YUNNAN KUNMING LIANGQU IMPROVED FOREST MANAGEMENT PROJECT

中信环境投资集团有限公司
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Yunnan Kunming Liangqu Improved Forest Management Project (hereafter “the project”) is located in Lianhe Township and Zhuanlong Town, Kunming City, Yunnan Province,P.R.C. It is implemented by Kunming Yuming Investment Development Co., Ltd. (hereafter “project owner”) to protect the once logging forest.

For Lianhe Township:

Lianhe Township locates in the north-west of Xundian County, and connects west of Zhuanlong Town, 165 kilometres of Kunming city, the capital of Yunnan Province, 117 kilometres away from Xundian downtown. The geographic coordinate is 102° 43’ ~103° 33’ E and 25° 20’ ~26° 50’ N. The total area is 16,671ha, of which 8,851.3 ha is the forest area, accounting 53.09% of the total area. The project area has a complex geomorphologic characteristic, which is mainly composed by mountainous regions with high mountains and steep hillside. The elevation level of the region is ranged from 2,110~3,261m and the climate feature is subtropical plateau monsoon. The dominant tree species within the project area are Broad leaf trees and Pines. Prior to the implementation of the project, the forest was logged annually according to the timber logging and managing plan issued by the local forest authority. In order to protect the ecological system, the local government has tried to reduce the annual forest timber volume within the project area, which can be seen from the timber logging and managing plan, the commercial harvest is cancelled and only tending and managing is permitted.

Zhuanlong Town locates in the north-east of Luquan County, 155 kilometres of Kunming city, the capital of Yunnan Province, 112 kilometres away from Luquan downtown. The geographic coordinate is 102° 13’ ~102° 56’ E and 25° 25’ ~26° 22’ N. The total area is 25,613ha, of which 14,627 ha is the forest area, accounting 57.11% of the total area. The project area the project area has a complex geomorphologic characteristic, which is mainly composed by mountainous regions with high mountains and steep hillside. The elevation level of the region is ranged from 1,881~3,266m and the climate feature is subtropical plateau monsoon. The dominant tree species within the project area are Broad leaf trees and Pines. Prior to the implementation of the project, the forest was logged annually according to the timber logging and managing plan issued by the local forest authority. In order to protect the ecological system, the local forest authorityhas tried to reduce the annual forest timber volume within the project area, which can be seen from the timber logging and managing plan, the commercial harvest is cancelled and only tending and managing is permitted.

The proposed project is implemented in Lianhe Township and Zhuanlong Town. The project has 6,879.2ha commercial forest, of which 1,425.1 and 5,454.1ha belongs to Lianhe and Zhuanlong Town respectively, whose ages ranging from sapling, middle age to mature forest. Before the implementation of the project, the forest within the project area was designed and planted as commercial forest. The main object of the project is to improve the forest coverage rate, protect local ecological environment, reduce carbon emissions and carbon sequestration by enhance the management level and converse logged to protected forest within the project area. The implementation of the project will result in significant carbon sequestration and improve the sustainable development of ecological system. The project is expected to generate 821,001 tCO_2e emission reductions within the crediting of 20 years starting from 01/04/2011 with the average annual emission reductions of 41,050 t CO_2e, without buffer deduction, the annual and the total emission reductions are 54,734 and 1,094,681 tCO_2e respectively.

From 2011, the project has strictly cancelled the once annual commercial timber harvest and only allowed tending and managing. In order to control the annual forest timber volume and achieve reliable and verified carbon sequestration, a forest protection plan will be issued by local government, and strictly executed by the project owner. The forest growth amount and forest second class investigation will be monitored by local forestry authority periodically.

1.2 Sectoral Scope and Project Type

Sectoral scope 14 (AFOLU)

Improved Forest Management: Logged to Protected Forest

1.3 Project Proponent

Organization name	Kunming Yuming Investment Development Co., Ltd.
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Title	Head of the investment & financing operation and management department
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Email	37332984@qq.com

1.4 Other Entities Involved in the Project

Organization name	China Green Carbon Foundation
Role in the project	Coordinator Negotiator
Contact person	Jinliang Li
Title	Chief Engineer
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Organization name	CITIC Environment Investment Group Co., Ltd.
Role in the project	Project Consultant
Contact person	Yapeng Zhang
Title	Project Manager
Address	Room 3202, Jingcheng Mansion, 6 Xinyuan Nanlu, Chaoyang District, Beijing, China.
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1.5 Project Start Date

The Project Start Date is represented by the notice issued by the local forest authority to strengthen the protection of the forest resource on 01/04/2011.

1.6 Project Crediting Period

The project crediting period is from 01/04/2011 to 31/03/2031 with the total length of 20 years.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e) without buffer deduction	Estimated GHG emission reductions or removals (tCO_2e) with buffer deduction
01/04/2011-31/12/2011	48,094.50	36,070.00
01/01/2012-31/12/2012	63,659.13	47,744.00
01/01/2013-31/12/2013	62,787.81	47,090.00

01/01/2014-31/12/2014	62,091.38	46,568.00
01/01/2015-31/12/2015	61,227.67	45,920.00
01/01/2016-31/12/2016	60,865.79	45,649.00
01/01/2017-31/12/2017	60,002.08	45,001.00
01/01/2018-31/12/2018	59,305.65	44,479.00
01/01/2019-31/12/2019	58,449.56	43,837.00
01/01/2020-31/12/2020	58,072.46	43,554.00
01/01/2021-31/12/2021	56,487.14	42,365.00
01/01/2022-31/12/2022	54,823.70	41,117.00
01/01/2023-31/12/2023	53,016.13	39,762.00
01/01/2024-31/12/2024	51,640.95	38,730.00
01/01/2025-31/12/2025	49,833.38	37,375.00
01/01/2026-31/12/2026	48,169.93	36,127.00
01/01/2027-31/12/2027	46,380.54	34,785.00
01/01/2028-31/12/2028	44,969.00	33,726.00
01/01/2029-31/12/2029	43,179.61	32,384.00
01/01/2030-31/12/2030	41,516.17	31,137.00
01/01/2031-31/03/2031	10,108.31	7,581.00
Total estimated Ers	1,094,680.89	821,001.00
Total number of crediting years	20	20
Average annual Ers	54,734.04	41,050.00

1.8 Description of the Project Activity

The project is located in south west part of Kunming Yuming Investment Development Co., Ltd. The project area has a subtropical plateau monsoon climate feature. As the forest coverage rate is 83.37%, the primary business within the project area is forest industry .The existing commercial forest was mainly comprised of broad leaf tree and pines, all the tree species are native to the project area. According to the timber logging and managing plan approved by local forest authority, prior to the project implementation, all timber logging including commercial harvest & tending and managing was planned annually at the beginning of every year. The harvested trees will be transported to the local lumber market. From 2011 of the project implementation, the commercial harvest has been cancelled and only tending and managing is allowed.

The project will converse 6,879.2ha forest from logged to protected, it is located in Lianhe Township and Zhuanlong Town. respectively, 1,425.1 and 5,454.1ha belongs to the former and latter. As the forest authority belongs to the hundreds of local villager group, in order to improve the efficiency, the villager groups commit Kunming Yuming Investment Development Co., Ltd to represent them as PO to implement the GHG related work. The project activity will significantly improve the forest management conditions within the project area, and benefit local ecological environment. The implementation of the project will not only achieve a reliable measurable carbon sequestration by reducing commercial timer, but also contribute to sustainable development of the local community, host country by means of:

- As one of the most precious ecological resources, forest is key to biodiversity and all life forms. The protection of local forest will enrich the biodiversity and provide more opportunity for adaptive response to natural challenges and economic development (e.g. climate change and new medical discoveries);

- Offer job opportunities. Instead of casual labour demand for forest timber (once a year or several years), the protected forest will create some employment opportunities for forest management. The related training process will improve the skill of the local employees.

