                                                 |
|  | <p>Creating new job opportunities and contributing to local economic prosperity. In particular, the job opportunities offered to them will significantly change their living style and build community capacity in gender and sustainable forest management. By being trained with the forestation skills and participating the community activities together with other employees, women may gain more happiness compares to doing housework only, thus positive welfare outcomes for local households are more likely to be expected. Through this project, it can illustrate China's goal of achieving sustainable development, decent work and economic growth by helping people in poverty-stricken areas to create jobs and provide wages through specific afforestation activities.</p> |

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Protect the sustainable use of terrestrial ecosystems, combat desertification, halt and reverse land degradation and halt the loss of biodiversity. Through this project, it can be shown that China is achieving the goal of sustainable development of protecting terrestrial life through specific forest protection activities to protect biodiversity and increase animal habitats.</p> |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 2 SAFEGUARDS

### 2.1 No Net Harm

An Environmental Impact Assessment (EIA) is not required for logged to protected forest projects according to Construction project classification management of environmental impact assessment list. The key mitigation action of the project activity is avoiding the illegal harvest of the forest, which can protect and improve the surviving environment, keep the ecological balance, save the species resources and enhance homeland security.

According to the guideline of the General Office of the State Council on improving the compensation mechanism for ecological protection<sup>2</sup>, the commercial logging subsidy and reward funds will be stopped, and the dynamic adjustment mechanism of forest compensation standards will be improved to improve the management and protection mechanism of forest, which mainly relies on government purchase of services. In this way, this will make up for the loss of timber harvest income for the foresters, as well as an additional income when the VCUs are sold.

Therefore, there is no potential negative environmental or socio-economic impact due to the project.

### 2.2 Local Stakeholder Consultation

Questionnaires were distributed by the project proponent to the residents who lives in the community and closely related to the project. The questions aimed to find out their concerns and opinions about the project. The questionnaires covered areas of economic, social benefit and environmental effect etc. The content of the questionnaire includes the following information :

1. The purpose of the questionnaire
2. Basic information of the participants
3. Questions
  - 1) Do you know the proposed project?

<sup>2</sup>[http://www.gov.cn/zhengce/content/2016-05/13/content\\_5073049.htm](http://www.gov.cn/zhengce/content/2016-05/13/content_5073049.htm)

- 2) What do you think the proposed project will bring to you?
- 3) Do you support the implementation of the proposed project?
- 4) What is your concern about the proposed project?
- 5) What is your opinion and suggestion regarding the proposed project?

#### Basic information of the interviewee

| Gender | Age | Education Level      | Position                         |
|--------|-----|----------------------|----------------------------------|
| M      | 51  | Primary Education    | Forester                         |
| M      | 45  | Middle School Degree | Staff of Huashan Forestry Farm   |
| M      | 48  | Middle School Degree | Staff of Huashan Forestry Farm   |
| M      | 61  | High School Degree   | Villager committee               |
| M      | 35  | Middle School Degree | Forester                         |
| M      | 41  | Middle School Degree | Forester                         |
| M      | 40  | Middle School Degree | Forester                         |
| M      | 35  | Middle School Degree | Staff of Huashan Forestry Farm   |
| M      | 47  | High School Degree   | Forester                         |
| F      | 32  | Bachelor Degree      | Officer of Local Forestry Bureau |
| M      | 35  | Middle School Degree | Staff of Huashan Forestry Farm   |
| M      | 44  | Middle School Degree | Forester                         |
| F      | 44  | Middle School Degree | Forester                         |
| M      | 29  | College Degree       | Officer of Local Forestry Bureau |
| F      | 31  | College Degree       | Officer of Local Forestry Bureau |
| M      | 36  | Bachelor Degree      | Officer of Local Forestry Bureau |
| F      | 36  | College Degree       | Villager committee               |
| M      | 65  | Primary Education    | Forester                         |

|   |    |                      |                                  |
|---|----|----------------------|----------------------------------|
| F | 29 | Bachelor Degree      | Villager committee               |
| F | 31 | Bachelor Degree      | Villager committee               |
| M | 52 | Bachelor Degree      | Officer of Local Forestry Bureau |
| M | 30 | Bachelor Degree      | Villager committee               |
| F | 39 | Bachelor Degree      | Staff of Huashan Forestry Farm   |
| F | 27 | College Degree       | Staff of Huashan Forestry Farm   |
| F | 54 | Middle School Degree | Forester                         |
| M | 28 | Bachelor Degree      | Officer of Local Forestry Bureau |
| F | 26 | Bachelor Degree      | Officer of Local Forestry Bureau |
| M | 47 | Middle School Degree | Forester                         |
| F | 26 | Bachelor Degree      | Officer of Local Forestry Bureau |
| F | 30 | Bachelor Degree      | Officer of Local Forestry Bureau |
| M | 46 | Middle School Degree | Forester                         |
| M | 50 | Middle School Degree | Forester                         |
| M | 48 | College Degree       | Staff of Huashan Forestry Farm   |
| M | 50 | College Degree       | Staff of Huashan Forestry Farm   |
| M | 47 | College Degree       | Staff of Huashan Forestry Farm   |
| F | 40 | College Degree       | Villager committee               |
| M | 46 | College Degree       | Villager committee               |
| M | 39 | Middle School Degree | Forester                         |
| F | 36 | High School Degree   | Forester                         |
| M | 40 | High School Degree   | Forester                         |
| M | 40 | Middle School Degree | Forester                         |
| M | 38 | High School Degree   | Staff of Huashan Forestry Farm   |
| F | 25 | College Degree       | Staff of Huashan Forestry Farm   |
| M | 22 | College Degree       | Villager committee               |
| F | 25 | College Degree       | Villager committee               |

|   |    |                      |                    |
|---|----|----------------------|--------------------|
| M | 27 | Bachelor Degree      | Villager committee |
| F | 30 | Bachelor Degree      | Villager committee |
| M | 35 | Middle School Degree | Forester           |
| M | 36 | Middle School Degree | Forester           |
| M | 39 | Middle School Degree | Forester           |
| F | 35 | College Degree       | Villager committee |
| M | 40 | Middle School Degree | Forester           |

The Survey was conducted through distributing and collecting responses to a questionnaire in Dec 2015. Totally 50 questionnaires returned out of 50 with 100% response. The following is a summary of the key findings based on returned questionnaires.

#### 1. Attitude towards the proposed project

All of them support the implementation of the project, they think the protection of forest instead of cutting is good the environment, and will benefit the sustainable development.

#### 2. The concern about the proposed project

The project could reduce tree logging by more than 300,000m<sup>3</sup> and manage forest effectively, so that it can control soil and water erosion and land degradation, prevent rocky desertification, enhance biodiversity conservation by increasing forest cover and nature habitat connectivity, absorb and fix carbon dioxide every year by conversion of logged to protected forest, and reduce GHG emission.

At the same time, the project will provide thousands of employment opportunities for managing forest.

#### 3. Conclusion

The survey shows that the proposed project is 100% supported by local people. It is because they believe the implementation of the project will bring multiple benefits.

During the implementation of the project, the local forestry bureau would continue to conduct a questionnaire survey among stakeholders to understand their opinions. Since the project is running normally, local stakeholders have no opinion. The local forestry bureau also conducts regular training on ecological forest conservation for stakeholders to ensure better implementation of the project.

- The project design and implementation, including the results of monitoring. It will be announced by the local forestry bureau.
- The risks, costs and benefits the project may bring to local stakeholders.

PP has entered into agreements with various local stakeholders of the project, which are supervised by the local forestry bureau.

- All relevant laws and regulations covering workers' rights in the host country.

The local forestry bureau has publicized to the local stakeholders of the project.

- The process of VCS Program validation and verification and the validation/verification body's site visit.

The validation body's visit has completed in Nov, 2020. The process of validation will be completed before October, 2021 and the process of verification will be completed before October, 2022.

In the current monitoring period, the project sponsor held a coordination mechanism for relevant stakeholders of the project in December 2016, April 2018 and May 2020 respectively to receive suggestions and opinions from stakeholders through WeChat group, telephone, E-mail, interview and meeting, etc. Some of the comments we received from stakeholders in the early stages mainly included the need for more technical and operational training to fully inform communities and farmers about carbon sequestration and whether the project development process could be simplified. In the May 2020 opinion, when the project will be approved and when the project will be profitable are the most important queries from stakeholders.

## 2.3 AFOLU-Specific Safeguards

- *Local stakeholder identification process and a description of results.*

The local stakeholder mainly include state-owned forest farms, collective-owned forestry owners and private forestry owners in Huanjiang Maonan Autonomous County who lives near by the project and the local government. Before start construction, project owner had distributed questionnaires for local stakeholder to investigate the suggestion of them on the construction of the project, including the impact on society, economy and life. 50 investigation questionnaires have been returned, of which, 36% are women, 58% are graduated from high school or inferior school, 100% are elder than twenty years old. According to Chapter II of the Labour Law of the People's Republic of China<sup>3</sup>, workers are not discriminated against in employment on the basis of their ethnic group, race, sex or religious belief. Women enjoy equal rights with men in employment, and employers are prohibited from recruiting minors under the age of 16. As the supervisor of the project, the local forestry Bureau supervised that all parties of the project did not violate laws during the implementation of the project, including labour and criminal laws, so as to avoid discrimination (gender/age/religion) and sexual harassment.

- *Risks to local stakeholders due to project implementation and how the project will mitigate such risks.*

According to agreement between PP and local stakeholders, there is no risk to local stakeholders due to the project implementation.

- *Risks to local stakeholder resources due to project implementation and how the project will mitigate such risks, including the plans to ensure the project will not impact*

<sup>3</sup>[http://www.mohrss.gov.cn/SYrlzyhshbzb/zcfg/flfg/fl/201601/t20160119\\_232110.html](http://www.mohrss.gov.cn/SYrlzyhshbzb/zcfg/flfg/fl/201601/t20160119_232110.html)

*local stakeholder's property rights without the free, prior and informed consent.*

Prior to the implementation of the project, the project proponent and local forestry Bureau held a mobilization meeting about the project activities. The local forestry bureau informed the representatives of each stakeholder to participate the meeting through the forestry stations of each township. The mobilization meeting was held in Jan 2016. The project proponent presented: what the project activity was, the benefit of the local stakeholders, the risks, costs and benefits the project might bring to local stakeholders, the relevant laws and regulations, the rights of workers, the process of VCS Program validation and verification and the validation/verification body's site visit, etc in the meeting. When the project implemented, the local stakeholders could not get timber harvest. But according the agreements signed by the PP and the local stakeholders, the PP would apply the project to VCS project. Then the local stakeholders could live for selling VCUs instead of selling timber harvest. Meanwhile, local forestry bureau would provide more jobs opportunities for the local stakeholders to manage and protect the forest, so as to ensure that the income of stakeholders was increased. So the project will not impact local stakeholder's property rights without the free, prior and informed consent. All the local stakeholders were existed and indicated that they would support the project activity.

- *Processes to ensure ongoing communication and consultation with local stakeholders, including a grievance redress procedure to resolve any conflicts which may arise between the project proponent and local stakeholders.*

Based on participatory rural appraisal tools such as field trips, questionnaires, community meetings and interviews with representative of the local stakeholders, the project activity was evaluated. The results showed that: The project activity could well reflect the livelihood development needs of local stakeholders, and would contribute not only to climate change mitigation, but also to community economic development and environmental protection. Relevant stakeholders such as farmers, communities and governments have put forward useful suggestions for the implementation of the project.

PRA (Participatory Rural Appraisal) will be done every two years, and the local government resolves any conflicts which may arise between the project proponent and local stakeholder according to the relevant law.

The project activity was evaluated based on participatory rural appraisal tools such as field trips, questionnaires, community meetings and interviews with representative of the local stakeholders. The first PRA of the project was implemented from 9-Dec-2016 to 31-Dec-2016. The results showed that: The project activity could well reflect the livelihood development needs of local stakeholders, and would contribute not only to climate change mitigation, but also to community economic development and environmental protection. The second PRA of the project was implemented from 16-Apr-2018 to 12-May-2018. There were some suggestions from the stakeholders such as: More technical and operational training is needed to give communities and farmers a comprehensive understanding of carbon sinks, whether the project development process could be simplified, etc. The third PRA of the project was implemented from 8-May-2020 to 06-Jun-2020. The education level of local community residents is not high. Few of them have graduated from university. When the project will be approved and when the

project will be profitable is the most important inquiries for the stakeholders. And the same questions were asked to the VVB at the verification meeting with the VVB.

## 3 IMPLEMENTATION STATUS

### 3.1 Implementation Status of the Project Activity

- From 01-Jul-2016, the forests owner decided to converse the forest from logged to protected forest to improve the carbon stock. In the subsequent implementation, the forests are well protected without any harvest or disturbance.
- As the project activity area contains different forest types or forests with different carbon density, stratification is carried out in order to improve the accuracy and precision of carbon stock estimates. Based on the availability of data regarding the nature and composition of forest stocks in the project area, stratification is developed on the basis of existing vegetation stratification, where these are documented in the legal right to harvest. In the VCS-PD, 3 strata with the total area of 9,364.72 ha are specified according to the tree species.
- For the Non-permanence Risk, according to AFOLU Non-Permanence Risk Tool: VCS Version 4.0, the risks are analyzed in Non-permanence Risk Report. The risk value is 23.

### 3.2 Deviations

#### 3.2.1 Methodology Deviations

There is no methodology deviation applicable to the project activity during this monitoring period.

#### 3.2.2 Project Description Deviations

There is no project description deviations applied during this monitoring period.

### 3.3 Grouped Projects

This project is not relevant to the grouped project; there is no new instance of the project activity.