- Meet the strategy development plan of host country and local area. After the implementation of the project, the increasing forest coverage rate will benefit the local environmental condition by producing more oxygen and absorb more greenhouse gas.

The land parcels of the project are listed as follow:

Parcel number	Department	Serial Number	Area (ha)
1	Lianhe Township	LH	1,425.1
2	Zhuanlong Town	ZL	5,454.1
Total			6,879.2

Of its 6,879.2 ha forest land, Lianhe Township covers an area of 1,425.1 ha, Zhuanlong Town covers 5,454.1 ha.

Of all the tree species, Broad-leaf tree covers an area of 2,905.4ha, Pine covers 3,973.8ha.

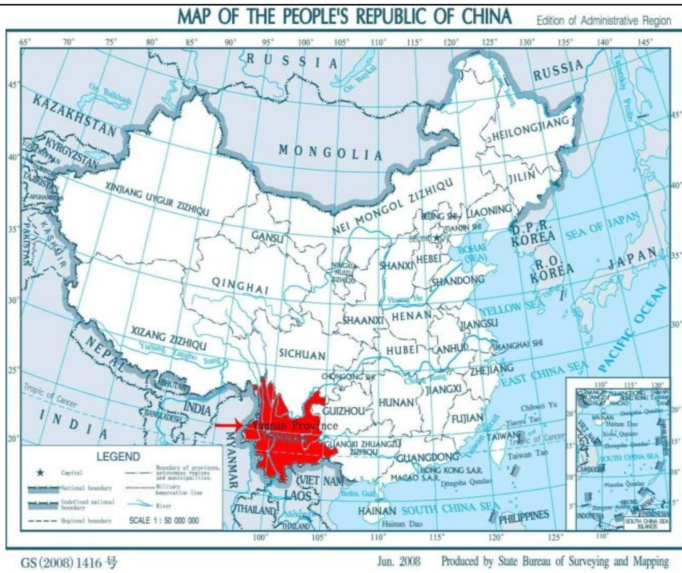
Based on its tree species, two strata has been set out. As stated in P56-57 of the professional college textbook “technology of sampling investigation” published by Chinese Forest Press in 2007, the main purpose of strata is to improve accuracy due to the variation of carbon stock and to reduce the sampling cost. The strata is set out mainly based on the tree species, age and canopy density, but it does not means all these factors should be considered for all the project, more strata could improve the accuracy but also could result in more workload and cost accordingly. Only one single factor for strata determination is also permitted as far as it could decrease the variation within the same stratum and reach the accuracy level under certain degree of freedom. As for the project, the species, which is the most important factor for the carbon stock, is relative simple, then only two strata is set out, and the sampling accuracy has been reached 90% as required, therefore, the strata is reasonable and feasible. the details are list as below:

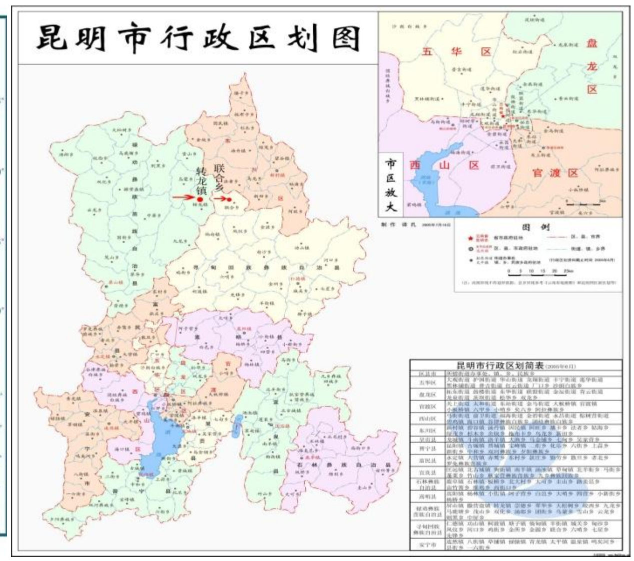
No.	Dominant Tree Species	Area (ha)	Volume(m3)	Data Source
LQ-BR-1	Broad-leaf tree	2,905.37	361,916.23	Forest second class investigation issued by Yunnan Institute of forest Inventory and Planning
LQ-Pine-2	Pines	3,973.83	528,435.15	
Total		6,879.20	890,351.37	

1.9 Project Location

The project locates in Lianhe Township and Zhuanlong Town of Kunming city. The project area has 6,879.2ha commercial forest.

The schematic diagram of the location of the project is shown below, the detailed location and coordinates of every small spot in Lianhe and Zhuanlong is listed in the appendix.

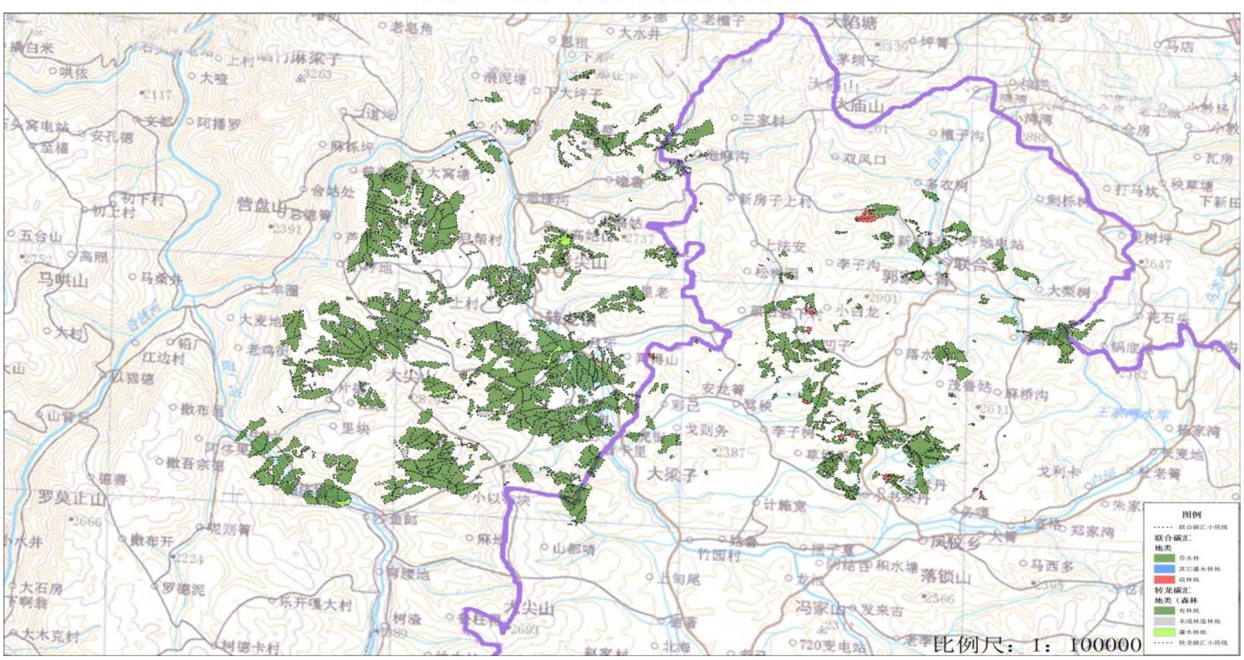




The location of Yunnan in China

The location of "Lianhe" and "Zhuanlong"

“两区”碳汇项目地块分布图



The location of the proposed project

1.10 Conditions Prior to Project Initiation

Prior to the implementation of the project, the forest within the project area was logged annually according to the timber harvest and management plan.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project activity is in line with the Forest Law of People's Republic of China.

1.12 Ownership and Other Programs

1.12.1 Right of Use

The forest ownership and legal right of the project belongs to the separate villager group, for the convenient management, they commit Kunming Yuming Investment Development Co., Ltd to apply the emission reductions from their IFM project activity using VCS standard.

1.12.2 Emissions Trading Programs and Other Binding Limits

The project does not involve in any other emission trading programs or binding limits.

1.12.3 Other Forms of Environmental Credit

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

1.12.4 Participation under Other GHG Programs

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

1.12.5 Projects Rejected by Other GHG Programs

N.A.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

N.A.

Leakage Management

N.A.

Commercially Sensitive Information

The commercially sensitive information has been excluded from the public version of the project description.

Further Information

No additional legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information has a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

VM0010 version 1.2: Methodology for Improved Forest Management: Conversion of Logged to Protected Forest.

This methodology uses all VCS approved definitions from the most recent VCS version and the VCS Tool for AFOLU Methodological Issues as listed:

Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities" (version 3.0)

Tool for Calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities (Version 02.1).

Tool for "AFOLU Non-Permanence Risk Analysis"(Version 3).

2.2 Applicability of Methodology

According to VM0010 version 1.2, Projects must fall within the AFOLU project category "IFM Logged to Protected Forest" as defined in the most recent version of the VCS AFOLU Guidance document. Therefore, specific conditions which can be applicable to the methodology are shown below:

Applicability of Methodology	The Project Activity	Jurisdiction (Y/N)
Forest management in the baseline scenario must be planned timber harvest;	Prior to the implementation of the project, the forest was logged annually according to the timber harvest and management plan issued by the local forest authority;	Y
Under the project scenario, forest use is limited to activities that do not result in commercial timber harvest	Under the project activity, the commercial logging has been cancelled and only tending and	Y

or forest degradation;	managing is allowed in the timber harvest and management plan, which clearly indicate that it will not result in commercial timber harvest or forest degradation;	
Planned timber harvest must be estimated using forest inventory investigation methods that determine allowable offtake as volume of timber (m^3 ha^{-1});	Planned timber harvest is issued by the forest authority. The allowable offtake as volume of timber was part of the forest growth, which is determined by the forest inventory investigation methods;	Y
The boundaries of the forest land must be clearly defined and documented;	The boundaries of the forest land can be identified by the forest map and the forest second class investigation data by authorized institute, both the forest map and forest second class investigation will be monitored periodically by the government according to the local laws and regulations;	Y
Baseline condition cannot include conversion to managed plantations;	According to the previously issued timber harvest and management plan, the baseline scenario prior to the project activity is planned timber harvest within the project area, which doesn't include conversion to managed plantations;	Y
Baseline scenario, project scenario and project case cannot include wetland or peatland.	According to the forest second class investigation, the project area is composed of forest land, shrub and grassland, therefore neither wetland nor peatland is involved in baseline scenario, project scenario and project case.	Y

2.3 Project Boundary

2.3.1 Geographic Boundary

All the land parcels of the project are listed as follow:

Parcel number	Department	Serial Number	Area (ha)
1	Lianhe Township	LH	1,425.1
2	Zhuanlong Town	ZL	5,454.1
Total			6,879.2

Of its 6,879.2 ha forest land, Lianhe Township covers an area of 1,425.1 ha, Zhuanlong Town covers 5,454.1 ha.

Of all the tree species, Broad-leaf tree covers an area of 2,905.4ha, Pine covers 3,973.8ha.

Of all the land parcels, Lianhe and Zhuanlong covers 225 and 397 small units respectively, their location and central geological coordinates are determined in the forest inventory table as listed in the appendix.

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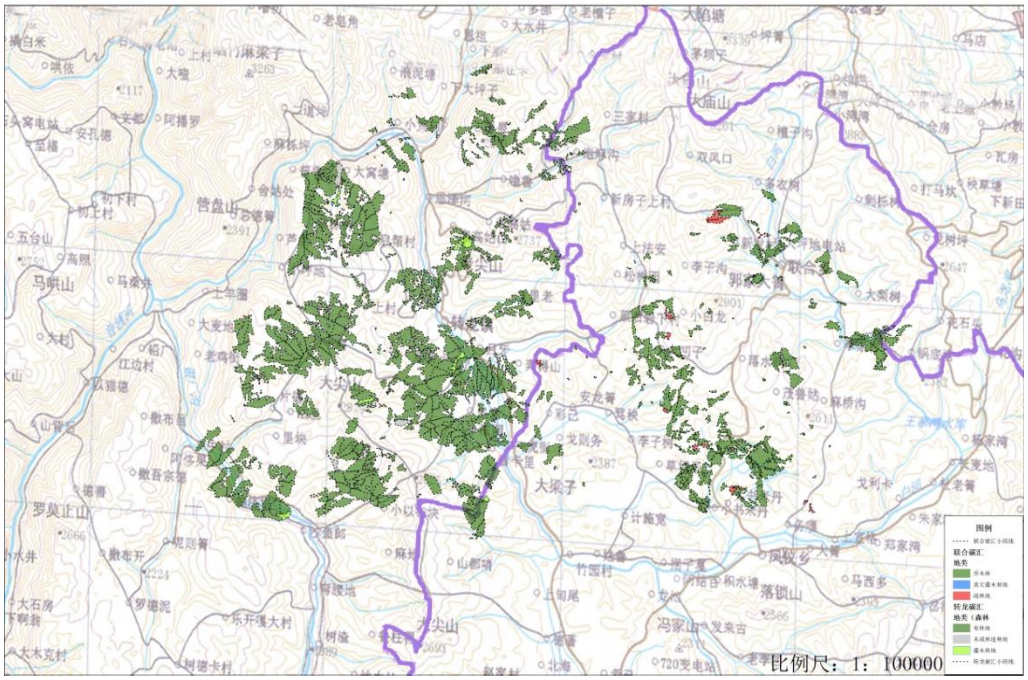
The spatial boundaries of the proposed project for each discrete lands are listed as follow:

“两区”碳汇项目地块分布图



The geographic boundaries of an IFM project are fixed and thus do not change over the project lifetime.

Following the VCS definition of market leakage the geographic boundaries for leakage from market effects are those of the country in which the project area occurs.

2.3.2 Temporal Boundary

The following temporal boundaries shall be defined:

Start date and length of the project crediting period

According to VCS standard version 3.5, the start date of the project activity is 01/04/2011. The length of the project crediting period is 20 years.

Duration of the monitoring periods

The project proponent decides the periodicity of verifications every 5 years.