## 4 DATA AND PARAMETERS

### 4.1 Data and Parameters Available at Validation

|                  |                |
|------------------|----------------|
| Data / Parameter | $V_{l,j,i,sp}$ |
| Data unit        | $m^3$          |

|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                                                                                  | Merchantable volume for tree <i>l</i> of species <i>j</i> in sample plot <i>sp</i> in stratum <i>i</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Source of data                                                                               | <p>Calculated from volume tables or equations linking diameter at breast height (DBH, at typically 1.3 m aboveground level), and merchantable height (MH), to commercial (merchantable) volume of trees in the sample plots above the minimum DBH set in the timber harvest plan.</p> <p>If locally derived equations or yield tables are not available use relevant regional, national or default equations from IPCC literature, national inventory reports or published peer-reviewed studies– such as those provided in Tables 4.A.1 to 4.A.3 of the GPG-LULUCF (IPCC 2003).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Value applied                                                                                | See the detailed excel spreadsheet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Justification of choice of data or description of measurement methods and procedures applied | <p>It is necessary to verify the applicability of equations used. Allometric equations can be verified by both:</p> <ol style="list-style-type: none"> <li>1. Verification of equation conditions</li> </ol> <p>Justification should be provided for the applicability of the equation to the project locations. Such justification should include identification of climatic, edaphic, geographical and taxonomic similarities between the project location and the location in which the equation was derived. Any equation used should have an <math>r^2</math> value of greater than 0.5 (50%) and a <math>p</math> value that is significant (<math>&lt;0.05</math> at the 95% confidence level).</p> <ol style="list-style-type: none"> <li>2. Additional field verification</li> </ol> <p>The following limited measures method must be used for field verification:</p> <p>select at least 10 trees per species distributed across the age range (but excluding trees less than 15 years old for which there is rarely a great relative inaccuracy in equations) ;</p> <p>measure DBH, and height to a 10 cm diameter top or to the first branch;</p> <p>calculate stem volume from measurements; and</p> <p>plot the estimated volume of all the measured trees along with the curve of volume against diameter as predicted by the allometric equation. If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a volume consistently higher than predicted by the equation. The equation may not be used if &gt;75% of the measured trees have a volume lower than the predicted curve. In this instance another equation must be selected.</p> |
| Purpose of Data                                                                              | Calculation of baseline emissions and project emission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Comments                                                                                     | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                                                                                               |                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | CF <sub>j</sub>                                                                                                                                                  |
| Data unit:                                                                                    | tC·td.m. <sup>-1</sup>                                                                                                                                           |
| Description:                                                                                  | Carbon fraction of dry matter for species j                                                                                                                      |
| Source of data:                                                                               | According to VM0010 version 1.3, the default value 0.5 tC·t d.m. <sup>-1</sup> is used and the same value is used in all instances where this parameter is used. |
| Value applied:                                                                                | 0.5                                                                                                                                                              |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                                                                                                              |
| Purpose of Data                                                                               | Calculation of baseline emissions and project emission                                                                                                           |
| Comments:                                                                                     | N/A                                                                                                                                                              |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter: | D <sub>j</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Data unit:        | t d.m. m <sup>-3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Description:      | Basic wood density of species j in t d.m. m <sup>-3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Source of data:   | <p>According to VM0010 version 1.3, it must be chosen with priority from higher to lower preference as follows:</p> <p>National species-specific or group of species-specific values (eg, from National GHG inventory);</p> <p>Species-specific or group of species-specific values from neighboring countries with similar conditions. When species-specific data from neighboring countries is of higher quality, being more representative of the species in the project scenario, it may be preferable to use these values than lower quality national data;</p> <p>Global species-specific or group of species-specific (eg, IPCC 2006 AFOLU Chapter 4 Tables 4.13 and 4.14).</p> <p>Species-specific wood densities may not always be available, and may be difficult to apply with certainty in the typically species rich forests of the humid tropics, hence it is acceptable practice to use wood densities developed for forest types or plant families or species groups.</p> <p>"Land Use Change and Forestry GHG Inventory (2013)" of "Second National Information Notification on China Climate Change" matches the first choice.</p> |

| Value applied:                                                                                | <table border="1"> <thead> <tr> <th>Tree species</th><th>D<sub>j</sub></th></tr> </thead> <tbody> <tr> <td>Broad-leaved tree</td><td>0.482</td></tr> <tr> <td>Chinese fir</td><td>0.307</td></tr> <tr> <td>Pinus massoniana</td><td>0.380</td></tr> </tbody> </table> | Tree species | D <sub>j</sub> | Broad-leaved tree | 0.482 | Chinese fir | 0.307 | Pinus massoniana | 0.380 |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------|-------------------|-------|-------------|-------|------------------|-------|
| Tree species                                                                                  | D <sub>j</sub>                                                                                                                                                                                                                                                        |              |                |                   |       |             |       |                  |       |
| Broad-leaved tree                                                                             | 0.482                                                                                                                                                                                                                                                                 |              |                |                   |       |             |       |                  |       |
| Chinese fir                                                                                   | 0.307                                                                                                                                                                                                                                                                 |              |                |                   |       |             |       |                  |       |
| Pinus massoniana                                                                              | 0.380                                                                                                                                                                                                                                                                 |              |                |                   |       |             |       |                  |       |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                                                                                                                                                                                                                   |              |                |                   |       |             |       |                  |       |
| Purpose of Data                                                                               | Calculation of baseline emissions and project emission                                                                                                                                                                                                                |              |                |                   |       |             |       |                  |       |
| Comments:                                                                                     | N/A                                                                                                                                                                                                                                                                   |              |                |                   |       |             |       |                  |       |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter: | $f_j(X, Y \dots)$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Data unit:        | t d.m. tree <sup>-1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Description:      | Allometric equation(s) for species j linking measured tree variable(s) to aboveground biomass of living trees                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Source of data:   | <p>Equations must have been derived using a wide range of measured variables (eg, DBH, Height, etc.) based on datasets that comprise at least 30 trees. Equations must be based on statistically significant regressions and must have an r<sup>2</sup> that is <math>\geq 0.8</math>.</p> <p>The source of equation(s) must be chosen with priority from higher to lower preference, as available, as follows:</p> <ul style="list-style-type: none"> <li>a) National species-, genus-, family-specific;</li> <li>b) Species-, genus-, family-specific from neighbouring countries with similar conditions (ie, broad continental regions);</li> <li>c) National forest-type specific;</li> <li>d) Forest-type specific from neighbouring countries with similar conditions (ie, broad continental regions);</li> <li>e) Forest type-specific such as those provided Tables 4.A.1 to 4.A.3 of the GPG-LULUCF (IPCC 2003); or in Pearson, T., Walker, S. and Brown, S. 2005. Sourcebook for Land Use, Land-Use Change and Forestry Projects. Winrock International and the World Bank Biocarbon Fund. 57pp.; or in Chave, J., C. Andalo, S. Brown, M. A. Cairns, J. Q. Chambers, D. Eamus, H. Folster, F. Fromard, N. Higuchi, T. Kira, J.-P. Lescure, B. W. Nelson, H. Ogawa, H. Puig, B. Riera, T. Yamakura. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. <i>Oecologia</i> 145: 87-99.</li> </ul> <p>Species-, genus- and family-specific allometric equations may not always be available, and may be difficult to apply with certainty in the typically species rich forests of the humid tropics. Hence it is acceptable practice to use equations developed for regional forest</p> |

|                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                        |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
|                                                                                               | <p>types, provided that their accuracy has been validated with direct site-specific data following guidance given below. If a forest-type specific equation is used, it should not be used in combination with species-specific equation(s) (ie, it must be used for all tree species).</p> <p>The equations are sourced from the data of the Forest Resources Planning and Design Survey Report made by Guangxi Zhuang Autonomous Region Forestry Survey and Design Institute.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                        |
| Value applied:                                                                                | Tree species                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | $f_i(X, Y...)$                                                                         |
|                                                                                               | Broad-leaved tree                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | $0.52750716 \times 10^{-4} \times \text{DBH}^{1.9450324} \times \text{H}^{0.9388533}$  |
|                                                                                               | Chinese fir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | $0.58777042 \times 10^{-4} \times \text{DBH}^{1.9699831} \times \text{H}^{0.89646157}$ |
|                                                                                               | Pinus massoniana                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | $0.71426544 \times 10^{-4} \times \text{DBH}^{1.867008} \times \text{H}^{0.9014632}$   |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                        |
| Purpose of Data                                                                               | Calculation of baseline emissions and project emission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                        |
| Comments:                                                                                     | <p>It is necessary to validate the applicability of equations used. Source data from which equation(s) was derived should be reviewed and confirmed to be representative of the forest type/species and conditions in the project and covering the range of potential independent variable values.</p> <p>Allometric equations can be validated either by:</p> <ol style="list-style-type: none"> <li>1. Limited Measurements</li> </ol> <p>select at least 30 trees (if validating forest type-specific equation, selection should be representative of the species composition in the project area, ie, species representation in roughly in proportion to relative basal area). Minimum diameter of measured trees must be 20cm and maximum diameter must reflect the largest trees present or potentially present in the future in the project area (and/or leakage belt);</p> <p>measure DBH, and height to a 10 cm diameter top or to the first branch;</p> <p>calculate stem volume from measurements and multiplying by species-specific density to gain biomass of bole;</p> <p>apply a biomass expansion factor to estimate total aboveground biomass from stem biomass<sup>37</sup>; and</p> <p>plot the estimated biomass of all the measured trees along with the curve of biomass against diameter as predicted by the allometric equation.</p> <p>If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a biomass consistently higher than predicted by the equation. If &gt;75% of the measured trees have a</p> |                                                                                        |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|  | <p>biomass lower than the predicted curve, destructive sampling must be undertaken or another equation must be selected.</p> <p>2. Destructive Sampling</p> <p>select at least 5 trees (if validating forest type-specific equation, selection should be representative of the species composition in the project area, ie, species representation in roughly in proportion to relative basal area) at the upper end of the range of independent variable values existing in the project area;</p> <p>measure DBH and commercial height and calculate volume using the same procedures/equations used to generate commercial volumes to which BCEFs will be applied;</p> <p>fell and weigh the aboveground biomass to determine the total (wet) mass of the stem, branch, twig, leaves, etc. Extract and immediately weigh subsamples from each of the wet stem and branch components, followed by oven drying at 70 degrees C to determine dry biomass;</p> <p>determine the total dry weight of each tree from the wet weights and the averaged ratios of wet and dry weights of the stem and branch components; and</p> <p>plot the estimated biomass of all the measured trees along with the curve of biomass against diameter as predicted by the allometric equation.</p> <p>If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a biomass consistently higher than predicted by the equation. If &gt;75% of the measured trees have a biomass lower than the predicted curve another equation must be selected.</p> <p>Details of destructive sampling measurements are given in: Brown, S. 1997. Estimating biomass and biomass change of tropical forests: a primer. FAO Forestry Paper 134, Rome, Italy. Available at <a href="http://www.fao.org/docrep/W4095E/W4095E00.htm">http://www.fao.org/docrep/W4095E/W4095E00.htm</a></p> <p>If using species-specific equations, and new species are encountered in the course of monitoring, new allometric equations must be sourced from the literature and validated, if necessary, as per requirements and procedures above.</p> <p>Default values must be updated whenever new guidelines are produced by the IPCC.</p> |
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|-------------------|-----------------------------------------------------------------------------------------|
| Data / Parameter: | BCEF <sub>R</sub>                                                                       |
| Data unit:        | t d.m. m <sup>-3</sup>                                                                  |
| Description:      | Biomass conversion and expansion factor applicable to wood removals in the project area |

| Source of data:                                                                               | <p>The source of data must be chosen with priority from higher to lower preference as follows:</p> <p>Existing local forest type-specific;</p> <p>National forest type-specific or eco-region-specific (eg, from national GHG inventory);</p> <p>Forest type-specific or eco-region-specific from neighboring countries with similar conditions. Sometimes (c) might be preferable to (b);</p> <p>Global forest type or eco-region-specific (eg, IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.5).</p> <p>Alternatively:</p> <p><math>BCEFR = BEFR * D</math></p> <p>Where BCEF values are not directly available, they can be calculated as Biomass Expansion Factor (BEF)* basic wood density (D).</p> <p>Application of this equation requires caution because basic wood density and biomass expansion factors tend to be correlated. If the same sample of trees was used to determine D, BEF or BCEF, conversion will not introduce error, therefore, it is acceptable to use this equation. If, however, basic wood density is not known with certainty, transforming one into the other might introduce error, as BCEF implies a specific but unknown basic wood density, therefore, all conversion and expansion factors must be derived or their applicability checked locally.</p> <p>"Land Use Change and Forestry GHG Inventory (2013)" of "Second National Information Notification on China Climate Change" matches the second choice.</p> |              |       |                   |       |             |       |                  |       |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------|-------------------|-------|-------------|-------|------------------|-------|
| Value applied:                                                                                | <table border="1"> <thead> <tr> <th>Tree species</th><th>BCEFR</th></tr> </thead> <tbody> <tr> <td>Broad-leaved tree</td><td>0.730</td></tr> <tr> <td>Chinese fir</td><td>0.502</td></tr> <tr> <td>Pinus massoniana</td><td>0.559</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Tree species | BCEFR | Broad-leaved tree | 0.730 | Chinese fir | 0.502 | Pinus massoniana | 0.559 |
| Tree species                                                                                  | BCEFR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |       |                   |       |             |       |                  |       |
| Broad-leaved tree                                                                             | 0.730                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |       |                   |       |             |       |                  |       |
| Chinese fir                                                                                   | 0.502                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |       |                   |       |             |       |                  |       |
| Pinus massoniana                                                                              | 0.559                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |       |                   |       |             |       |                  |       |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |       |                   |       |             |       |                  |       |
| Purpose of Data                                                                               | Calculation of baseline emissions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |       |                   |       |             |       |                  |       |

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Comments: | <p>The combustion factor is a measure of the proportion of the fuel that is actually combusted, which varies as a function of the size and architecture of the fuel load (ie, a smaller proportion of large, coarse fuel such as tree stems will be burnt compared to fine fuels, such as grass leaves), the moisture content of the fuel and the type of fire (ie, intensity and rate of spread).</p> <p>Default values must be updated whenever new guidelines are produced by the IPCC</p> |
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|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | G <sub>gi</sub>                                                                                  |
| Data unit:                                                                                    | g kg <sup>-1</sup> dry matter burnt                                                              |
| Description:                                                                                  | Emission factor for stratum i for gas g                                                          |
| Source of data:                                                                               | Defaults can be found in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5 |
| Value applied:                                                                                | Please refer to the spreadsheet                                                                  |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                                              |
| Purpose of Data                                                                               | Calculation of baseline emissions                                                                |
| Comments:                                                                                     | Default values shall be updated whenever new guidelines are produced by the IPCC                 |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| Data / Parameter: | OF, SLF, WW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Data unit:        | Kg kg <sup>-1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Description:      | <p>OF = Fraction of wood products that will be emitted to the atmosphere between 3 and 100 years after production; SLF = Fraction of wood products that will be emitted to the atmosphere within 3 years of production; and</p> <p>WW = Fraction of extracted biomass effectively emitted to the atmosphere during production</p> <p>Wood waste fraction(WW):</p> <p>Winjum et al. 1998 indicate that the proportion of extracted biomass that is oxidized (burning or decaying) from the production of commodities to be equal to 19% for developed countries, 24% for developing countries.</p> <p>Short-lived fraction (SLF)</p> <p>Winjum et al. 1998 give decay rates for proportions of wood products, which were converted to with short-term (&lt;3yr) uses (applicable internationally) as below:</p> <p>Sawnwood 0.12</p> <p>Woodbase panels 0.06</p> |

|                                                                                               | <p>Other industrial roundwood 0.18</p> <p>Paper and Paperboard 0.24</p> <p>Additional oxidized fraction (OF)</p> <p>Winjum et al 1998 gives annual oxidation fractions for each class of wood products split by forest region (boreal, temperate and tropical).</p> <p>This methodology projects these fractions over 95 years to give the additional proportion that is oxidized between the 3rd and the 100<sup>th</sup> year after initial harvest:</p> <table><tr><th rowspan="2">Wood Product Class</th><th colspan="3">OF</th></tr><tr><th>Boreal</th><th>Temperate</th><th>Tropical</th></tr><tr><td>Sawnwood</td><td>0.39</td><td>0.62</td><td>0.86</td></tr><tr><td>Woodbase panels</td><td>0.62</td><td>0.86</td><td>0.98</td></tr><tr><td>Other industrial roundwood</td><td>0.86</td><td>0.98</td><td>0.99</td></tr><tr><td>Paper and paperboard</td><td>0.39</td><td>0.62</td><td>0.99</td></tr></table> | Wood Product Class | OF       |       |    | Boreal                                                 | Temperate | Tropical | Sawnwood | 0.39 | 0.62 | 0.86 | Woodbase panels | 0.62 | 0.86 | 0.98 | Other industrial roundwood | 0.86 | 0.98 | 0.99 | Paper and paperboard | 0.39 | 0.62 | 0.99 |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------|-------|----|--------------------------------------------------------|-----------|----------|----------|------|------|------|-----------------|------|------|------|----------------------------|------|------|------|----------------------|------|------|------|
| Wood Product Class                                                                            | OF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
|                                                                                               | Boreal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Temperate          | Tropical |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Sawnwood                                                                                      | 0.39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.62               | 0.86     |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Woodbase panels                                                                               | 0.62                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.86               | 0.98     |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Other industrial roundwood                                                                    | 0.86                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.98               | 0.99     |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Paper and paperboard                                                                          | 0.39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.62               | 0.99     |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Source of data:                                                                               | According to VM0010 version 1.3, the default values are chosen.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Value applied:                                                                                | <table><tr><th>Parameters</th><th>Species</th><th>Value</th></tr><tr><td>OF</td><td rowspan="3">Broad-leaved tree/<br/>Chinese fir/<br/>Pinus massoniana</td><td>0.86</td></tr><tr><td>SLF</td><td>0.12</td></tr><tr><td>WW</td><td>24%</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Parameters         | Species  | Value | OF | Broad-leaved tree/<br>Chinese fir/<br>Pinus massoniana | 0.86      | SLF      | 0.12     | WW   | 24%  |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Parameters                                                                                    | Species                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Value              |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| OF                                                                                            | Broad-leaved tree/<br>Chinese fir/<br>Pinus massoniana                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.86               |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| SLF                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.12               |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| WW                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 24%                |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Purpose of Data                                                                               | Calculation of baseline emissions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |
| Comments:                                                                                     | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |          |       |    |                                                        |           |          |          |      |      |      |                 |      |      |      |                            |      |      |      |                      |      |      |      |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter: | RGR <sub>i</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Data unit:        | tC.ha <sup>-1</sup> .yr <sup>-1</sup>                                                                                                                                                                                                                                                                                                                                                                                                              |
| Description:      | Forest regrowth rate post timber harvest for stratum i                                                                                                                                                                                                                                                                                                                                                                                             |
| Source of data:   | <p>According to VM0010 version 1.3, regrowth rate must be calculated from either</p> <p>a) data generated in a reference area using measurements of timber volume in a chronosequence of replicated sample plots; or</p> <p>b) published data on forest growth after timber harvest of the same forest type within the same region as the project; or</p> <p>c) the IPCC default values for aboveground net biomass growth in natural forests.</p> |