2.3.3 Carbon Pool

The carbon pools included or excluded from the project boundary are listed below:

Carbon pools	Included/Optional/Excluded	Justification/Explanation of choice
Aboveground trees	Included	The stock change in the aboveground tree biomass is estimated.
Aboveground non-tree	Excluded	Exclusion is always conservative when forests remains as forest.
Belowground	Excluded	Unlikely to change significantly in forests remaining as forests and is difficult to measure - omission is conservative
Dead wood (logging slash)	Included in the baseline	The dead wood (logging slash) carbon pool is expected to be larger in the baseline than in the project scenario, and therefore this pool must be included.
Dead wood (naturally accumulated)	Excluded	Following IPCC guidelines, it is assumed that carbon stocks in the naturally occurring dead wood pool (both standing and lying) are equivalent in both the project and baseline scenario, and therefore this pool is conservatively excluded.

Carbon pools	Included/Optional/Excluded	Justification/Explanation of choice
Harvested wood products	Included	Will be greater in baseline than project scenario and significant.
Litter	Excluded	Insignificant and exclusion is conservative.
Soil organic carbon	Excluded	Exclusion is always conservative when forests remains as forest.

2.3.3 Greenhouse Gases

The emissions sources included in or excluded from the project boundary are shown in Table below.

Any one of these sources must be neglected (ie, accounted as zero) if the application of the most recent version of the CDM Tool for testing significance of GHG emissions in A/R CDM project activities leads to the conclusion that the emission source is insignificant. In addition, the sum of decreases in carbon pools and increases in emissions that may be neglected must be less than 5% of the total project GHG benefits.

Gas	Sources	Included?	Justification/Explanation
Carbon dioxide (CO_2)	Combustion of fossil fuels (in vehicles machinery and equipment)	Excluded	Conservative as emissions will be greater in the baseline scenario than in the project case.
	Removal of herbaceous vegetation	Excluded	Based on CDM EB decision reflected in paragraph 11 of the report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023_rep.pdf.
Methane (CH_4)	Combustion of fossil fuels (in vehicles machinery and equipment)	Excluded	Conservative as emissions will be greater in the baseline scenario than in the project case.
	Burning of Biomass	Included	Included as CO_2 equivalent emission.
Nitrous oxide (N_2O)	Combustion of fossil fuels (in vehicles machinery and	Excluded	Potential emissions are negligible

Gas	Sources	Included?	Justification/Explanation
	equipment)		
	Nitrogen based fertilizer	Excluded	Potential emissions are negligible. Following the VCS update to the Tool for AFOLU Methodological Issues and Guidance for AFOLU Projects emissions through the use of fertilizer are considered insignificant and are not considered here.
	Burning of Biomass	Excluded	Potential emissions are negligible

2.4 Baseline Scenario

In compliance with the "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities" (version 3.0), the following steps are applied for the demonstration of the additionality for the proposed project:

a) STEP 1. Identification of alternative land use scenarios to the AFOLU project activity;

b) STEP 2. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or

c) STEP 3. Barriers analysis; and

d) STEP 4. Common practice analysis.

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

Sub-step 1a. Identify credible alternative land use scenarios to the proposed VCS AFOLU project activity

a) Identify realistic and credible land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS. The identified land use scenarios includes:

i) Continuation of the pre-project land use as the timber harvest and management plan;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project;

iii) If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- Legal requirements; or

- Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.

For (ii), the NPV under this scenario is obviously not financially attractive compared to the scenario of logging.

For (iii), the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements and are existed as forests more than ten years prior to the project start date. So (iii) is not applicable.

Therefore, the baseline scenario is continuation of the pre-project land use as the timber harvest and management plan.

The baseline is further confirmed by the timber harvest and management plan issued by local forestry bureau and is determined both in PD and MR.

According to VM0010 version 1.2, a historical baseline scenario is used for determining how to model the baseline management scenario as:

1. Historical records of forest management exist for 5 years preceding the project start date;

2. Historical records indicate that the management practices have surpassed the legal requirements provided by conforming to all local and regional forest legislation;

3. Historical records that indicate that the historical management surpasses financial barriers by providing above average financial returns.

Box 1. Timber Harvest Plan

The description of harvesting in the form of a timber harvest plan forms the basis of the baseline scenario for greenhouse gas accounting.

The timber harvest plan describes the harvest of timber products and including:

a) reference the forest volume inventory (see Section 8.1.1 – parameter $V_{j,i|BSL}$) to identify the relative number of trees per hectare potentially available for harvest by species in each stratum;

b) demarcate all non-harvest areas within the forest based on legally required exclusions for environmental features such as slope, swamp areas or conservation buffers;

c) divide the harvestable forest into annual operating areas (referred to throughout this methodology as land parcels) using common practice;

d) include a design and presentation of the transport system to move harvested timber products from the land parcels to downstream processing or market entry points; and

e) list necessary harvest and transport machinery.

The timber harvest plan is in line with the local best practice for timber harvest and the timber resource volume and extraction quotas defined in the legal requirements.

For the purpose of estimating the net annual changes in carbon stocks resulting from planned timber harvest in the baseline scenario a detailed planned timber harvesting schedule will be developed from the timber harvest plan, spelling out details of harvest for each land parcel in the project area in terms of the following:

a) the species to be harvested;

b) the year (1,2,3...) in which timber harvest of each land parcel is scheduled to occur;

c) the number of years each land parcel is in a post-harvest state during the project crediting period;

d) the maximum and minimum diameters at breast height (DBH), at stump and at top for tree harvesting;

e) the planned harvesting regime (clearfelling, specie/stratum-selective logging, area-selective logging);

f) technical specifications for the categories of wood products to be harvested; and

g) the total volumes or fractions to be harvested, broken down by categories of wood products defined as sawnwood, wood-based panels, other industrial roundwood, paper and paper board, and other.

The planned timber harvest schedule is determined ex ante to reflect the timber harvesting plan as stipulated in the legal right to harvest. The planned timber harvesting schedule will be developed for the Project Area to include all land parcels within the project boundary for the proposed IFM activity.

The output of the timber harvest plan shall be the mean extracted volume per unit area by species in each stratum in each year ($V_{EX,j,i|BSL}$).

The planned timber harvesting schedule will be submitted by project proponents as part of the VCS-PD.

The timber harvest and management plan describes the harvest of timber products and includes:

<table>
<tr><th>Timber harvest plan</th><th>The project activity</th></tr>
<tr><td>reference the forest volume inventory (see Section 8.1.1 – parameter $V_{j,i|BSL}$) to identify the relative number of trees per hectare potentially available for harvest</td><td>According to the forest volume inventroy, the $V_{j,i|BSL}$ is listed as follows:
<table>
<tr><th>Doment Species</th><th>Area （ha）</th><th>Volume (m^3)</th><th>$V_{j,I,BSL}$(m^3/ha)</th></tr>
</table></td></tr>
</table>

<table>
<tr><td>by species in each stratum;</td><td><table><tr><td>Broad-leaf tree</td><td>2,905.37</td><td>361,916.23</td><td>124.57</td></tr><tr><td>Pines</td><td>3,973.83</td><td>528,435.15</td><td>132.98</td></tr></table></td></tr>
<tr><td>demarcate all non-harvest areas within the forest based on legally required exclusions for environmental features such as slope, swamp areas or conservation buffers;</td><td>The project area contains only the commercial forest, others with environmental or ecological requirements are excluded from the project boundary, therefore, the legally required exclusions for environmental features such as slope, swamp areas or conservation buffer are obviously non-harvest areas, which is also clearly demarcated in the timber harvest and management plan.</td></tr>
<tr><td>divide the harvestable forest into annual operating areas (referred to throughout this methodology as land parcels) using common practice;</td><td>Yes, the harvestable forest are listed into annual operating areas.

The timber harvest schedule is listed yearly by such harvest type as final felling and tending harvest.</td></tr>
<tr><td>include a design and presentation of the transport system to move harvested timber products from the land parcels to downstream processing or market entry points; and</td><td>The timber products from the land parcel will be fist transported to the warehouse by tractor, second, they will be treated by some process such as bucking, selection, mill scale classification and piling, and then be transported to the customers based on their requirements.</td></tr>
<tr><td>list necessary harvest and transport machinery.</td><td>The necessary harvest and transport machinery is listed as:<table><tr><td>Harvest</td><td>Chain saw</td></tr><tr><td>transport</td><td>Tractor(from the land parcel to the warehouse)

Railway or highway (form the warehouse to the customers)</td></tr></table></td></tr>
</table>

The timber harvest schudule	The project activity
the species to be harvested;	The species within the project area are broad leaf trees and Pine, the latter is the dominant species of the project area;
the year (1,2,3...) in which timber harvest of each land parcel is scheduled to occur;	The timber production schedule is specifically stated the land parcel by the harvest type.

the number of years each land parcel is in a post-harvest state during the project crediting period;	According to the timber harvest plan, the land parcel will be regenerated by three methods after timber harvest, the post-harvest state during the project crediting period will be not more than a year.
the maximum and minimum diameters at breast height (DBH), at stump and at top for tree harvesting;	The code of timber harvest practice has no specific requirement for the maximum and minimum diameters at breast height (DBH), at stump and at top for tree harvesting, which is not applicable in China.
the planned harvesting regime (clear felling, specie/stratum-selective logging, area- selective logging);	Two kinds of harvesting applied to the project activity, they are final felling and tending. For the former, they can select clear felling, selective logging and shelter wood cutting.
technical specifications for the categories of wood products to be harvested; and	There is no technical specifications for the categories of the wood products, they will be determined by the requirements of the customers.
the total volumes or fractions to be harvested, broken down by categories of wood products defined as sawnwood, wood-based panels, other industrial roundwood, paper and paper board, and other.	The wood products of the project is only sawnwood, no others such as wood-based panels, other industrial roundwood, paper and paper board, etc.

In compliance with the methodology, if the proposed project area contains different forest types or forests with different carbon density, stratification must be carried out in order to improve the accuracy and precision of carbon stock estimates.

For estimation of base year carbon stocks, strata must be defined on the basis of parameters that are key variables in any method used to estimate changes in managed forest carbon stocks. Strata will include either forest type, vegetation type and/or target timber species.

Based on the availability of data regarding the nature and composition of forest stocks in the project area, stratification will be developed on the basis of either:

a) existing vegetation mapping or stratification, where these are documented in the legal right to harvest; or

b) estimates developed from sampling the project area using standard forest assessment protocols specific to the forest region where the project area is located.

Baseline stratification is developed ex ante as follow:

No.	Dominant Tree Species	Area (ha)	Volume(m3)
LQ-BR-1	Broad-leaf tree	2,905.37	361,916.23
LQ-Pine-2	Pines	3,973.83	528,435.15
Total		6,879.20	890,351.37

2.5 Additionality

According to VM0010 version 1.2, the additionality of the project is demonstrated using the VCS "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities" version 3.0.

Step 1: Identification of alternative land use scenarios to the AFOLU project activity;

Step 1.1: Identify credible alternative land use scenarios to the proposed VCS AFOLU project activity

a) Identify realistic and credible land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS. The scenarios should be feasible for the project area taking into account relevant national and/or sectoral policies and circumstances, such as historical land uses, practices and economic trends.

The identified land use scenarios shall at least include:

i) Continuation of the pre-project land use as the timber harvest plan as analysed in section 2.4;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.

iii) If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- Legal requirements; or
- Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.

For (iii), the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements and are existed as forests more than ten years prior to the project start date. So (iii) is not applicable.

Pre-project land use scenario is the timber forest which is the common practice in China, it is feasible for the project area taking into account Forest Law of People's Republic of China. And there is no land within the Project boundary performed being registered as the VCS AFOLU project.

b) All identified land use scenarios must be credible. All land-uses within the boundary of the proposed VCS AFOLU project that are currently existing or that existed at some time in the period beginning ten years prior to the project start date but no longer exist, may be deemed realistic and credible. For all other land use scenarios, credibility shall be justified. The justification shall include elements of spatial planning information (if applicable) or legal requirements and may include assessment of economic feasibility of the proposed land use scenario.

The (i) and (ii) identified land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS are realistic and credible, as all land-uses within the boundary of the project activity that existed in the period beginning ten years prior to the project start date but no longer exist. Therefore, it is deemed realistic and credible. Outcome of Section 2.5.1.1:

The identified land use scenarios include the two below:

i) Continuation of the pre-project land use as the timber harvest plan as analysed in section 2.4;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.

Step 1.2: Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

The scenarios are feasible for the project area taking into account Forest Law of People's Republic of China,. Therefore, the 2 identified realistic and credible alternative land used scenarios that could have occurred on the land within the project boundary of the VCS AFOLU project are listed above.

The identified land use scenarios include the two below:

i) Continuation of the pre-project land use as the timber harvest plan as analysed in section above;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.

Step 2: Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or

This section will determine whether the proposed project activity, without the revenue from the sale of GHG credits is economically or financially less attractive than at least one of the other land use scenarios. To conduct the investment analysis, use the following sections.

Step 2.1: Determine appropriate analyses method

Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis. If the VCS AFOLU project generates no financial or economic benefits other than VCS related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III). Note, that Options I, II and III are mutually exclusive hence, only one of them can be applied.

According to the tool, Option I is not applicable for the proposed project since the project will generate other financial and economic benefits (e.g. small amount of sales revenue from wood products of tending and managing) other than VCS related income.

Therefore, the investment comparison analysis (Option II) will be applied for the demonstration of financial barrier for the proposed project.

Step 2.2: Apply investment comparison analysis

Identify the financial indicator, NPV (net present value), for the project and decision-making context.

Step 2.3: Calculation and comparison of financial indicators (only applicable to options II and III):

a) Calculate the suitable financial indicator for the proposed VCS AFOLU project without the financial benefits from the VCS and baseline scenarios. Include all relevant costs and revenues, and, as appropriate, non-market cost and benefits in the case of public investors.

No	Item	Baseline Scenario	Project Scenario	Unit	Data source
Sales Revenue					
Timber Price					
1	Broad Leaf Tree	800	0	CNY/m^3	Economic assessment parameter Table
2	Pine	700	0	CNY/m^3	
3	Others	600	0	CNY/m^3	
Extracted Volume					
	Broad Leaf Tree	8,444	0	m^3/year	Economic assessment parameter Table
	Pine	13,387	0		
	Other timber product from tending and managing instead of commercial harvest	7,123	7,123		
Sapling and fertilizer Cost					

1	Broad Leaf Tree	163.6	163.6	CNY/mu	Economic assessment parameter Table
2	Pine	123.5	123.5	CNY/mu	
Other					
1	Project Area	6,879.2	6,879.2	Ha	Forest second class investigation Data
2	Labor Cost (Plantation)	100	100	CNY/working day	Economic assessment parameter Table
3	Labor Cost (Protection)	80	80	CNY/working day	
4	Management Cost	5%	5%	%	
5	Additional Maintenance Cost for Protected Forest	0	0.03	Working day/mu	
6	Social Discount Rate	8	8	%	Economic assessment methods and parameters for the construction projects

(b) Present the investment analysis in a transparent manner and provide all the relevant assumptions in the VCS AFOLU project description.