|                                                                                               |                                                                                                                                                                                                                                                                                                                       |                   |      |             |      |                  |      |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------|-------------|------|------------------|------|
| Value applied:                                                                                | <table border="1"> <tr> <td>Broad-leaved tree</td><td>1.50</td></tr> <tr> <td>Chinese fir</td><td>1.50</td></tr> <tr> <td>Pinus massoniana</td><td>1.50</td></tr> </table>                                                                                                                                            | Broad-leaved tree | 1.50 | Chinese fir | 1.50 | Pinus massoniana | 1.50 |
| Broad-leaved tree                                                                             | 1.50                                                                                                                                                                                                                                                                                                                  |                   |      |             |      |                  |      |
| Chinese fir                                                                                   | 1.50                                                                                                                                                                                                                                                                                                                  |                   |      |             |      |                  |      |
| Pinus massoniana                                                                              | 1.50                                                                                                                                                                                                                                                                                                                  |                   |      |             |      |                  |      |
| Justification of choice of data or description of measurement methods and procedures applied: | Method a is applied. The average annual regrowth is confirmed by The statement on the growth volume in Huanjiang issued by Guangxi Huanjiang Maonan Autonomous County Forestry Bureau. And the RGRi can therefore be calculated by the biomass expansion factor, density and carbon fraction of the separate species. |                   |      |             |      |                  |      |
| Purpose of Data                                                                               | Calculation of baseline emissions                                                                                                                                                                                                                                                                                     |                   |      |             |      |                  |      |
| Comments:                                                                                     | Default values must be updated whenever new guidelines are produced by the IPCC                                                                                                                                                                                                                                       |                   |      |             |      |                  |      |

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|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | $V_{EX,j,i BSL}$                                                                                                                                                                 |
| Data unit:                                                                                    | $m^3.ha^{-1}$                                                                                                                                                                    |
| Description:                                                                                  | Mean volume of extracted timber per unit area for species j in stratum i                                                                                                         |
| Source of data:                                                                               | The timber harvest plan sets the allowable mean extracted volume is equal to the merchantable volume of timber in the forest inventory ( $V_{j,i BSL}$ ), based on legal limits. |
| Value applied:                                                                                | please refer to ER sheet                                                                                                                                                         |
| Justification of choice of data or description of measurement methods and procedures applied: | The measurement method is from academic paper and equations developed for regional forest types. Please refer to ER sheet                                                        |
| Purpose of Data                                                                               | Calculation of baseline emissions                                                                                                                                                |
| Comments:                                                                                     | N/A                                                                                                                                                                              |

|                                                                                               |                                              |
|-----------------------------------------------------------------------------------------------|----------------------------------------------|
| Data / Parameter:                                                                             | $A_{i,p}$                                    |
| Data unit:                                                                                    | Ha                                           |
| Description:                                                                                  | Area covered by stratum i over land parcel p |
| Source of data:                                                                               | Data of timber harvest plan                  |
| Value applied:                                                                                | See the ER sheet                             |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                          |

|                 |                                                                                                      |
|-----------------|------------------------------------------------------------------------------------------------------|
| Purpose of Data | Calculation of baseline emissions-                                                                   |
| Comments:       | It must be assumed ex-ante that land parcel boundaries and strata areas must not change through time |

|                                                                                               |                                                                      |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Data / Parameter:                                                                             | $A_{1,i,p}$                                                          |
| Data unit:                                                                                    | Ha                                                                   |
| Description:                                                                                  | The area of stratum i in land parcel p that was harvested 1 year ago |
| Source of data:                                                                               | Data of timber harvest plan                                          |
| Value applied:                                                                                | See the ER sheet                                                     |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                  |
| Purpose of Data                                                                               | Calculation of baseline emissions                                    |
| Comments:                                                                                     | N/A                                                                  |

|                                                                                               |                                                                                     |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | $A_{2-10,i,p}$                                                                      |
| Data unit:                                                                                    | Ha                                                                                  |
| Description:                                                                                  | The area of stratum i in land parcel p that was harvested between 2 and 10 year ago |
| Source of data:                                                                               | Data of timber harvest plan                                                         |
| Value applied:                                                                                | See the ER sheet                                                                    |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                                 |
| Purpose of Data                                                                               | Calculation of baseline emissions                                                   |
| Comments:                                                                                     | N/A                                                                                 |

|                                                                                               |                                                                                      |
|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | $A_{11-20,i,p}$                                                                      |
| Data unit:                                                                                    | Ha                                                                                   |
| Description:                                                                                  | The area of stratum i in land parcel p that was harvested between 11 and 20 year ago |
| Source of data:                                                                               | Data of timber harvest plan                                                          |
| Value applied:                                                                                | See the ER sheet                                                                     |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                                                                  |

|                 |                                   |
|-----------------|-----------------------------------|
| Purpose of Data | Calculation of baseline emissions |
| Comments:       | N/A                               |

|                                                                                               |                                            |
|-----------------------------------------------------------------------------------------------|--------------------------------------------|
| Data / Parameter:                                                                             | $A_{t^*}$                                  |
| Data unit:                                                                                    | Ha                                         |
| Description:                                                                                  | Cumulative area harvested until time $t^*$ |
| Source of data:                                                                               | Data of timber harvest plan                |
| Value applied:                                                                                | See the ER sheet                           |
| Justification of choice of data or description of measurement methods and procedures applied: | N/A                                        |
| Purpose of Data                                                                               | Calculation of baseline emissions          |
| Comments:                                                                                     | N/A                                        |

|                                                                                               |                                                                                                                                          |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | $A_{s,p}$                                                                                                                                |
| Data unit:                                                                                    | Ha                                                                                                                                       |
| Description:                                                                                  | Area of sample plot sp                                                                                                                   |
| Source of data:                                                                               | Recording and archiving of size of sample plots, in the monitoring Manual issued by Shenzhen Huanong gardening Co., Ltd who is qualified |
| Value applied:                                                                                | 0.04                                                                                                                                     |
| Justification of choice of data or description of measurement methods and procedures applied: | Standard procedures for plot delineation in forest timber inventory surveys shall be used                                                |
| Purpose of Data                                                                               | Calculation of baseline emissions                                                                                                        |
| Comments:                                                                                     | Ex-ante the size of the plots shall be defined and recorded in the monitoring plan.                                                      |

## 4.2 Data and Parameters Monitored

|                   |                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------|
| Data / Parameter: | Illegal Logging PRA Results                                                                              |
| Data unit:        | Dimensionless                                                                                            |
| Description:      | N/A                                                                                                      |
| Source of data:   | PRA implemented during 9-Dec-2016 to 31-Dec-2016, 16-Apr-2018 to 12-May-2018, 8-May-2020 to 06-Jun-2020. |

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Description of measurement methods and procedures to be applied: | <p>The PRA must evaluate whether timber harvest may be occurring in the project area and shall consist of semi-structured interviews / questionnaires.</p> <p>If <math>\geq 10\%</math> of those interviewed/surveyed believe that illegal logging may be occurring within the project boundary then the limited on-the-ground illegal logging survey shall be triggered.</p> <p>An additional output of the PRA shall be a depth of penetration of illegal logging pressure. A maximum distance shall be recorded for penetration into the forest from access points (such as roads, rivers, already cleared areas) for the purpose of harvesting timber.</p> |
| Frequency of monitoring/recording:                               | Every two years                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Value applied:                                                   | Ex-ante as 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Monitoring equipment:                                            | Monitoring System and forest authority.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| QA/QC procedures to be applied:                                  | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Purpose of Data                                                  | Calculation of project emissions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Calculation method:                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Comments:                                                        | Ex ante estimation shall be made of illegal logging in the with- project case. If the belief is that zero illegal logging will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent illegal logging.                                                                                                                                                                                                                                                                                                                                                                |

|                                                                  |                                                                                                                                                                                                                                       |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                | Result of Limited Illegal Logging Survey                                                                                                                                                                                              |
| Data unit:                                                       | Dimensionless                                                                                                                                                                                                                         |
| Description:                                                     | N/A                                                                                                                                                                                                                                   |
| Source of data:                                                  | Limited on-the-ground illegal logging survey                                                                                                                                                                                          |
| Description of measurement methods and procedures to be applied: | Sampled by surveying multiple transects of known length and width across the access-buffer area to check whether new tree stumps are evident or not. The access-buffer area shall be equal in area to at least 1% of $A_{DIST\_IL,i}$ |
| Frequency of monitoring/recording:                               | Must to be repeated each time the PRA indicates a potential for illegal logging.                                                                                                                                                      |
| Value applied:                                                   | Ex-ante as 0                                                                                                                                                                                                                          |
| Monitoring equipment:                                            | Monitoring System and forest authority.                                                                                                                                                                                               |
| QA/QC procedures to be applied:                                  | N/A                                                                                                                                                                                                                                   |
| Purpose of Data                                                  | Calculation of project emissions                                                                                                                                                                                                      |
| Calculation method:                                              | N/A                                                                                                                                                                                                                                   |

|           |                                                                                                                                                                                                                                                                                                    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comments: | Ex ante an estimation shall be made of illegal logging in the with- project case. If the belief is that zero illegal logging will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent illegal logging. |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                | $A_{burn,i,t}$                                                                                                                                                                                                                                                                                                               |
| Data unit:                                                       | Ha                                                                                                                                                                                                                                                                                                                           |
| Description:                                                     | Area burnt in stratum i at time t                                                                                                                                                                                                                                                                                            |
| Source of data:                                                  | Geodetic coordinates and / or Remote Sensing data                                                                                                                                                                                                                                                                            |
| Description of measurement methods and procedures to be applied: | N/A                                                                                                                                                                                                                                                                                                                          |
| Frequency of monitoring/recording:                               | Areas burnt must be monitored at least every five years                                                                                                                                                                                                                                                                      |
| Value applied:                                                   | Ex-ante as 0                                                                                                                                                                                                                                                                                                                 |
| Monitoring equipment:                                            | Monitoring System and forest authority.                                                                                                                                                                                                                                                                                      |
| QA/QC procedures to be applied:                                  | Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended. |
| Purpose of Data                                                  | Calculation of project emissions                                                                                                                                                                                                                                                                                             |
| Calculation method:                                              | N/A                                                                                                                                                                                                                                                                                                                          |
| Comments:                                                        | Ex ante estimations of areas burned shall be based on historic incidence of fire in the Project region                                                                                                                                                                                                                       |

|                                                                  |                                                              |
|------------------------------------------------------------------|--------------------------------------------------------------|
| Data / Parameter:                                                | $A_{dist,i,t}$                                               |
| Data unit:                                                       | Ha                                                           |
| Description:                                                     | Area disturbed in stratum i at time t                        |
| Source of data:                                                  | Geodetic coordinates and / or Remote Sensing data            |
| Description of measurement methods and procedures to be applied: | N/A                                                          |
| Frequency of monitoring/recording:                               | Areas disturbed shall be monitored at least every five years |
| Value applied:                                                   | Ex-ante as 0                                                 |
| Monitoring equipment:                                            | Monitoring System and forest authority.                      |

|                                 |                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| QA/QC procedures to be applied: | Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended. |
| Purpose of Data                 | Calculation of project emissions                                                                                                                                                                                                                                                                                             |
| Calculation method:             | N/A                                                                                                                                                                                                                                                                                                                          |
| Comments:                       | Ex ante estimations of areas burned must be based on historic incidence of fire in the Project region                                                                                                                                                                                                                        |

|                                                                  |                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                | $A_{DIST\_IL,i}$                                                                                                                                                                                                                                                                                                             |
| Data unit:                                                       | Ha                                                                                                                                                                                                                                                                                                                           |
| Description:                                                     | Area potentially impacted by illegal logging in stratum i                                                                                                                                                                                                                                                                    |
| Source of data:                                                  | GIS delineation and ground truthing                                                                                                                                                                                                                                                                                          |
| Description of measurement methods and procedures to be applied: | Must be composed of a buffer from all access points (access buffer), such as roads and rivers or previously cleared areas. The width of the buffer shall be determined by the depth of degradation penetration as defined as a PRA output                                                                                    |
| Frequency of monitoring/recording:                               | Repeated each time the PRA indicates a potential for degradation                                                                                                                                                                                                                                                             |
| Value applied:                                                   | Ex-ante as 0                                                                                                                                                                                                                                                                                                                 |
| Monitoring equipment:                                            | Monitoring System and forest authority.                                                                                                                                                                                                                                                                                      |
| QA/QC procedures to be applied:                                  | Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended. |
| Purpose of Data                                                  | Calculation of project emissions                                                                                                                                                                                                                                                                                             |
| Calculation method:                                              | N/A                                                                                                                                                                                                                                                                                                                          |
| Comments:                                                        | Ex ante a limited survey can be used to determine a likely depth of degradation penetration                                                                                                                                                                                                                                  |

|                   |                                                                                        |
|-------------------|----------------------------------------------------------------------------------------|
| Data / Parameter: | $C_{DIST\_IL,i,t PRJ}$                                                                 |
| Data unit:        | tCO <sub>2</sub> e                                                                     |
| Description:      | biomass carbon of trees cut and removed through illegal logging in stratum i at time t |
| Source of data:   | Field measurements in sample plots                                                     |

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description of measurement methods and procedures to be applied: | The sampling plan must be designed using plots systematically placed over the buffer zone so that they sample at least 3% of the area of the buffer zone ( $A_{DIST\_IL,i}$ ). The diameter of all tree stumps will be measured and conservatively assumed to be the same as the DBH. Where the stump is a large buttress, several individuals of the same species nearby shall be located and a ratio of the diameter at DBH to the diameter of buttress at the same height above ground as the measured stumps shall be determined. This ratio will be applied to the measured stumps to estimate the likely DBH of the cut tree. The aboveground carbon stock of each harvested tree will be estimated using the allometric regression equations chosen for forest growth in the project scenario. The mean aboveground carbon stock of the harvested trees is conservatively estimated to be the total emissions and to all enter the atmosphere |
| Frequency of monitoring/recording:                               | Repeated each time limited sampling of $A_{DIST\_IL}$ , indicates illegal logging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Value applied:                                                   | Ex-ante 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Monitoring equipment:                                            | Monitoring System and forest authority.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| QA/QC procedures to be applied:                                  | Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Purpose of Data                                                  | Calculation of project emissions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Calculation method:                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Comments:                                                        | If species-specific equations are used and species cannot be identified from stumps then it shall be assumed that the harvested species is the species most commonly harvested. A PRA shall be used to determine the most commonly harvested species.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                                                                  |                                                                                                                                                                                 |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                | $AP_i$                                                                                                                                                                          |
| Data unit:                                                       | Ha                                                                                                                                                                              |
| Description:                                                     | Total area of illegal logging sample plots in stratum i                                                                                                                         |
| Source of data:                                                  | Ground measurement                                                                                                                                                              |
| Description of measurement methods and procedures to be applied: | A sampling plan must be designed using multiple sample plots systematically placed across the buffer zone so that they sample at least 3% of the area of the buffer zone.       |
| Frequency of monitoring/recording:                               | Not more than five years                                                                                                                                                        |
| Value applied:                                                   | Not applicable. As for the project area, illegal logging is unlikely to happen, the $C_{DIST\_IL,i,t PRJ}$ is ex- ante zero, there is no need for the illegal logging sampling. |
| Monitoring equipment:                                            | Not applicable                                                                                                                                                                  |