The NPV before and after the conversion of logged to protected forest is shown in the Table below. The NPV under the scenario of logging is CNY 1,202.87*$10^4$with the discount rate of 8%. However, the NPV under the scenario of protected forest is CNY -3,178.98 *$10^4$with the discount rate of 8%, which is lower than the scenario of logging. Therefore, the NPV under the scenario of protected forest is obviously not financially attractive compared to the scenario of logging. With revenue from VCS at the assumed price level, the project would be more financially attractive. Table below shows the comparison of the NPV between project and baseline scenario.

	NPV (10^4 CNY)
Baseline Scenario	1,202.87
Project Activity	-3,178.98

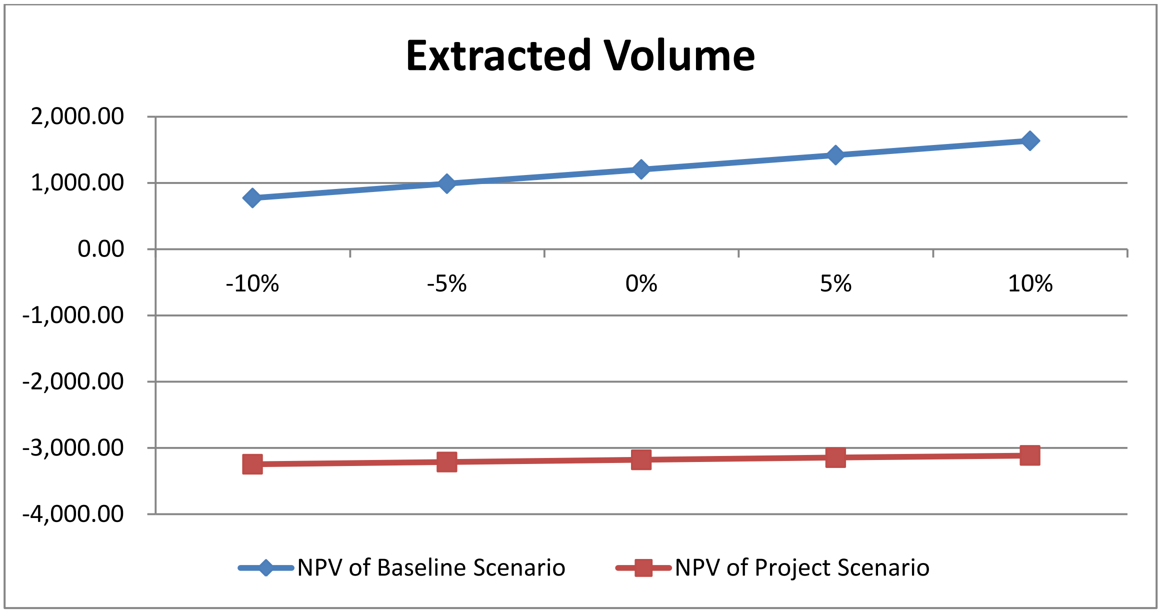
Step 2.4: Sensitivity analysis:

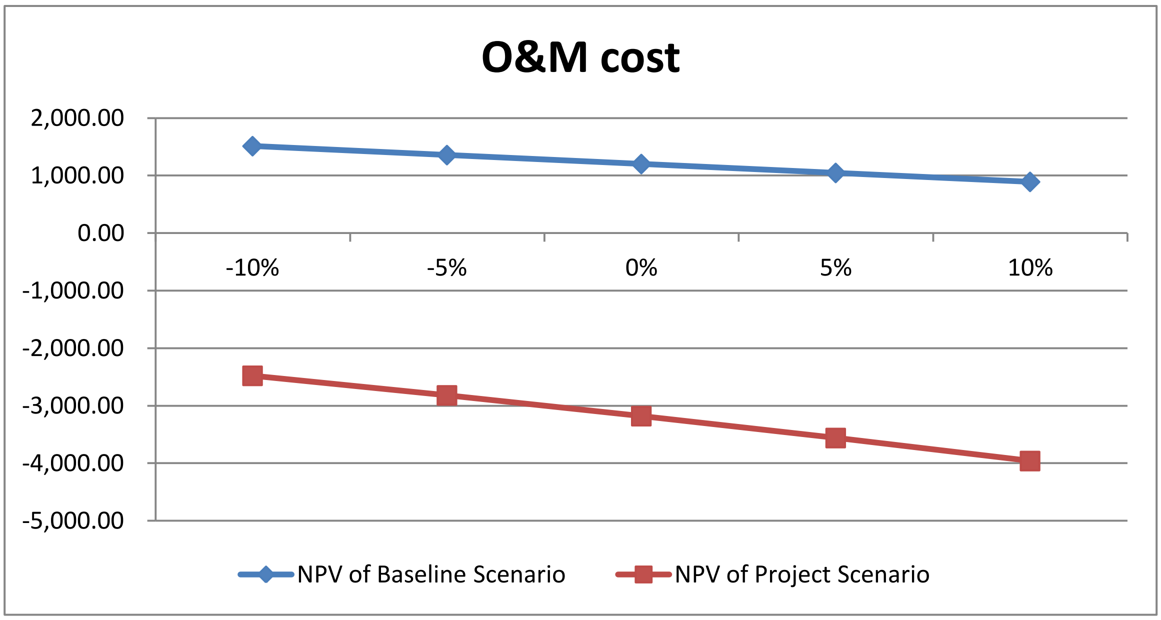
The objective of the sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the proposed VCS AFOLU project without the financial benefits from the VCS is unlikely to be financially attractive.

For the project, the key parameters, including timber price, extracted volume, O&M cost will be taken into account of the sensitivity analysis. Results of the comparison between the baseline and project scenario is listed in the table below and sensitivity analysis of the three parameter are shown in the figure below.

The NPV comparision between the baseline and project scenario

Parameters	NPV of Baseline Scenario					NPV of Project Scenario				
	-10%	-5%	0%	5%	10%	-10%	-5%	0%	5%	10%
Timber Price	708.46	955.66	1,202.87	1,450.08	1,697.29	-3,267.85	-3,223.41	-3,178.98	-3,134.54	-3,090.11
Extracted Volume	771.73	987.30	1,202.87	1,418.44	1,634.01	-3,245.63	-3,212.30	-3,178.98	-3,145.65	-3,112.32
Cost	1,513.02	1,357.95	1,202.87	1,047.80	892.72	-2,478.08	-2,818.58	-3,178.98	-3,559.27	-3,959.46





Sensitivity Analysis of the Project

By referring to the Figures above, the NPV under protected scenario will not exceed the baseline scenario if the timber price, the extracted volume and the O&M cost varies within ±10%.

In the baseline scenario, the project receives revenue from both the commercial harvest and timber products derived from tending and managing. The latter covers a small fraction, with 17.97%(227.9/1,268.1) of the total revenue, and the commercial harvest accounts for 82.03%(1-17.97%) of the total. Under the project scenario, all the commercial harvest has been cancelled and only tending and managing is allowed, the only revenue of the project scenario is the income from the selling of the timber products from tending and managing, which remains the same amounts as the baseline scenario. It is obvious that the revenue of the project is a small part of the baseline scenario, which would not be influenced by the variation of the timber price and extracted volume. While on the other hand, the cost in the project scenario will increase due to the more cost on tending and maintenance. Therefore, theoretically, it is impossible for the NPV of the project scenario to reach to the baseline scenario no matter how the two parameters vary.

In order to show the opportunity of the NPV under protected scenario exceeding the baseline scenario is very little, the analysis of critical assumption is conducted as below. That is, for the three parameters, to what extent, the NPV of the baseline scenario and the project scenario can reach to that of the baseline scenario.

Parameters	Range Extent(When the NPV of the project scenario reached to the baseline scenario)
Timber Price	493.06%
Extracted Volume	657.41%
O&M Cost	/

1) timber price

It is assumed that only when the timber product price for tending and managing increased 493.06%, the nominal NPV of the project scenario could reach to1,202.87*10^4. Since the timber price for the project scenario and the baseline scenario remains the same. Therefore, the project scenario will not become equal to the baseline scenario.

2) Extracted Volume

It is assumed that only when the extracted volume for tending and managing increased 657.41%, the nominal NPV of the project scenario could reach to 1,202.87*10^4. As the extracted volume of the project is determined in the timber production plan issued by the forestry authority yearly, which remains the same since 2006 keeping constant for nearly 10 years, and it is also impossible to increase 657.41%. Therefore, it is impossible for the NPV of the project scenario to reach to the baseline scenario within the crediting period.

3) O&M cost

The NPV of the Project will reach to 248.95*10^4 if the O&M cost reduced by 100%, and it is obvious that when the O&M cost reduced by 100%, it would become zero, that is impossible to occur for the normal project operating, therefore, actually, the NPV of the project could not reach to 1,202.87*10^4. In fact, the agricultural means of production price index and the labour cost have been increasing according to the latest financial reports issued by the Kunming Branch of People's bank of China[1]. Since the two factors are the main components of the O&M cost, it further demonstrates that O&M cost cann't decrease by 100%,even if it decreased 100%, the NPV of the project scenario could not reach to 1,202.87*10^4 .

[1] http://www.gov.cn/foot/site1/20150705/5701143609693828O.pdf

In summary, the NPV of the project can't reach to the baseline scenario even when the three main parameters vary within the sensitivity range of ±10%. Also, it confirms that, the NPV of project scenario can't reach to that of the baseline no matter how these three parameters vary.

2.6 Methodology Deviations

N.A.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

Calculation of baseline scenario greenhouse gas emissions requires the application of the equations presented in this section to complete the greenhouse gas accounts for all land parcels in the baseline case.

The following table lists the baseline emissions modelled by the methodology:

Including in modelling
Emission from wood product conversion Decomposition of dead wood from harvested trees Emissions from wood product retirement Stock change due to regrowth following timber harvest
Conservatively excluded from modelling
Decomposition of trees incidentally killed during tree felling Decomposition of trees killed through skid trail creation Decomposition of trees killed through road construction Emissions through fossil fuels burned in baseline harvesting practices Emissions through subsequent forest re-entry

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

The baseline net greenhouse gas emissions are determined from calculation of deadwood generated in the process of timber harvest, the emissions resulting from production and subsequent retirement of wood products derived from the timber harvesting, minus the rates of forest regrowth post timber harvest.

Baseline commercial timber volumes must be derived for development of the timber harvest plan and for ex-post accounting of emissions resulting from natural forest disturbance.

The equations calculate the total emissions across the project crediting period for each emission source. Total emissions are averaged across the crediting period to give annual emissions and are multiplied by t*, time elapsed since the start of project activity. EX-post, t* is updated so baseline projections are available for each proposed future verification date.

Data for input into these carbon stock change calculations for the baseline scenario shall be established from the same data used to create the timber harvesting plan. According to VM0010 version 1.2, the baseline emissions are calculated in the sections below:

3.1.1 Calculation of carbon stocks in commercial timber volumes

This section calculates $C_{HB,j,i|BSL}$, the mean carbon stock in total harvested biomass in tC • ha^{-1} and $C_{EX,j,i|BSL}$, the mean carbon stock in extracted timber (merchantable timber that leaves the forest) in tC • ha^{-1} .

In compliance with the methodology, the pre-existing forest second class investigation data are used as the data:

a) represents the project strata;

b) is not more than 10 years old.

The forest second class investigation data is investigated by local forestry government following related laws and regulations (e.g. *State Technical Regulation for Forestry Investigation*). The investigation is mainly carried out through following steps:

- Regional division and stratification through GPS and Aerophotography;
- Investigate forestry inventory for typical forest by Angle Gauge Measurement;
- Investigate forestry inventory for non-typical forest by Systematic Sampling;
- Data comprehensive analysis and system management.

The QA/QC procedure for the above mentioned steps is in line with state laws and regulations, for each investigated strata, at least 1 sample plot will be selected in 1 subcompartment , the mean volume is calculated from a sample plot with 0.04 ha. The relevant accuracy would satisfies the essential requirement stipulated by the *Tool for Calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities*.

The estimate of merchantable volume for each species j at the sample plot level will be calculated as:

$$V_{j,i,sp} = \sum_{l}^{L} V_{l,j,i,sp} \qquad (1)$$

Where:

$V_{j,I,sp}$	merchantable volume for species j in stratum i in sample plot sp, m^3;
$V_{l,j,I,sp}$	merchantable volume for tree l of species j in stratum i in sample plot sp, m^3;
l	1, 2, 3 ⋯L sequence of individual trees in sample plot;
i	1, 2, 3 ⋯M strata;
sp	1, 2, 3 ⋯SP sample plots; and
j	1, 2, 3 ⋯J tree species.

Therefore, the merchantable volume per unit area of species j in stratum i will be calculated as the mean merchantable volume in all sample plots in stratum i:

$$V_{j,i,BSL} = \frac{1}{SP} * \sum_{sp=1}^{SP} \frac{V_{j,i,sp}}{A_{sp}} \qquad (2)$$

Where:

$V_{j,i,BSL}$	mean merchantable volume per unit area of species j in stratum i in the baseline scenario, $m^3 \cdot ha^{-1}$;
$V_{j,i,sp}$	merchantable volume for species j in stratum i in sample plot sp; m^3;
A_{sp}	area of sample plot sp, ha;
i	1, 2, 3 ⋯M strata;
sp	1, 2, 3 ⋯SP sample plots; and
j	1, 2, 3 ⋯J tree species.

Therefore, the carbon stock of timber harvested per unit area for species j in stratum i will be calculated from this mean volume of extracted timber:

$$C_{HB,j,i,BSL} = V_{EX,j,i,BSL} * BCEF_R * CF_j \qquad (3)$$

Where:

$C_{HB,j,i,BSL}$	mean carbon stock of harvested biomass per unit area for species j in stratum i, $tC \cdot ha^{-1}$;

$V_{EX,j,i,BSL}$	mean volume of extracted timber per unit area for species j in stratum i, $m^3 \cdot ha^{-1}$;
$BCEF_R$	biomass conversion and expansion factor applicable to wood removals in the project area, t.d.m m^{-3};
CF_j	biomass conversion and expansion factor applicable to wood removals in the project area, t.d.m m^{-3};
i	1, 2, 3 ⋯M strata; and
j	1, 2, 3 ⋯J tree species.

Not all of the harvested biomass leaves the forest because the timber harvested has two components: 1) wood removed to market (extracted timber) and, 2) wood remaining in the forest as a result of harvest.