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| QA/QC procedures to be applied: | Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended. |
| Purpose of Data                 | Calculation of project emissions                                                                                                                                                                                                                                                                                             |
| Calculation method:             | N/A                                                                                                                                                                                                                                                                                                                          |
| Comments:                       | Ex ante estimation should be made of area of plots. This should be set to exactly 3% of the buffer zone $A_{DIST\_IL,i}$                                                                                                                                                                                                     |

|                                                                  |                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                | $PMP_i$                                                                                                                                                                                                                                                                                                                      |
| Data unit:                                                       | %                                                                                                                                                                                                                                                                                                                            |
| Description:                                                     | Merchantable biomass as a proportion of total aboveground tree biomass for stratum $i$ within the project boundaries                                                                                                                                                                                                         |
| Source of data:                                                  | Within each stratum divide the summed merchantable biomass (defined as total gross biomass of a tree 15cm DBH or larger) by the summed total of aboveground tree biomass.                                                                                                                                                    |
| Description of measurement methods and procedures to be applied: | A sampling plan must be designed using multiple sample plots systematically placed across the buffer zone so that they sample at least 3% of the area of the buffer zone.                                                                                                                                                    |
| Frequency of monitoring/recording:                               | Not more than five years                                                                                                                                                                                                                                                                                                     |
| Value applied:                                                   | Not applicable, as the leakage factor of this project is zero, it is unnecessary to calculate $PMP_i$ .                                                                                                                                                                                                                      |
| Monitoring equipment:                                            | Not applicable                                                                                                                                                                                                                                                                                                               |
| QA/QC procedures to be applied:                                  | Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended. |
| Purpose of Data                                                  | Calculation of project emissions and leakage                                                                                                                                                                                                                                                                                 |
| Calculation method:                                              | N/A                                                                                                                                                                                                                                                                                                                          |
| Comments:                                                        | Ex-ante a time zero measurement shall be made of this factor. The timber harvest plan sets the allowable mean extracted volume from the merchantable volume of timber in the forest inventory ( $V_{j,i BSL}$ ), based on legal limits.                                                                                      |

|                   |       |
|-------------------|-------|
| Data / Parameter: | $A_i$ |
| Data unit:        | Ha    |

| Description                                                     | Area covered by stratum i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--|-------------------------|-----------|--------------|---|----------|-------------------|---|----------|-------------|---|----------|------------------|-------|----------|--|
| Source of data                                                  | Geodetic coordinates and/or Remote Sensing data and/or legal parcel records                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| Description of measurement methods and procedures to be applied | The stratum is from the second class forestry inventory                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| Frequency of monitoring/recording:                              | Every ten years.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| Value applied:                                                  | <table><tr><th>Serial number of strata</th><th>Area (ha)</th><th>Tree species</th></tr><tr><td>1</td><td>4,440.05</td><td>Broad-leaved tree</td></tr><tr><td>2</td><td>2,736.96</td><td>Chinese fir</td></tr><tr><td>3</td><td>2,169.71</td><td>Pinus massoniana</td></tr><tr><td>Total</td><td>9,346.72</td><td></td></tr></table>                                                                                                                                                                                         |                   |  | Serial number of strata | Area (ha) | Tree species | 1 | 4,440.05 | Broad-leaved tree | 2 | 2,736.96 | Chinese fir | 3 | 2,169.71 | Pinus massoniana | Total | 9,346.72 |  |
| Serial number of strata                                         | Area (ha)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Tree species      |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| 1                                                               | 4,440.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Broad-leaved tree |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| 2                                                               | 2,736.96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Chinese fir       |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| 3                                                               | 2,169.71                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Pinus massoniana  |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| Total                                                           | 9,346.72                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| Monitoring Equipment:                                           | Tape Measure, GPS device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| QA/QC procedures to be applied:                                 | Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended.                                                                                                                                                                                              |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| Purpose of Data                                                 | For the calculation of the baseline and project emissions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| Calculation method:                                             | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |
| Comments                                                        | In the baseline scenario strata areas must not change through time. In the project scenario it must be assumed ex-ante that stand boundaries and strata areas must not change through time. Ex post adjustments of the project scenario strata may be needed if unexpected disturbances occur during the project crediting period, severely affecting different parts of an originally homogenous stratum. This disturbance will be delineate as a separate stratum for the purpose of monitoring the carbon stock changes. |                   |  |                         |           |              |   |          |                   |   |          |             |   |          |                  |       |          |  |

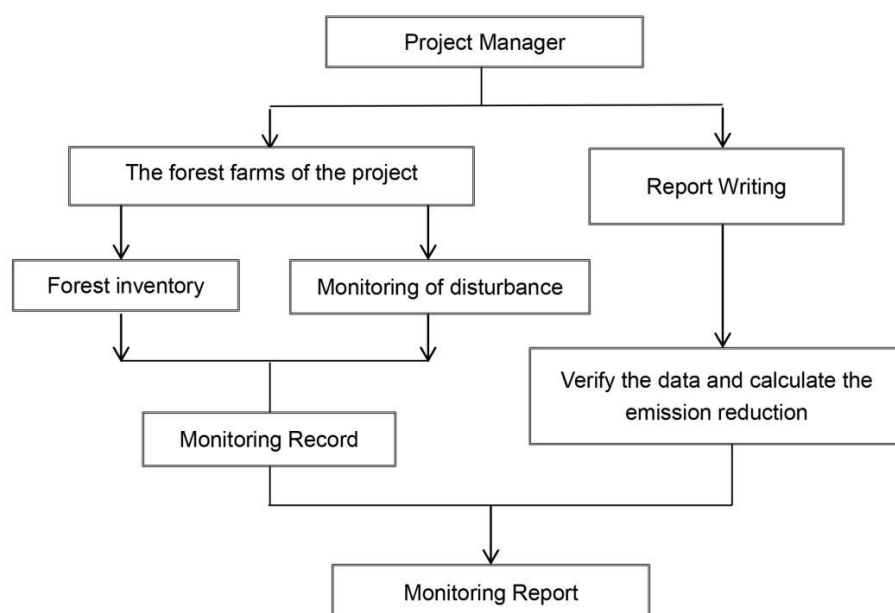
|                                                                 |                                                                                                                                                                    |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                               | DBH                                                                                                                                                                |
| Data unit:                                                      | cm                                                                                                                                                                 |
| Description                                                     | Diameter at breast height of tree                                                                                                                                  |
| Source of data                                                  | On site measuring on the sample spot.                                                                                                                              |
| Description of measurement methods and procedures to be applied | The National Forest Resource Continuous Investigation Technical Regulation issued by the State Forestry Bureau has detailed requirement of the measurement method. |

|                                    |                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency of monitoring/recording: | Not more than five years                                                                                                                                                                                                                                                                                                                                     |
| Value applied:                     | N/A                                                                                                                                                                                                                                                                                                                                                          |
| Monitoring Equipment:              | Tape Measure                                                                                                                                                                                                                                                                                                                                                 |
| QA/QC procedures to be applied:    | Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended.                               |
| Purpose of Data                    | Calculation of tree volume, then to carbon stock change further to the project emissions.                                                                                                                                                                                                                                                                    |
| Calculation method:                | N/A                                                                                                                                                                                                                                                                                                                                                          |
| Comments                           | As for the project tree species, there are no allometric equation applied in the project area, the average annual growth and biomass expansion method is adopted for the estimated calculation of carbon stock change. Based on the DBH and local volume table, the volume can be calculated, combined by the BCEF and CF, the carbon stock can be obtained. |

## 4.3 Monitoring Plan

### 4.3.1 Scope of monitoring and the monitoring plan

The project proponent and consultant will set up a team together to conduct the monitoring. The team is in charge of collecting, monitoring and verifying the data, while the project manager will be assisted by the consultant company. The findings should be reported to the project manager and work out a solution. The operational and management structure is as follows:



Monitoring is required to

- a) determine changes in forest carbon stocks and greenhouse gas emissions from project activity;
- b) confirm project activity; and
- c) determine changes in forest carbon stocks and greenhouse gas emissions from disturbance and illegal logging.

In some cases monitoring may also be implemented to update stratification.

The monitoring plan addresses the monitoring of project implementation, the monitoring of actual carbon stock changes from project activity, and estimation of ex-post net carbon stock changes from the conversion of logged to protected forest.

#### 4.3.2 General requirements for monitoring

All data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the project crediting period. All measurements will be conducted according to relevant standards.

Data archiving shall take both electronic and paper forms, and copies of all data shall be provided to each project participant.

All electronic data and reports shall also be copied on durable media such as CDs and copies of the CDs are to be stored in multiple locations.

The archives shall include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheets;
- Estimates of the carbon stock changes in all pools and non-CO<sub>2</sub> GHG and corresponding calculation spreadsheets;
- GIS products; and
- Copies of the measuring and monitoring reports.

#### 4.3.3 Monitoring of project implementation

Information must be provided, and recorded in the VCS-PD, to establish that:

- The geographic position of the project boundary is recorded for all areas of land;
- The geographic coordinates of the project boundary (and any stratification inside the boundary) are established, recorded and archived. This will be achieved by field survey (e.g. using GPS) or by using geo-referenced spatial data (e.g. maps, GIS datasets, aerial photography, or geo-referenced remote sensing images);
- Commonly accepted principles of forest inventory and management are implemented;

- Standard operating procedures (SOPs) and quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management will be applied. SOPs already applied in national forest monitoring or available from published handbooks or from the IPCC GPG LULUCF 2003 will be used.
- The project plan, together with a record of the plan as actually implemented during the project, shall be available for validation or verification as appropriate.

#### 4.3.4 Stratification

An ex ante stratification of the project area in the project scenario is developed by project proponents through sampling in the project area according to the species.

Sampling to adjust the number and boundaries of the strata defined ex ante where an update is required because of

- a) unexpected disturbances occurring during the project crediting period affecting differently various parts of an originally homogeneous stratum and/or
- b) forest management activities that are implemented in a way that affects the existing stratification in the project scenario.

Established strata may also be merged if the reasons for their establishment have disappeared.

Based on the availability of data regarding the nature and composition of forest stocks in the project area, stratification is developed on the basis of existing vegetation stratification, where these are documented in the legal right to harvest. In the VCS-PD, 3 strata are specified according to the tree species.

#### 4.3.5 Monitoring of actual carbon stock changes

Carbon stocks will be measured according to the stock assessment equations with field sampling based on forest inventory methods. Various sources exist to assist with the design of a verifiable forest field inventory based on best practice for sampling, data management and analysis (Box 3).

In the project area the inventory plan is specified as below:

- a) adequate forest stratification, sample size estimation methods and consider uncertainty:

The forest stratification is based on the species, which is adequate according to the methodology. The sample size estimation methods, allocation among strata and uncertainty consideration is according to the “Calculation of the number of sample plots for measurements within A/R CDM project activities” (version 02.1.0) approved by the CDM Executive Board.

- b) a sampling framework including sample size, plot size, plot shape and information to determine plot location:

The design of a verifiable forest field inventory based on best practice for sampling, data management and analysis are selected from the Box 3 of the methodology. The sample size estimation methods,

allocation among strata and uncertainty consideration is according to the most recent version of the tool for the “Calculation of the number of sample plots for measurements within A/R CDM project activities” (version 02.1.0) approved by the CDM Executive Board.

For the baseline scenario, the calculation process is shown below:

| Parameter | Unit          | Description                                                                                                  |
|-----------|---------------|--------------------------------------------------------------------------------------------------------------|
| $n$       | dimensionless | Number of sample plots required for estimation of biomass stocks within the project boundary                 |
| $n_i$     | dimensionless | Number of sample plots allocated to stratum $i$ for estimation of biomass stocks within the project boundary |

In the baseline scenario:

$n_{BSL}$  for  $n$  and  $n_{BSL,i}$  for  $n_i$ .

In the project scenario:

$n_{PROJ}$  for  $n$  and  $n_{PROJ,i}$  for  $n_i$

The sample plot will be 0.04 ha and at least 3 sample plots will be selected in 1 stratum. As the sample size should be less than 100, then the total sample plot area should be less than 4 ha, which is small than 5% of the total project area ( $9,364.72 \times 5\% = 328.6$  ha).

So we can conclude that the area sampled will be less than 5% of the project area, which means a small sampling fraction.

Therefore, the following simplified equation can be used for estimating the number of sample plots according to the CDM tool:

$$n = \left( \frac{t_{VAL}}{E} \right)^2 * \left( \sum_i \omega_i * S_i \right)^2 \quad (1)$$

where:

- $n$  Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
- $t_{VAL}$  Two-sided Student's  $t$ -value at infinite degrees of freedom for the required confidence level; dimensionless
- $E$  Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. (or t d.m. ha<sup>-1</sup>), i.e. in the units used for  $S_i$
- $w_i$  Relative weight of the area of stratum  $i$  (i.e. the area of the stratum  $i$  divided by the project area); dimensionless
- $S_i$  Estimated standard deviation of biomass stock in stratum  $i$ ; t d.m. (or t d.m. ha<sup>-1</sup>)
- $i$  1, 2, 3, ... biomass stock estimation strata within the project boundary

After the estimation of total number of sample plots (n), allocation of number of sample plots among strata is calculated as:

$$n_i = n * \frac{\omega_i * S_i}{\sum_i \omega_i * S_i} \quad (2)$$

where:

- $n_i$  Number of sample plots allocated to stratum i; dimensionless
- $n$  Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
- $w_i$  Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless
- $S_i$  Estimated standard deviation of biomass stock in stratum i; t d.m. (or t d.m. ha<sup>-1</sup>)
- $i$  1, 2, 3, ... biomass stock estimation strata within the project boundary

Based on the data of biomass stocks in a carbon pool in the baseline scenario, the estimation of number of sample plots required is shown in table 10 below:

Table 9: The estimation of number of sample plots required

| Strata No | Stratum Name      | Area (ha) | Mean tonnes C/ha | Standard Deviation (t C/ha) | Plot size (ha) | Wi   | Wi * Si |
|-----------|-------------------|-----------|------------------|-----------------------------|----------------|------|---------|
| Strata 1  | Broad-leaved tree | 4,440.05  | 55.81            | 21.7                        | 0.04           | 0.48 | 10.4    |
| Strata 2  | Chinese fir       | 2,736.96  | 42.22            | 18.35                       | 0.04           | 0.29 | 5.3     |
| Strata 3  | Pinus massoniana  | 2,169.71  | 50.63            | 16.97                       | 0.04           | 0.23 | 3.9     |

| STRATA NO             | Stratum Name      | Number of Plots |                       |
|-----------------------|-------------------|-----------------|-----------------------|
|                       |                   | Plot Quantity   | Rounded Plot Quantity |
| Total Sample Size     |                   |                 |                       |
| Strata 1              | Broad-leaved tree | 31.8            | 32                    |
| Strata 2              | Chinese fir       | 16.3            | 17                    |
| Strata 3              | Pinus massoniana  | 11.9            | 12                    |
| TOTAL NUMBER OF PLOTS |                   |                 | 61                    |

\* Where the confidence level is 95% as required in the methodology VM0010 version 1.3 and  $D_f$  is  $\infty$ . Therefore,  $t_{VAL}$  is 1.96.

Carbon stock changes over time have been estimated by taking measurements in plots at each monitoring event measured in July 2016 just before the projected started and re-measured in December 2020. The number of years between the monitoring intervals in July 2016 and December 2020 is 4.5 years.

#### 4.3.6 The monitoring campaign includes the ages, species, DBH and any parameters the needed. Conservative approach and uncertainty

Project proponent will also apply all relevant equations for the ex-ante calculation of net anthropogenic GHG removals by sinks with care and provide transparent estimations for the parameters that are monitored during the project crediting period. These estimates shall be based on measured or existing published data where possible and project proponents should retain a conservative approach; that is, if different values for a parameter are equally plausible, a value that does not lead to over-estimation of net anthropogenic GHG removals by sinks must be selected.

An uncertainty analysis is required for all estimates from monitoring related to change in area, change in carbon stocks and emissions for both the baseline and project case.

## 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 5.1 Baseline Emissions

Baseline projections are calculated ex-ante and are not adjusted through-out the project lifetime.

The net carbon stock change to be converted to emissions is equal to the carbon stock change as a result of timber harvest plus the carbon stock change resulting from conversion and retirement of wood products minus carbon sequestration from forest regrowth after harvest.

In order to generate the annual carbon stock change in the baseline scenario, the total net change in carbon stocks for parcels within is multiplied by the area of forest in the particular age class.

The annualized calculations vary between years 1, 2-10; 10-20; and all years since the start of the project activity, depending on which decay functions apply.

Therefore, the net change in carbon stock from wood products and logging slash across all parcels within the first year of harvest in the baseline is calculated as:

$$\Delta C_{NET|BSL(1)} = \sum_{i,p} A_{1,i,p} * \sum_{i=1}^M (C_{DIVSLASH,i,p|BSL}/10) + C_{WPD,i,p|BSL} + (C_{WPF100,i,p|BSL}/20) \quad (3)$$

Where:

|                              |                                                                                                                                                                                                                |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\Delta C_{NET BSL(1)}$      | net change in carbon stock across all parcels in the baseline scenario in the first year since harvest in the baseline scenario, in tC;                                                                        |
| $\Delta C_{DWSLASH,i,p BSL}$ | change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum i in land parcel p, in tC ha <sup>-1</sup> ;                                                       |
| $\Delta C_{WP0,i,p BSL}$     | change in carbon stock resulting from wood product conversion and retirement from stratum i in land parcel p, that is assumed to be emitted in the first year of harvest in the baseline tC ha <sup>-1</sup> ; |
| $\Delta C_{WP100,i,p BSL}$   | Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha <sup>-1</sup> ;                                                |
| $A_{1,i,p}$                  | the area of stratum i in land parcel p that was harvested 1 year ago, ha;                                                                                                                                      |
| i                            | 1, 2, 3 ...M strata; and                                                                                                                                                                                       |
| p                            | 1, 2, 3 ...P land parcels harvested within the project crediting period.                                                                                                                                       |

The net change in carbon stock from wood products and logging slash across all parcels the years 2-10 since harvest in the baseline are calculated as:

$$\Delta C_{NET|BSL(2-10)} = \sum_{i,p} A_{2-10,i,p} * \sum_{i=1}^M (C_{DWSLASH,i,p|BSL}/10) + (C_{WP100,i,p|BSL}/20) \quad (4)$$

Where:

|                              |                                                                                                                                                                 |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\Delta C_{NET BSL(2-10)}$   | net change in carbon stock across all parcels in the baseline scenario in years 2-10 since harvest in the baseline scenario, in tC;                             |
| $\Delta C_{DWSLASH,i,p BSL}$ | change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum i in land parcel p, in tC ha <sup>-1</sup> ;        |
| $\Delta C_{WP100,i,p BSL}$   | Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha <sup>-1</sup> ; |
| $A_{2-10,i,p}$               | the area of stratum i in land parcel p that was harvested 2 and 10 years ago, ha;                                                                               |
| i                            | 1, 2, 3 ...M strata; and                                                                                                                                        |
| p                            | 1, 2, 3 ...P land parcels harvested within the project crediting period.                                                                                        |

The net change in carbon stock from wood products across all parcels the years 11 -20 since harvest in the baseline are calculated as:

$$\Delta C_{NET|BSL(11-20)} = \sum_{i,p} A_{11-20,i,p} * \sum_{i=1}^M (C_{WP100,i,p|BSL}/20)$$

(5)

Where:

|                             |                                                                                                                                                                 |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\Delta C_{NET BSL(11-20)}$ | net change in carbon stock across all parcels in the baseline scenario in years 11-20 since the start of the project activity, in tC;                           |
| $\Delta C_{WP100,i,p BSL}$  | Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha <sup>-1</sup> ; |
| $A_{11-20,i,p}$             | the area of stratum i in land parcel p that was harvested 11 and 20 years ago, ha;                                                                              |
| i                           | 1, 2, 3 ...M strata; and                                                                                                                                        |
| p                           | 1, 2, 3 ...P land parcels harvested within the project crediting period.                                                                                        |

The net change (sequestration) in carbon stock due to forest regrowth across all parcels in all years since harvest in the baseline scenario is calculated according to equation 6 below. Note that there will be no more emissions quantified from decay of logging slash or wood products.

$$\Delta C_{NET|BSL(1+)} = \sum_i A_{t*} * \sum_{i=1}^M (-\Delta C_{RG,i,p|BSL})$$

(6)

Where:

|                          |                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| $\Delta C_{NET BSL(1+)}$ | net change in carbon stock due to forest regrowth in all parcels that have been harvested in the baseline scenario, in tC;  |
| $\Delta C_{RG,i,p BSL}$  | carbon sequestration resulting from forest regrowth after timber harvest in stratum i in land parcel p, tC ha <sup>-1</sup> |
| $A_{t*}$                 | Cumulative area harvested until time t*, ha;                                                                                |
| i                        | 1, 2, 3 ...M strata; and                                                                                                    |
| p                        | 1, 2, 3 ...P land parcels harvested within the project crediting period.                                                    |

Therefore, net change in carbon stock across all parcels harvested over each year of the project crediting period in the baseline scenario since the start of the project activity is calculated as:

$$\Delta C_{NET|BSL,t*} = \sum_{p=1}^P \Delta C_{NET|BSL(1)} + \Delta C_{NET|BSL(2-10)} + \Delta C_{NET|BSL(11-20)} + \Delta C_{NET|BSL(1+)}$$

(7)

Where:

|                             |                                                                                                                                                        |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\Delta C_{NET BSL,t^*}$    | net change in carbon stock across all parcels in the baseline scenario in the year $t^*$ since the start of the project activity, in tC;               |
| $\Delta C_{NET BSL(1)}$     | net change in carbon stock in the baseline scenario for all parcels p that are within 1 year of harvest in the baseline scenario, in tC;               |
| $\Delta C_{NET BSL(2-10)}$  | net change in carbon stock in the baseline scenario for all parcels p, that were harvested between 2-10 years ago in the baseline scenario, in tC;     |
| $\Delta C_{NET BSL(11-20)}$ | net change in carbon stock in the baseline scenario in parcel p, that were harvested between 11-20 years ago in the baseline scenario, in tC;          |
| $\Delta C_{NET BSL(1+)}$    | net change in carbon stock due to forest regrowth in the baseline scenario for all parcels p that have been harvested in the baseline scenario, in tC; |
| $t^*$                       | time elapsed since the start of the project, in years; and                                                                                             |
| p                           | 1, 2, 3 ...P land parcels harvested within the project crediting period.                                                                               |

The net carbon stock change in the baseline scenario must be converted to net greenhouse gas emissions and is calculated as:

$$GHG_{NET|BSL,t^*} = \Delta C_{NET|BSL,t^*} * \frac{44}{12} \quad (8)$$

Where:

|                      |                                                                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| $GHG_{NET BSL,t^*}$  | net greenhouse gas emissions in the baseline scenario in the year $t^*$ since the start of the project activity, tCO <sub>2</sub> e;      |
| $\Delta C_{NET BSL}$ | net change in carbon stock across all parcels in the baseline scenario in the year $t^*$ since the start of the project activity, tC; and |
| 44/12                | ratio of molecular weights of carbon dioxide and carbon, tCO <sub>2</sub> -e tC <sup>-1</sup> .                                           |

The baseline emission process has been demonstrated in the PD of the project, the outcome during this crediting period is listed in the following:

| Year                    | $GHG_{NET BSL,t}$   |
|-------------------------|---------------------|
| 01-Jul-2016-30-Jun-2017 | 81,411              |
| 01-Jul-2017-30-Jun-2018 | 89,099              |
| 01-Jul-2018-30-Jun-2019 | 110,088             |
| 01-Jul-2019-30-Jun-2020 | 129,639             |
| 01-Jul-2020-31-Dec-2020 | 64,353 <sup>4</sup> |

<sup>4</sup> The baseline scenario emission reduction of 01-Jul-2020-30-Jun-2021 is 128,707 tCO<sub>2</sub> in VCS-PD, the period of 01-Jul-2020-31-Dec-2020 is half year, so  $GHG_{NET|BSL,t}$  of 01-Jul-2020-31-Dec-2020 is calculated by  $128,707 * 0.5 = 64,353$  tCO<sub>2</sub>

|                                       |                      |
|---------------------------------------|----------------------|
| Total                                 | 474,591              |
| Average annual GHG <sub>NET BSL</sub> | 105,464 <sup>5</sup> |

## 5.2 Project Emissions

The net greenhouse gas emissions in the project scenario will be equal to emissions resulting from forest disturbance (both illegal logging and natural disturbances) minus carbon sequestration through ongoing forest growth.

$$\Delta C_{AB,t|PRJ} = \left( \sum_{i=1}^M (A_i * \frac{C_{AB,i,t2|PRJ} - C_{AB,i,t1|PRJ}}{T}) \right) * \frac{44}{12} \quad (9)$$

Where:

|                       |                                                                                                                              |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------|
| $\Delta C_{AB,t PRJ}$ | annual carbon stock change in aboveground biomass of trees in year $t$ , tCO <sub>2</sub> <sup>e</sup> yr <sup>-1</sup> ;    |
| $C_{AB,i,t PRJ}$      | mean aboveground biomass carbon stock of trees in stratum $i$ at time $t$ , tCO <sub>2</sub> <sup>e</sup> ha <sup>-1</sup> ; |
| $A_i$                 | area covered by stratum $i$ , ha;                                                                                            |
| $sp$                  | 1, 2, 3 ... SP sample plots;                                                                                                 |
| $T$                   | number of years between monitoring time $t_1$ and $t_2$ ( $T=t_2 - t_1$ ); years;                                            |
| $i$                   | 1, 2, 3 ... $M$ strata; and                                                                                                  |
| $t$                   | 0, 1, 2, 3 ... $t^*$ years elapsed since the start of the project activity; and                                              |
| 44/12                 | ratio of molecular weights of carbon dioxide divided carbon, tCO <sub>2</sub> <sup>e</sup> tC <sup>-1</sup> .                |

Therefore, based on the IPCC 2006 Inventory Guidelines, estimation of greenhouse gas emissions from biomass burning shall be calculated as:

$$\Delta C_{DIST_{FR,t}|PRJ} = \sum_{i=1}^M A_{burn,i,t} * B_{i,t|PRJ} * COMF_i * G_{g,i} * 10^{-3} * GWP_{CH4} \quad (10)$$

Where:

|                              |                                                                                                            |
|------------------------------|------------------------------------------------------------------------------------------------------------|
| $\Delta C_{DIST_{FR,t} PRJ}$ | net greenhouse gas emissions resulting from fire disturbance in year $t$ , tCO <sub>2</sub> <sup>e</sup> ; |
| $A_{burn,i,t}$               | area burnt for stratum $i$ at time $t$ , ha;                                                               |

<sup>5</sup> The average annual GHG<sub>NET|BSL</sub> is calculated by 474,591/4.5=105,464 tCO<sub>2</sub>/yr

|               |                                                                                                                                                                          |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $B_{i,t PRJ}$ | average aboveground biomass stock present in the project scenario but absent in the baseline scenario before burning stratum $i$ , time $t$ ; t d. m. ha <sup>-1</sup> ; |
| $COMF_i$      | combustion factor for stratum $i$ , dimensionless;                                                                                                                       |
| $G_{g,i}$     | emission factor for stratum $i$ for methane, g kg <sup>-1</sup> dry matter burnt;                                                                                        |
| $GWP_{CH_4}$  | global warming potential for CH <sub>4</sub> (IPCC default: 21), tCO <sub>2</sub> e tCH <sub>4</sub> <sup>-1</sup> ;                                                     |
| $i$           | 1, 2, 3 ... $M$ strata; and                                                                                                                                              |
| $t$           | 1, 2, 3, ... $t^*$ years elapsed since the start of the IFM project activity.                                                                                            |

As there is no fire occurred during the monitoring period,  $\Delta C_{DIST-FR,t,PRJ}$  is equal to 0.

It is conservatively assumed that the natural disturbance is a stand-replacing disturbance, and that the biomass change as a result of the natural disturbance ( $\Delta C_{DIST,t,PRJ}$ ) is emitted in the year of disturbance.

$$\Delta C_{DIST,t|PRJ} = \sum_{i=1}^M \left( A_{dist,i,t} * \sum_{j=1}^J \{ C_{AB,j,i|BSL} \} \right) * \frac{44}{12} \quad (11)$$

Where:

|                         |                                                                                                             |
|-------------------------|-------------------------------------------------------------------------------------------------------------|
| $\Delta C_{DIST,t PRJ}$ | net greenhouse gas emissions resulting from non-fire natural disturbance in year $t$ , tCO <sub>2</sub> e ; |
| $A_{dist,i,t}$          | area disturbed for stratum $i$ at time $t$ , ha;                                                            |
| $C_{AB,j BSL}$          | carbon stock in aboveground biomass per unit area in stratum $i$ , tC·ha <sup>-1</sup> ;                    |
| $44/12$                 | ratio of molecular weights of carbon dioxide and carbon, tCO <sub>2</sub> e tC <sup>-1</sup> ;              |
| $i$                     | 1, 2, 3 ... $M$ strata;                                                                                     |
| $j$                     | 1, 2, 3 ... $J$ tree species; and                                                                           |
| $t$                     | 1, 2, 3, ... $t^*$ years elapsed since the start of the IFM project activity.                               |

As indicates by the relevant statement issued by the local authority, no natural disasters occurred during the monitoring period,  $\Delta C_{DIST,t,PRJ}$  is equal to zero.

### Illegal logging

A participatory rural appraisal (PRA) of the communities surrounding the project area must be completed to determine if there is the potential for illegal extraction of trees from the project area. If this assessment finds no potential pressure for these activities then illegal logging ( $\Delta C_{DISTLI,i,t,PRJ}$ ) can be assumed to be zero and no monitoring is needed.

If the results of the PRA suggest that there is a potential for illegal logging activities, then limited field sampling must be undertaken.

Therefore, where the PRA or the limited sampling indicate no illegal logging occurring:

$$\Delta C_{DIST\_IL,t|PRJ} = 0$$

Where the PRA and the limited sampling indicate degradation is occurring, net carbon stock changes as a result of illegal logging shall be calculated as:

$$\Delta C_{DIST\_IL,t|PRJ} = \sum_{i=1}^M \left( A_{DIST\_IL,i} * \frac{C_{DIST\_IL,i,t|PRJ}}{AP_i} \right) \quad (12)$$

Where:

|                             |                                                                                                                  |
|-----------------------------|------------------------------------------------------------------------------------------------------------------|
| $\Delta C_{DIST\_IL,t PRJ}$ | net carbon stock changes as a result of illegal logging at time $t$ , tCO <sub>2</sub> e;                        |
| $A_{DIST\_IL,i}$            | area potentially impacted by illegal logging in stratum $i$ , ha;                                                |
| $C_{DIST\_IL,i,t PRJ}$      | biomass carbon of trees cut and removed through illegal logging in stratum $i$ at time $t$ , tCO <sub>2</sub> e; |
| $AP_i$                      | total area of illegal logging sample plots in stratum $i$ , ha;                                                  |
| $i$                         | 1, 2, 3 ... $M$ strata in the in the project case; and                                                           |
| $t$                         | 1, 2, 3, ... $t$ years elapsed since the projected start of the project activity.                                |

Therefore, net greenhouse gas emissions in the project scenario in year  $t$ , is calculated as:

$$\Delta C_{NET,t|PRJ} = (\Delta C_{DIST\_FR,t|PRJ} + \Delta C_{DIST,t|PRJ} + \Delta C_{DIST\_IL,t|PRJ}) - \Delta C_{AB,t|PRJ} \quad (13)$$

Where:

|                             |                                                                                                                    |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------|
| $\Delta C_{NET,t PRJ}$      | net greenhouse gas emissions in the project scenario in year $t$ , tCO <sub>2</sub> e                              |
| $\Delta C_{DIST\_FR,t PRJ}$ | net greenhouse gas emissions resulting from fire disturbance in year $t$ , tCO <sub>2</sub> e                      |
| $\Delta C_{DIST,t PRJ}$     | net greenhouse gas emissions resulting from non-fire natural disturbance in year $t$ , tCO <sub>2</sub> e          |
| $\Delta C_{DIST\_IL,t PRJ}$ | Net carbon stock changes as a result of illegal logging at time $t$ , tCO <sub>2</sub> e                           |
| $\Delta C_{AB,t PRJ}$       | annual carbon stock change in aboveground biomass of trees in year $t$ , tCO <sub>2</sub> e yr <sup>-1</sup> ; and |
| $t$                         | 1, 2, 3, $t^*$ years elapsed since start of the project activity.                                                  |

The net greenhouse gas emissions across in the project scenario since the start of the project activity is calculated as:

$$GHG_{NET|PRJ} = \sum_{t=1}^{t^*} \Delta C_{NET,t|PRJ} \quad (14)$$

Where:

|                        |                                                                                                         |
|------------------------|---------------------------------------------------------------------------------------------------------|
| $GHG_{NET PRJ}$        | net greenhouse gas emissions in the project scenario since the start of the project activity, $tCO_2^e$ |
| $\Delta C_{NET,t PRJ}$ | net greenhouse gas emissions in the project scenario in year t, $tCO_2^e$ ; and                         |
| t                      | 1, 2, 3, t* years elapsed since start of the project activity.                                          |

$\Delta C_{DIST-FR,t,PRJ}$ ,  $\Delta C_{DIST,t,PRJ}$ ,  $\Delta C_{DIST-IL,t,PRJ}$  are zero during the monitoring period, on-going growth rate is measured by the project owner based on the sample data, the details are listed below:

| Year                    | $\Delta C_{DIST-FR,t PRJ}$ | $\Delta C_{DIST,t PRJ}$ | $\Delta C_{DIST-IL,t PRJ}$ | $\Delta C_{AB,t PRJ}^6$ | $\Delta C_{NET,t PRJ}$ |
|-------------------------|----------------------------|-------------------------|----------------------------|-------------------------|------------------------|
| 01-Jul-2016-30-Jun-2017 | 0                          | 0                       | 0                          | 72,939                  | -72,939                |
| 01-Jul-2017-30-Jun-2018 | 0                          | 0                       | 0                          | 72,939                  | -72,939                |
| 01-Jul-2018-30-Jun-2019 | 0                          | 0                       | 0                          | 72,939                  | -72,939                |
| 01-Jul-2019-30-Jun-2020 | 0                          | 0                       | 0                          | 72,939                  | -72,939                |
| 01-Jul-2020-31-Dec-2020 | 0                          | 0                       | 0                          | 36,469 <sup>7</sup>     | -36,469                |
| <b>Total</b>            | 0                          | 0                       | 0                          | 328,225                 | -328,225               |
| <b>Average</b>          |                            | 0                       | 0                          | 72,938                  | -72,938                |

## 5.3 Leakage

### 5.3.1 Activity shifting leakage

The project does not consider the activity shifting leakage because:

<sup>6</sup> In fact, the total carbon stock change in project scenario from 01/07/2016 to 31/12/2020 is calculated based on the monitored growth during 2016 to 2020. In order to calculate the annual carbon stock change, the total carbon stock change is averaged by these 4.5 years. This method is also commonly accepted in forestry. As stated in P169-171 of the professional college textbook "forest resource operation and management" published by Chinese Forest Press in 2001, the forest growth is divided into average growth and current annual increment, the latter is usually difficult to measure and have a high error, therefore, the former is commonly used to determine the forest growth. The results of carbon stock change are the same if calculated by these two methods, but the current annual increment is unavailable for the project, so the total carbon stock change is averaged to obtain the annual carbon stock change.

<sup>7</sup> The project scenario emission reduction of 2020 is 72,939 as calculated in MR-ER sheet, the period of 01-Jul-2020-31/12/2020 is half year, so  $GHG_{NET,PRJ,t}$  of 01-Jul-2020-31/12/2020 is calculated by  $72,939 \times 0.5 = 36,469 tCO_2$

According to Forest law of the People's Republic of China<sup>8</sup> Article 6 and Regulations of the People's Republic of China on forestry law<sup>9</sup> Article 28, forest cutting management quota system is implemented in China. The central government issued the maximum timber harvest to provinces and larger state-owned forest enterprises every five years. And the provincial forestry authority issued the timber harvest approval and restrictions to its subordinate based on its limit. Also, the China Forest Law also clearly stipulates the punishment for the illegal logging, which not only requires 5-10 times compensation of replanting, but also 2-10 times economic penalty.

The forests are owned by many different owners, including stated-owned, privately-owned and collective-owned. According to the cooperation agreements among PP and forest owners, the Project Proponent was authorized to manage all the forests by the forest owners, including ecological public welfare forest. There are 22888.45 ha ecological public welfare forest in Chuanshan Town, 8238.72 ha ecological public welfare forest in Da'an Township, 6517.96 ha ecological public welfare forest in Dongxing Town, 5342.53 ha ecological public welfare forest in Huashan Forest Farm, 5626.61 ha ecological public welfare forest in Jiuwanshan Conservation Zone, 9991.52 ha ecological public welfare forest in Longyan Township, 10560.78 ha ecological public welfare forest in Luoyang Town, 22266.3 ha ecological public welfare forest in Minglun Town, 10287.27 ha ecological public welfare forest in Mulun Conservation Zone, 22366.59 ha ecological public welfare forest in Shuiyuan Town, 9553.64 ha ecological public welfare forest in Si'en Town, 7491.05 ha ecological public welfare forest in Tiancai Township, 20046.98 ha ecological public welfare forest in Xianan Township, 25077.13 ha ecological public welfare forest in Xunle Township, 10158.21 ha ecological public welfare forest in Changmei Township, The management of these forests is subsidized, but cutting is prohibited by the state. So the owners do not control any other forests that can be harvested commercially, However, So project will not result in the significant national concession and illegal logging.

Therefore, for the project activity, even if the project proponent has more than one forest parcels, the timber harvest limit is planned in advance by the forestry authority; they have no right to harvest more in other parcels outside the project activity.

So the activity shifting leakage is 0.

### 5.3.2 Market leakage

Leakage due to market effects is equal to the net emissions from planned timber harvest activities in the baseline scenario multiplied by an appropriate leakage factor:

$$GHG_{LK|LtPF} = LF_{me} * GHG_{NET|BSL,t} \quad (27)$$

Where:

$GHG_{LK|LtPF}$  is total market leakage as a result of IFM LtPF activities, tCO<sub>2</sub>e;

<sup>8</sup> [http://www.law-lib.com/law/law\\_view.asp?id=95233](http://www.law-lib.com/law/law_view.asp?id=95233)

<sup>9</sup> [http://www.law-lib.com/law/law\\_view.asp?id=7](http://www.law-lib.com/law/law_view.asp?id=7)

$LF_{ME}$  is the dimensionless leakage factor for market-effects calculations;  
 $GHG_{NET|BSL,t^*}$  net greenhouse gas emissions in the baseline scenario in the year  $t^*$  since the start of the project activity,  $tCO_2e$ .

The leakage factor is determined by considering where in the country logging will be increased as a result of the decreased timber supply caused by the project.

#### Leakage factor calculation

The leakage factor is determined by considering where in the country logging will be increased as a result of the decreased supply of the timber caused by the project. If the areas liable to be logged have a higher ratio of merchantable biomass to total biomass higher than the project area it is likely that the proportional leakage is higher and vice versa.

Therefore,

$$LF_{ME} = 0$$

If it can be demonstrated that no market-effects leakage will occur within national boundaries, that is if no new concessions are being assigned AND annual extracted volumes cannot be increased within existing national concessions AND illegal logging is absent (or de minimis) in the host country.

The amount of leakage is determined by where in the country's forest estate harvesting would likely be displaced. If harvesting is displaced to forests where a lower proportion of forest biomass is merchantable material from harvestable species than in the project area, then in order to extract a given volume higher emissions should be expected as more trees will need to be cut to supply the same volume.

In contrast if a higher proportion of the total biomass of commercial species is merchantable in the displacement forest than in the project forests, then a smaller area would have to be harvested and lower emissions would result.

Therefore, each project must calculate within each stratum the ratio of merchantable biomass to total biomass ( $PMP_i$ ). This shall then be compared to the ratio of merchantable biomass to total biomass for each forest type ( $PML_{FT}$ ).

The following deduction factors ( $LF_{ME}$ ) shall be used:

|                                               |                 |
|-----------------------------------------------|-----------------|
| $PML_{FT}$ is equal ( $\pm 15\%$ ) to $PMP_i$ | $LF_{ME} = 0.4$ |
| $PML_{FT}$ is $> 15\%$ less than $PMP_i$      | $LF_{ME} = 0.7$ |
| $PML_{FT}$ is $> 15\%$ greater than $PMP_i$   | $LF_{ME} = 0.2$ |

Where:

$PML_{FT}$ : mean merchantable biomass as a proportion of total aboveground tree biomass for each forest type, %;

PMP<sub>i</sub>: merchantable biomass as a proportion of total aboveground tree biomass for stratum i within the project boundaries, %; and

LF<sub>ME</sub>: Leakage factor for market-effects calculations; dimensionless.

Where sufficient variation exists in PMP<sub>i</sub> relative to PML<sub>FT</sub> that multiple values of LF<sub>ME</sub> result, then an area weighted final value for LF<sub>ME</sub> shall be calculated. The area of stratum i as a proportion of the total project area shall be multiplied by LF<sub>ME</sub>. All values are then summed to arrive at the area weighted final value of LF<sub>ME</sub>.

For the project,

- According to the 13th Five-year Forest Harvest Limit issued by State Council (Guohan [2016] No.32)<sup>10</sup>, the total harvest volume limit from 2016 to 2020 is 25,403.6\*10<sup>4</sup> m<sup>3</sup> each year, and the total harvest volume limit of Guangxi Zhuang Autonomous Region from 2016 to 2020 is 4,460.9\*10<sup>4</sup> m<sup>3</sup> each year. The harvest volume when the proposed project absent is 25.94\*10<sup>4</sup> per year m<sup>3</sup> from 2016 to 2020, extremely low compared to provincial level and far below the country level in the same time period. The harvest volume in the baseline is only 0.58% of the total harvest volume in Guangxi Zhuang Autonomous Region and 0.10% of the host country level, far less than the 25% indicated by VCS standard. The reduction in timber supply caused by the project activities is insignificant compared with the market of the whole Guangxi Zhuang Autonomous Region. Therefore, the project activities will not lead to change in the balance of supply and market demand. The stability of timber prices can also prove this view. According to GUANGXI STATISTICAL YEARBOOK 2020<sup>11</sup>, the timber price index from 2016 to 2018 was 101.6%, 101.5% and 102.3% (of preceding year) respectively, indicating the price is stable with slightly increasing.
- China's annual extracted volumes are allocated by the country to the provinces and then to the counties and cities which is a top-down governmental regulation. Whether the county, city or company harvests or not will not affect the decision-making of the upper level. That is, no new concessions will be assigned. If a concession owner decides to give up the rights of logging, he can't trade or transfer the logging right to any other. So even if the market demand for timber increases, under the existing legal framework, annual extracted volumes cannot be increased. And China's penalty on illegal logging is very heavy. Regulations of the People's Republic of China on forestry law Article 38 and Article 39 clearly stipulate the punishment for the illegal logging. According to the volume and quantity of illegal logging, punishment includes not only 5-10 times compensation of replanting, but also 2-10 times economic penalty.
- In general, without new logging concessions, the harvest can't be done. And due to the strictly enforced law, illegal logging is absent with frequent patrol and high economic penalty. So the

<sup>10</sup>[http://www.gov.cn/zhengce/content/2016-02/16/content\\_5041486.htm](http://www.gov.cn/zhengce/content/2016-02/16/content_5041486.htm)

<sup>11</sup> <http://tjj.gxzf.gov.cn/tjsj/tjnj/material/tjnj20200415/2020/zk/indexch.htm>

leakage emission will not be shifted to anywhere in the host country. Although the risk of market leakage caused by project activities is very low, we still discuss it again according to the VCS Standard V4.2 for the sake of conservatism. According VCS Standard V4.2 (3.14.9) states that “IFM projects may apply the appropriate market leakage discount factor identified in Table 3 to the net change in carbon stock associated with the activity that reduces timber harvest to determine market leakage”.

- Guangxi Huanjiang IFM project is a logged to protected forest IFM activity. The project activities permanently protect the forests in the project area, and harvesting activity is permanently stopped. As mentioned earlier, even if the market demand for timber increases, under the existing legal framework, annual extracted volumes cannot be increased. So project activities are more in line with option 3 (IFM activity that substantially reduces harvest levels permanently). And market leakage discount factor conditional upon where timber harvest is likely to be shifted follow the VCS Standard table 3 and VCS Methodology. Therefore, each project must calculate within each stratum the ratio of merchantable biomass to total biomass (PMP<sub>i</sub>). This shall then be compared to the ratio of merchantable biomass to total biomass for each forest type (PML<sub>FT</sub>). We select Guangxi Zhuang Autonomous Region which is located in the subtropical area with subtropical monsoon climate and dominated by forest type of Subtropical humid forest as the reference area (harvest most likely to be displaced) since China has a vast and varied territory across tropical, subtropical, temperate, cold temperate, cold and its climate, elevation and wood supply and demand are huge different. We have set 3 stratum based on the tree species which are Broad-leaved Tree, Chinese Fir and Pinus Massoniana for the project.

Hence, the calculation is below, in the base year:

$$PMP_{\text{Broad-leaved trees}} = 124791^{12} \text{m}^3 / 9,914,981^{13} \text{m}^3 = 1.26\%$$

$$PMP_{\text{Chinese Fir}} = 62676^{14} \text{m}^3 / 5891553^{15} \text{m}^3 = 1.06\%$$

$$PMP_{\text{Pinus Massoniana}} = 62716^{16} \text{m}^3 / 1774702^{17} \text{m}^3 = 3.53\%^{18}$$

<sup>12</sup> Extracted volume of broad-leaved trees in the base year in the project, data sourced from the Timber Harvest Plan.

<sup>13</sup> From the data of the Forest Resources Planning and Design Survey Report made by Guangxi Zhuang Autonomous Region Forestry Survey and Design Institute.

<sup>14</sup> Extracted volume of Chinese fir in the base year in the project, data sourced from the Timber Harvest Plan.

<sup>15</sup> From the data of the Forest Resources Planning and Design Survey Report made by Guangxi Zhuang Autonomous Region Forestry Survey and Design Institute.

<sup>16</sup> Extracted volume of pinus massoniana in the base year in the project, data sourced from the Timber Harvest Plan.

<sup>17</sup> From the data of the Forest Resources Planning and Design Survey Report made by Guangxi Zhuang Autonomous Region Forestry Survey and Design Institute.

<sup>18</sup> From ER calculation sheet

$$PML_{\text{Subtropical humid forest}} = 4460.9^{19} \times 10^4 \text{ m}^3 / 22272.16^{20} \times 10^4 \text{ m}^3 = 20.03\%^{21}$$

$PML_{\text{Subtropical humid forest}}$  is 1491.4%<sup>22</sup> greater than  $PMP_{\text{Broad-leaved trees}}$

$PML_{\text{Subtropical humid forest}}$  is 1782.7%<sup>23</sup> greater than  $PMP_{\text{Chinese Fir}}$

$PML_{\text{Subtropical humid forest}}$  is 466.8%<sup>24</sup> greater than  $PMP_{\text{Pinus Massoniana}}$

PMP data was calculated by the data sourced from the Timber Harvest Plan and the data of the Forest Resources Planning and Design Survey Report. And PML data comes from 2016 China Forestry Statistical Yearbook<sup>25</sup>. From above calculation, it is indicated that the  $PML_{FT}$  is > 15% greater than  $PMP_i$ , the ratio of merchantable biomass to total biomass is higher within the area to which harvesting is displaced compared to the project area. Therefore, whether according to VCS Standard table 3 or VCS Methodology, the market leakage discount factor is 20%.

In summary,  $LF_{ME} = 0.2$

All the regulations and laws with regard to no new concessions and the penalty on illegal logging and data sources has been submitted to and verified by DOE.

## 5.4 Net GHG Emission Reductions and Removals

According to the equation (28) in VCS-PD, the Net Project Greenhouse Gas Emission Reductions are calculated as: For non-AFOLU projects, use the following table:

$$GHG_{CREDITS|LIPF,t^*} = GHG_{NET|BSL,t^*} - GHG_{NET|PR,t^*} - GHG_{LK|LIPF,t^*} \quad (15)$$

Where:

$GHG_{CREDITS|LIPF,t^*}$  project greenhouse gas credits associated with the implementation of improved forest management (IFM) activities in the year  $t^*$  since the start of the project activity, in the project scenario,  $tCO_2^e$

<sup>19</sup> From the 13th Five-year Forest Harvest Limit

<sup>20</sup> From 2016 China Forestry Statistical Yearbook

<sup>21</sup> <https://navi.cnki.net/knavi/yearbooks/YCSRT/detail>

<sup>22</sup> From ER calculation sheet

<sup>23</sup> From ER calculation sheet

<sup>24</sup> From ER calculation sheet

<sup>25</sup> <https://navi.cnki.net/knavi/yearbooks/YCSRT/detail>

|                     |                                                                                                                                                                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $GHG_{NET BSL,t^*}$ | net greenhouse gas emissions in the baseline scenario in the year $t^*$ since the start of the project activity, $tCO_2^e$                                                                                                                                        |
| $GHG_{NET PRJ,t^*}$ | net greenhouse gas emissions in the project scenario in the year $t^*$ since the start of the project activity, $tCO_2^e$ ; and                                                                                                                                   |
| $GHG_{LK LIPF,t^*}$ | total greenhouse gas emissions due to leakage arising outside the project boundary as a result of the implementation of improved forest management (IFM) activities in the year $t^*$ since the start of the project activity, in the project scenario, $tCO_2^e$ |

$GHG_{NET|BSL}$  and  $GHG_{NET|PRJ}$  is calculated in section 5.1 and 5.2 of the monitoring report.  $GHG_{LK|LIPF}$  is demonstrated in section 5.3. Therefore, table 7 shows a summary of  $GHG_{CREDITS|LIPF}$  for the monitoring period from 2016-2020. Detailed calculation could be seen in the excel version of emission calculation.

Table 7 Summary of total net GHG emission reductions for 01-Jul-2016-31-Dec-2020

| Year                    | Baseline emissions or removals ( $tCO_2e$ ) | Project emissions or removals ( $tCO_2e$ ) | Leakage emissions ( $tCO_2e$ ) | Net GHG emission reductions or removals ( $tCO_2e$ ) |
|-------------------------|---------------------------------------------|--------------------------------------------|--------------------------------|------------------------------------------------------|
| 01-Jul-2016-30-Jun-2017 | 81,411                                      | -72,939                                    | 16282                          | 138,068                                              |
| 01-Jul-2017-30-Jun-2018 | 89,099                                      | -72,939                                    | 17819                          | 144,219                                              |
| 01-Jul-2018-30-Jun-2019 | 110,088                                     | -72,939                                    | 22017                          | 161,010                                              |
| 01-Jul-2019-30-Jun-2020 | 129,639                                     | -72,939                                    | 25927                          | 176,651                                              |
| 01-Jul-2020-31-Dec-2020 | 64,353                                      | -36,469                                    | 12870                          | 87,952                                               |
| Total                   | 474,591                                     | -328,225                                   | 94,915                         | 707,901                                              |

#### 5.4.1 Adjustment for uncertainty

Estimated greenhouse gas emissions and emission reductions from IFM activities have uncertainties associated with parameters and coefficients including estimates of area, carbon stocks, regrowth and expansion factors. It is assumed that the uncertainties associated with input data are available, either as default uncertainty values given in most recent IPCC guidelines, or as statistical estimates based on sampling.

Uncertainty at all times is defined at the 95% confidence interval where the estimated variance exceeds +/- 15 percent from the mean. Procedures including stratification and the allocation of sufficient measurement plots will help ensure that low uncertainty results and ultimately full crediting can result.

Uncertainties arising from the measurement and monitoring of carbon pools and greenhouse gases shall always be quantified. Errors in each pool shall be weighted by the size of the pool so that projects may reasonably target a lower precision level in pools that only form a small proportion of the total stock.

For both the baseline and the with-project case the total uncertainty is equal to the square root of the sum of the squares of each component uncertainty and is calculated at the time of reporting through propagating the error in the baseline stocks and the error in the project stocks.

Therefore, total uncertainty for LtPF project is calculated as:

$$U_{TOTAL|LtPF} = \sqrt{U_{PRJ}^2 + U_{BSL}^2} \quad (16)$$

Where:

|                  |                                                                                                             |
|------------------|-------------------------------------------------------------------------------------------------------------|
| $U_{total LtPF}$ | total uncertainty for LtPF Project, dimensionless;                                                          |
| $U_{PRJ}$        | total uncertainty for the improved forest management activities in the project scenario, dimensionless; and |
| $U_{BSL}$        | total uncertainty for the baseline scenario, dimensionless.                                                 |

*Project proponents must justify the selection of uncertainty propagation in the VCS-PD. If  $U_{total|LtPF} \leq 0.15$  then no deduction will result for uncertainty.*

*If  $U_{total|LtPF} > 0.15$  then the amount of greenhouse gas emission credits associated with IFM activities will be deducted as follows:*

$$Credits_{total|LtPF} = GHG_{credits|LtPF} \cdot (1 - U_{total|LtPF}) \quad (17)$$

Where:

|                        |                                                                                                                                                                                       |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $Credits_{total LtPF}$ | total greenhouse gas credits adjusted for uncertainty for each year t in the project crediting period;                                                                                |
| $GHG_{credits LtPF}$   | project greenhouse gas credits associated with the implementation of improved forest management (IFM) activities in the project scenario, tCO <sub>2</sub> e·year <sup>-1</sup> ; and |
| $U_{total LtPF}$       | total uncertainty for LtPF Project, dimensionless.                                                                                                                                    |

**For the baseline scenario:**

As ex-ante calculated in the VCS-PD, the  $U_{BSL}$  is 1.70% for the baseline scenario.

**For the project scenario:**

According to IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories<sup>26</sup>, the uncertainty in the baseline scenario is associated with parameters and coefficients including estimates of area, carbon stocks, regrowth and expansion factors, the calculation process follows the two rules below:

Rule A: Where uncertainties are to be combined by addition, the standard deviation of the sum will be the square root of the sum of the squares of the standard deviations of the quantities that are added with the standard deviations all expressed in absolute terms (this rule is exact for uncorrelated variables).

Using this interpretation, a simple equation can be derived for the uncertainty of the sum, that when expressed in percentage terms become:

$$U_{total} = \frac{\sqrt{(U_1 \times E_1)^2 + (U_2 \times E_2)^2 + \dots + (U_n \times E_n)^2}}{E_1 + E_2 + \dots + E_n} \quad (18)$$

Where:

- $U_{total}$  is the percentage uncertainty in the sum of the quantities (half the 95% confidence interval divided by the total (i.e. mean) and expressed as a percentage);
- $E_i$  and  $U_i$  are the uncertain quantities and the percentage uncertainties associated with them, respectively

Rule B : Where uncertain quantities are to be combined by multiplication, the same rule applies except that the standard deviations must all be expressed as fractions of the appropriate mean values (this rule is approximate for all random variables)

A simple equation can also be derived for the uncertainty of the product, expressed in percentage terms:

$$U_{total} = \sqrt{U_1^2 + U_2^2 + \dots + U_n^2} \quad (19)$$

Where:

- $U_{total}$  is the percentage uncertainty in the product of the quantities (half the 95% confidence interval divided by the total and expressed as a percentage);
- $U_i$  are the percentage uncertainties associated with each of the quantities.

<sup>26</sup> IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, Chapter 6, Quantifying Uncertainties in Practice

The uncertainty is calculated per stratum by dividing the 95% confidence interval by the mean value of the uncertainty quantities. The corresponding standard deviation is calculated over the measured plot values of the uncertainty quantities. The 95% confidence interval is calculated based on the standard deviation and the t-value for n-1 degree of freedom of plots per stratum.

As the uncertainty in the baseline scenario is associated with parameters and coefficients including estimates of area, carbon stocks, regrowth and expansion factors, the calculation of the 4 parameters and coefficients are shown below:

#### 1) Uncertainty of Area:

In the baseline scenario, the area of every stratum are quoted from the field survey inventory data and legal right of harvest, so no data are from measurement and monitoring. Therefore, it is deemed as 0 in the period of validation. It will be monitored in the period of verification.

#### 2) Uncertainty of expansion factors:

The Sample size, Sample mean and Standard error of expansion factors are quoted from Forestry Part of China's greenhouse gas emissions list divided as tree species, and the uncertainty of expansion factors are calculated as below:

For Broad-leaved tree:

| Uncertainty of BCEF- Broad-leaved tree |       | 3.02%                               |       |
|----------------------------------------|-------|-------------------------------------|-------|
| Uncertainty of BEF Broad-leaved tree   | 2.99% | Uncertainty of D- Broad-leaved tree | 0.42% |
| BEF                                    |       | D                                   |       |
| Sample size                            | 153   | Sample size                         | 189   |
| Sample mean (BEF)                      | 1.514 | Sample mean (D)                     | 0.443 |
| Standard deviation                     | 0.283 | Standard deviation                  | 0.013 |
| Average error                          | 0.023 | Average error                       | 0.001 |
| Confidence level                       | 0.95  | Confidence level                    | 0.95  |
| Degree of freedom                      | 152   | Degree of freedom                   | 188   |
| Two-sided Student's t-value            | 1.976 | Two-sided Student's t-value         | 1.973 |
| Allowable error                        | 0.045 | Allowable error                     | 0.002 |
| Lower confidence limit                 | 1.469 | Lower confidence limit              | 0.441 |
| Upper confidence limit                 | 1.559 | Upper confidence limit              | 0.445 |
| Confidence interval                    | 0.045 | Confidence interval                 | 0.002 |

For Chinese fir:

| Uncertainty of BCEF- Chinese fir |       | 2.21%                         |       |
|----------------------------------|-------|-------------------------------|-------|
| Uncertainty of BEF- Chinese fir  | 2.06% | Uncertainty of D- Chinese fir | 0.80% |
| BEF                              |       | D                             |       |
| Sample size                      | 71    | Sample size                   | 54    |
| Sample mean (BEF)                | 1.323 | Sample mean (D)               | 0.307 |

|                             |       |                             |       |
|-----------------------------|-------|-----------------------------|-------|
| Standard deviation          | 0.115 | Standard deviation          | 0.009 |
| Average error               | 0.014 | Average error               | 0.001 |
| Confidence level            | 0.95  | Confidence level            | 0.95  |
| Degree of freedom           | 70    | Degree of freedom           | 53    |
| Two-sided Student's t-value | 1.994 | Two-sided Student's t-value | 2.006 |
| Allowable error             | 0.027 | Allowable error             | 0.002 |
| Lower confidence limit      | 1.296 | Lower confidence limit      | 0.305 |
| Upper confidence limit      | 1.350 | Upper confidence limit      | 0.309 |
| Confidence interval         | 0.027 | Confidence interval         | 0.002 |

For Pinus massoniana:

|                                       |       |                                    |       |
|---------------------------------------|-------|------------------------------------|-------|
| Uncertainty of BCEF- Pinus massoniana |       | 2.38%                              |       |
| Uncertainty of BEF- Pinus massoniana  | 1.82% | Uncertainty of D- Pinus massoniana | 1.54% |
| BEF                                   |       | D                                  |       |
| Sample size                           | 68    | Sample size                        | 43    |
| Sample mean (BEF)                     | 1.305 | Sample mean (D)                    | 0.380 |
| Standard deviation                    | 0.098 | Standard deviation                 | 0.019 |
| Average error                         | 0.012 | Average error                      | 0.003 |
| Confidence level                      | 0.95  | Confidence level                   | 0.95  |
| Degree of freedom                     | 67    | Degree of freedom                  | 42    |
| Two-sided Student's t-value           | 1.996 | Two-sided Student's t-value        | 2.018 |
| Allowable error                       | 0.024 | Allowable error                    | 0.006 |
| Lower confidence limit                | 1.281 | Lower confidence limit             | 0.374 |
| Upper confidence limit                | 1.329 | Upper confidence limit             | 0.386 |
| Confidence interval                   | 0.024 | Confidence interval                | 0.006 |

- 3) The calculation of uncertainty of carbon stock is based on the uncertainty of volume in every stratum multiply by the uncertainty of expansion factors using formula (33) in the VCS-PD:

For 2016:

|                                                |           |                                          |           |                                               |           |
|------------------------------------------------|-----------|------------------------------------------|-----------|-----------------------------------------------|-----------|
| Uncertainty of carbon stock- Broad-leaved tree | 4.25%     | Uncertainty of carbon stock- Chinese fir | 5.32%     | Uncertainty of carbon stock- Pinus massoniana | 4.24%     |
| Uncertainty of volume- Broad-leaved tree       | 2.99%     | Uncertainty of volume – Chinese fir      | 4.84%     | Uncertainty of volume – Pinus massoniana      | 3.51%     |
| carbon stock- Broad-leaved tree                | 247788.36 | carbon stock- Chinese fir                | 115567.36 | carbon stock- Pinus massoniana                | 109849.82 |
| Area(ha)                                       | 4440.05   | Area(ha)                                 | 2736.96   | Area(ha)                                      | 2169.71   |
| Sample size                                    | 646       | Sample size                              | 310       | Sample size                                   | 350       |
| Sample mean                                    | 152.95    | Sample mean                              | 115.72    | Sample mean                                   | 138.76    |

|                              |        |                              |        |                              |        |
|------------------------------|--------|------------------------------|--------|------------------------------|--------|
| (m <sup>3</sup> /ha)         |        | (m <sup>3</sup> /ha)         |        | (m <sup>3</sup> /ha)         |        |
| Standard deviation           | 59.40  | Standard deviation           | 50.30  | Standard deviation           | 46.50  |
| Average error                | 2.34   | Average error                | 2.86   | Average error                | 2.49   |
| Confidence level             | 0.95   | Confidence level             | 0.95   | Confidence level             | 0.95   |
| Degree of freedom            | 645    | Degree of freedom            | 309    | Degree of freedom            | 349    |
| Two-sided Student's t- value | 1.96   | Two-sided Student's t- value | 1.96   | Two-sided Student's t- value | 1.96   |
| Allowable error              | 4.58   | Allowable error              | 5.60   | Allowable error              | 4.87   |
| Lower confidence limit       | 148.37 | Lower confidence limit       | 110.12 | Lower confidence limit       | 133.89 |
| Upper confidence limit       | 157.53 | Upper confidence limit       | 121.32 | Upper confidence limit       | 143.63 |
| Confidence interval          | 4.58   | Confidence interval          | 5.60   | Confidence interval          | 4.87   |

For 2020:

|                                                |        |                                          |        |                                               |        |
|------------------------------------------------|--------|------------------------------------------|--------|-----------------------------------------------|--------|
| Uncertainty of carbon stock- Broad-leaved tree | 10.07% | Uncertainty of carbon stock- Chinese fir | 6.69%  | Uncertainty of carbon stock- Pinus massoniana | 23.26% |
| Uncertainty of volume- Broad-leaved tree       | 9.61%  | Uncertainty of volume – Chinese fir      | 6.31%  | Uncertainty of volume – Pinus massoniana      | 23.14% |
| carbon stock- Broad-leaved tree                | 62.27  | carbon stock- Chinese fir                | 28.60  | carbon stock- Pinus massoniana                | 23.72  |
| Area(ha)                                       | 1.28   | Area(ha)                                 | 0.68   | Area(ha)                                      | 0.48   |
| Sample size                                    | 32     | Sample size                              | 17     | Sample size                                   | 12     |
| Sample mean (m <sup>3</sup> /ha)               | 133.33 | Sample mean (m <sup>3</sup> /ha)         | 167.68 | Sample mean (m <sup>3</sup> /ha)              | 176.67 |
| Standard deviation                             | 36.98  | Standard deviation                       | 22.27  | Standard deviation                            | 72.25  |
| Average error                                  | 6.54   | Average error                            | 5.40   | Average error                                 | 20.86  |
| Confidence level                               | 0.95   | Confidence level                         | 0.95   | Confidence level                              | 0.95   |
| Degree of freedom                              | 31     | Degree of freedom                        | 16     | Degree of freedom                             | 11     |
| Two-sided Student's t- value                   | 1.96   | Two-sided Student's t- value             | 1.96   | Two-sided Student's t- value                  | 1.96   |
| Allowable error                                | 12.81  | Allowable error                          | 10.58  | Allowable error                               | 40.88  |
| Lower confidence limit                         | 120.51 | Lower confidence limit                   | 157.10 | Lower confidence limit                        | 135.79 |
| Upper confidence limit                         | 146.14 | Upper confidence limit                   | 178.27 | Upper confidence limit                        | 217.55 |
| Confidence interval                            | 12.81  | Confidence interval                      | 10.58  | Confidence interval                           | 40.88  |

The baseline emission uncertainty has been listed in the PD is 1.70%, the detailed calculation is listed as follows:

Based on the calculation of the parameters and coefficients above, the calculation of  $U_{PRJ}$  is shown below:

| Stratum           | Parameter | A <sub>rea</sub> (Ha) | V <sub>EX,j,i BSL</sub><br>(m <sup>3</sup> /ha) | BEF   | D(tdm/m <sup>3</sup> ) | BCEFR<br>(tdm/m <sup>3</sup> ) | CFj(tc/tdm) | C <sub>HB,j,i BSL</sub> (tC /ha) | C <sub>EX,j,i BSL</sub><br>(tC ha <sup>-1</sup> ) | ΔC <sub>DW,i,p BSL</sub>                                         |
|-------------------|-----------|-----------------------|-------------------------------------------------|-------|------------------------|--------------------------------|-------------|----------------------------------|---------------------------------------------------|------------------------------------------------------------------|
|                   |           | a                     | b                                               | c     | d                      | e=c*d                          | f           | g=b*e*f                          | h=b*d*f                                           | i=g-h                                                            |
|                   |           |                       |                                                 |       |                        |                                |             | $U_g = \sqrt{U_b^2 + U_e^2}$     | $U_h = \sqrt{U_b^2 + U_d^2}$                      | $U_i = \frac{\sqrt{(E_g * U_h)^2 + (E_h * U_g)^2}}{(E_g + E_h)}$ |
| Broad-leaved tree | E         | 4440.05               | 152.95                                          | 1.514 | 0.482                  | 0.730                          | 0.5         | 55.81                            | 36.86                                             | 18.95                                                            |
|                   | U         | 0.00%                 | 2.99%                                           | 2.99% | 0.42%                  | 3.02%                          |             | 4.25%                            | 3.02%                                             | 2.83%                                                            |
| Chinese fir       | E         | 2736.96               | 115.72                                          | 1.634 | 0.307                  | 0.502                          | 0.5         | 29.03                            | 17.76                                             | 11.26                                                            |
|                   | U         | 0.00%                 | 4.84%                                           | 2.06% | 0.80%                  | 2.21%                          |             | 5.32%                            | 4.90%                                             | 3.79%                                                            |
| Pinus massoniana  | E         | 2169.71               | 138.76                                          | 1.472 | 0.380                  | 0.559                          | 0.5         | 38.81                            | 26.36                                             | 12.44                                                            |
|                   | U         | 0.00%                 | 3.51%                                           | 1.82% | 1.54%                  | 2.38%                          |             | 4.24%                            | 3.83%                                             | 2.96%                                                            |

| Stratum           | Parameter | WW <sub>k</sub> | SLF <sub>k</sub> | C <sub>wp,0 BSL</sub><br>(tc/ha) | C <sub>WP,i BSL</sub> (tc/ha)                                    | OF <sub>k</sub> | ΔC <sub>WP,100 BSL</sub><br>(tc/ha) | A <sub>i,p</sub> (ha) | ΔC <sub>NET BSL(1)</sub> (tC)                                                          |
|-------------------|-----------|-----------------|------------------|----------------------------------|------------------------------------------------------------------|-----------------|-------------------------------------|-----------------------|----------------------------------------------------------------------------------------|
|                   |           | j               | k                | l=h*(j+k)                        | m=h-l                                                            | n               | o=m*n                               | p                     | q=(i/10+l+o/20)*p                                                                      |
|                   |           |                 |                  | U <sub>l</sub> =U <sub>h</sub>   | $U_m = \frac{\sqrt{(E_s * U_h)^2 + (E_l * U_l)^2}}{(E_h + E_l)}$ |                 | U <sub>o</sub> =U <sub>m</sub>      | U <sub>p</sub> =0     | $U_m = \frac{\sqrt{(E_l * U_l)^2 + (E_i * U_l)^2 + (E_o * U_o)^2}}{(E_h + E_l + E_o)}$ |
| Broad-leaved tree | E         | 24%             | 0.12             | 13.27                            | 23.59                                                            | 0.86            | 20.29                               | 4440.05               | 71835.71                                                                               |
|                   | U         |                 |                  | 3.02%                            | 2.36%                                                            |                 | 2.36%                               | 0.00%                 | 1.57%                                                                                  |
| Chinese fir       | E         | 24%             | 0.12             | 6.39                             | 11.37                                                            | 0.86            | 9.78                                | 2736.96               | 21923.01                                                                               |
|                   | U         |                 |                  | 4.90%                            | 3.83%                                                            |                 | 3.83%                               | 0.00%                 | 2.36%                                                                                  |
| Pinus massoniana  | E         | 24%             | 0.12             | 9.49                             | 16.87                                                            | 0.86            | 14.51                               | 2169.71               | 24866.79                                                                               |
|                   | U         |                 |                  | 3.83%                            | 3.00%                                                            |                 | 3.00%                               | 0.00%                 | 1.86%                                                                                  |

| Stratum           | Parameter | $\Delta C_{NET BSL(2-10)}(tC)$                                   | $\Delta C_{NET BSL(11-20)}(tC)$ | regrowth rate<br>(m <sup>2</sup> /ha/yr) | $\Delta C_{NET BSL,t}(tC)$   | $\Delta C_{NET, i,P BSL}$                                                                                    |
|-------------------|-----------|------------------------------------------------------------------|---------------------------------|------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------|
|                   |           | $r=(i/10+o/20)*p$                                                | $s=o/20*p$                      | t                                        | $v=e*f*p*t$                  | $w=q+r+s-v$                                                                                                  |
|                   |           | $U_r = \frac{\sqrt{(E_i * U_i)^2 + (E_o * U_o)^2}}{(E_i + E_o)}$ | $U_s = U_o$                     | $U_t = 10\%$                             | $U_r = \sqrt{U_i^2 + U_o^2}$ | $U_m = \frac{\sqrt{(E_q * U_q)^2 + (E_r * U_r)^2 + (E_s * U_s)^2 + (E_v * U_v)^2}}{(E_q + E_r + E_s + E_v)}$ |
| Broad-leaved tree | E         | 116247.77                                                        | 35931.73                        | 2.06                                     | 56536.19                     | 167479.02                                                                                                    |
|                   | U         | 1.83%                                                            | 2.36%                           | 10.00%                                   | 10.44%                       | 2.29%                                                                                                        |
| Chinese fir       | E         | 39783.46                                                         | 10445.76                        | 2.99                                     | 34500.32                     | 37651.91                                                                                                     |
|                   | U         | 2.70%                                                            | 3.83%                           | 10.00%                                   | 10.24%                       | 3.52%                                                                                                        |
| Pinus massoniana  | E         | 38467.10                                                         | 12491.63                        | 2.68                                     | 27558.44                     | 48267.08                                                                                                     |
|                   | U         | 2.11%                                                            | 3.00%                           | 10.00%                                   | 10.28%                       | 2.91%                                                                                                        |
|                   |           |                                                                  |                                 |                                          | $U_{BSL}$                    | 1.70%                                                                                                        |

### Uncertainty for the project scenario:

| Stratum           | Parameter | $A_{rea}(Ha)$ | $V_{AB,i 2016}$<br>(m <sup>3</sup> /ha) | BEF   | $D(tdm/m^3)$ | $BCEFR$<br>(tdm/m <sup>3</sup> ) | CFj<br>(tc/tdm) | $V_{AB,i 2020}$<br>(m <sup>3</sup> /ha) | $\Delta V_{AB,i PRJ}$ (m <sup>3</sup> /ha) | $\Delta C_{AB,i PRJ}$ (tCO <sub>2</sub> ) |
|-------------------|-----------|---------------|-----------------------------------------|-------|--------------|----------------------------------|-----------------|-----------------------------------------|--------------------------------------------|-------------------------------------------|
|                   |           | a             | b                                       | c     | d            | e=c*d                            | f               | g                                       | h=g-b                                      | i=h*a*e*f*44/12                           |
|                   |           |               |                                         |       |              |                                  |                 |                                         |                                            | $U_i = \sqrt{U_d^2 + U_f^2}$              |
| Broad-leaved tree | E         | 4440.05       | 152.95                                  | 1.514 | 0.482        | 0.730                            | 0.5             | 133.33                                  | -19.62                                     | -116557.73                                |
|                   | U         | 0.00%         | 2.99%                                   | 2.99% | 0.42%        | 3.02%                            |                 | 9.61%                                   | 4.75%                                      | 5.63%                                     |
| Chinese fir       | E         | 2736.96       | 115.72                                  | 1.634 | 0.307        | 0.502                            | 0.5             | 167.68                                  | 51.96                                      | 130786.64                                 |
|                   | U         | 0.00%         | 4.84%                                   | 2.06% | 0.80%        | 2.21%                            |                 | 6.31%                                   | 4.23%                                      | 4.77%                                     |
| Pinus massoniana  | E         | 2169.71       | 138.76                                  | 1.472 | 0.380        | 0.559                            | 0.5             | 176.67                                  | 37.91                                      | 84350.12                                  |
|                   | U         | 0.00%         | 3.51%                                   | 1.82% | 1.54%        | 2.38%                            |                 | 23.14%                                  | 13.05%                                     | 13.27%                                    |
|                   |           |               |                                         |       |              |                                  |                 | $U_{PRJ}$                               |                                            | 14.60%                                    |

### Total uncertainty:

Total uncertainty for Lt<sub>PF</sub> project is calculated according to the follow equation:

$$U_{Total\ LtPF} = \sqrt{U_{PRJ}^2 + U_{BSL}^2} = \sqrt{1.70\%^2 + 14.60\%^2} = 14.70\% = 0.1470$$

As  $U_{total} \leq 0.15$ , then no deduction will result for uncertainty

## 5.4.2 Calculation of verified carbon units

The amount of greenhouse gas credits estimated at Step 4.4.1 above should be adjusted to account for risk.

Based on the VCS Tool for AFOLU Non-Permanence Risk Tool version 4.0, the amount of VCUs that can be issued at time  $t=t_2$  (the date of verification) for monitoring period  $T=t_2-t_1$ , is calculated as the equation:

$$VCU_{net|LtPF} = (Credits_{total,t2|LtPF} - Credits_{total,t1|LtPF}) - Bu_{IFM-VCS}$$

Where:

|                           |                                                                                                           |
|---------------------------|-----------------------------------------------------------------------------------------------------------|
| $VCU_{net LtPF}$          | number of verified carbon units; dimensionless;                                                           |
| $Credits_{total,t1 LtPF}$ | net anthropogenic greenhouse gas removals by sinks, as estimated for $t^*=t_1$ in tCO <sub>2</sub> e;     |
| $Credits_{total,t2 LtPF}$ | net anthropogenic greenhouse gas removals by sinks, as estimated for $t^*=t_2$ in tCO <sub>2</sub> e; and |
| $Bu_{IFM-VCS}$            | total number of credits withheld in VCS buffer account                                                    |

Based on the analysis in section 3.1, the overall risk rating of 23 is converted to a percentage as 23%. This percentage is multiplied by the net change in the project's carbon stock. Therefore, the amount of verified carbon units of this crediting period is:

| Year                        | Baseline emissions or removals (tCO <sub>2</sub> e) | Project emissions or removals (tCO <sub>2</sub> e) | Leakage emissions (tCO <sub>2</sub> e) | Net GHG emission reductions or removals (tCO <sub>2</sub> e) | Buffer pool allocation | VCUs eligible for issuance |
|-----------------------------|-----------------------------------------------------|----------------------------------------------------|----------------------------------------|--------------------------------------------------------------|------------------------|----------------------------|
| 01-Jul-2016-30-Jun-2017     | 81,411                                              | -72,939                                            | 16282                                  | 138,068                                                      | 31,756                 | 106,312                    |
| 01-Jul-2017-30-Jun-2018     | 89,099                                              | -72,939                                            | 17819                                  | 144,219                                                      | 33,170                 | 111,048                    |
| 01-Jul-2018-30-Jun-2019     | 110,088                                             | -72,939                                            | 22017                                  | 161,010                                                      | 37,032                 | 123,977                    |
| 01-Jul-2019-30-Jun-2020     | 129,639                                             | -72,939                                            | 25927                                  | 176,651                                                      | 40,630                 | 136,021                    |
| 01-Jul-2020-31-Dec-2020     | 64,353                                              | -36,469                                            | 12870                                  | 87,952                                                       | 20,229                 | 67,723                     |
| <b>Total</b>                | <b>474,591</b>                                      | <b>-328,225</b>                                    | <b>94,915</b>                          | <b>707,901</b>                                               | <b>162,817</b>         | <b>545,081</b>             |
| <b>Average annual value</b> | <b>105,464</b>                                      | <b>-72,938</b>                                     | <b>21,092</b>                          | <b>157,311</b>                                               | <b>36,181</b>          | <b>121,129</b>             |