Therefore, the mean carbon stock of extracted timber per unit area for species j in stratum i will be calculated from the mean volume of extracted timber multiplied by density and carbon fractions:

$$C_{EX,j,i,BSL} = V_{EX,j,i,BSL} * D_j * CF_j \qquad (4)$$

Where:

$C_{EX,j,i,BSL}$	mean carbon stock of extracted timber per unit area for species j in stratum i; $tC \cdot ha^{-1}$;
$V_{EX,j,i,BSL}$	mean volume of extracted timber per unit area for species j in stratum i; in $m^3 \cdot ha^{-1}$;
D_j	basic wood density of species j; t d.m. m^{-3};
CF_j	carbon fraction of biomass for species j; tC t $d.m.^{-1}$;
i	1, 2, 3 ⋯M strata; and
j	1, 2, 3 ⋯J tree species.

3.1.2 Calculation of dead wood (logging slash) generated in the process of timber harvest

This section calculates $\Delta C_{DWSLASH,i,p,BSL}$, the change in carbon stock in dead wood resulting from timber harvest in stratum i in land parcel p, using $C_{EX,j,i,BSL}$ and $C_{HB,j,i,BSL}$ as calculated in above section.

The simplifying assumption is made that dead wood created during timber harvest is emitted in the year of harvest. Therefore, the change in carbon stock in the dead wood pool in stratum i in land parcel p will be calculated as the difference between the total carbon stock of the harvested biomass and the carbon stock of the extracted timber:

$$\Delta C_{DWSLASH,i,p,BSL} = \sum_{j=1}^{J} (C_{HB,j,i,BSL} - C_{EX,j,i,BSL}) \qquad (5)$$

Where:

$\Delta C_{DWSLASH,i,p,BSL}$	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 $tCha^{-1}$;
$C_{HB,j,i,BSL}$	mean carbon stock of harvested biomass per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
$C_{EX,j,i,BSL}$	mean carbon stock of extracted timber per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
j	1, 2, 3 ⋯J tree species;
i	1, 2, 3 ⋯M strata; and
p	1, 2, 3 ...P land parcels.

3.1.3 Calculation of baseline carbon sequestered in wood products

The carbon stock of extracted timber across species is calculated as:

$$C_{EX,i,BSL} = \sum_{j=1}^{J} C_{EX,j,i,BSL} \qquad (6)$$

Where:

$C_{EXi,BSL}$	change in carbon stock of extracted wood products resulting from timber harvest per unit area in stratum i in land parcel p, $tC \cdot ha^{-1}$;
$C_{EX,j,i,BSL}$	mean carbon stock of extracted wood per hectare, $tC \cdot ha^{-1}$;
j	1, 2, 3 ⋯J tree species;
i	1, 2, 3 ⋯M strata.

In accordance with the VCS AFOLU Requirements, the amount of carbon stored in wood products that would decay within 3 years after harvest (ie, the Wood Waste (WW) and the Short Lived Fraction (SLF)), are assumed to be emitted at the time of harvest.

Wood products that are retired between 3 and 100 years after harvest (ie, the Additional Oxidised Fraction, OF), must be accounted according to a 20 year linear decay function. This decay function is applied when the net greenhouse gas emissions/removals are calculated on an annual basis in equations 8 and 9.

All other wood product pools are considered to permanently store carbon.

Therefore, the carbon stock of extracted timber that is immediately emitted to the atmosphere at the time of harvest is calculated as:

$$C_{WPO,i,BSL} = \sum_k C_{EX,i,k,BSL} * (WW_k + SLF_k) \qquad (7)$$

Where:

$C_{WPOi,BSL}$	carbon stock of extracted timber from stratum i that is assumed to be emitted immediately at the time of harvest, in tC • ha^{-1};
$C_{EX,i,k,BSL}$	mean carbon stock of extracted timber per unit area in stratum i, for wood product type k, tC • ha^{-1};
WW_k	fraction of biomass carbon from wood waste that is assumed to be emitted to the atmosphere immediately at the time of harvest for wood product k, dimensionless;
SLF_k	fraction of biomass carbon from the short lived wood product pool that is assumed to that be emitted to the atmosphere immediately at the time of harvest for wood product k, dimensionless;
i	1, 2, 3 ⋯M strata; and
k	Wood products (sawnwood, wood base products, etc).

The amount of extracted carbon stock that is assumed to enter the wood products pool that is not immediately emitted at harvest is calculated as per equation 8 below:

$$C_{WP,i,BSL} = \sum_k C_{EX,i,k,BSL} - C_{WPO,i,BSL} \qquad (8)$$

Where:

$C_{WPi,BSL}$	carbon stock of extracted timber from stratum i that is assumed to enter the wood products pool that is not immediately emitted at the

time of harvest ,in tC • ha^{-1};

$C_{EXi,BSL}$ mean carbon stock of extracted timber per unit area in stratum i, for wood product type k, tC • ha^{-1};

$C_{WPOi,BSL}$ carbon stock of extracted timber from stratum i that is assumed to be emitted immediately at the time of harvest, in tC • ha^{-1};

SLF_k fraction of biomass carbon from the short lived wood product pool that is assumed to that be emitted to the atmosphere immediately at the time of harvest for wood product k, dimensionless;

i 1, 2, 3 ···M strata; and

k Wood products (sawnwood, wood base products, etc).

Therefore, the carbon stock of wood products assumed to be retired between 3-100 years following harvest is calculated as:

$$C_{WP100,i,BSL} = C_{WP,i,BSL} * OF_k \qquad (9)$$

Where :

$C_{WP100,i,BSL}$ Amount of carbon stored in wood products that are assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC • ha^{-1};

$C_{WP100,i,BSL}$ carbon stock of extracted timber from stratum i that is assumed to enter the wood products pool that is not immediately emitted at the time of harvest ,in tC • ha^{-1};

OF_k fraction of biomass carbon for wood product type k that is assumed to be emitted to the atmosphere between 3 and 100 years of timber harvest, dimensionless; and

i 1, 2, 3 ···M strata.

3.1.4 Change in carbon stocks due to forest regrowth after harvest

The carbon sequestration in the baseline resulting from forest regrowth after timber harvest up to year t is equal to the forest regrowth rate of each stratum.

Therefore, carbon sequestration resulting from forest regrowth after timber harvest is calculated as:

$$C_{RG,i,p,BSL} = \sum_i RGR_i \qquad (10)$$

Where:

$C_{RG,\ i,\ p,BSL}$	carbon sequestration resulting from forest regrowth after timber harvest in stratum i in land parcel p, tC ha^{-1} yr^{-1};
RGR_i	regrowth rate of forest post timber harvest for stratum i, tCha^{-1} yr^{-1};
i	1, 2, 3 ⋯M strata.

3.1.5 Change in carbon stocks due to forest regrowth after harvest

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 (ie, years since harvest in the baseline).

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:

$$\Delta C_{NET,BSL(1)} = \sum_{i,p} A_{1,i,p} * \sum_{i=1}^{M} (C_{DWSLASH,i,p\backslash BSL}/10) + C_{WPO,i,p\backslash BSL} + (C_{WP100,i,p\backslash BSL}/20) \quad (11)$$

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^{-1};
$\Delta C_{WP0,i,p,BSL}$	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^{-1};
$\Delta C_{WP100,i,p,BSL}$	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^{-1};
$A_{1,i,p}$	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:

$$\Delta C_{NET,\,BSL(2-10)} = \sum_{i,p} A_{2-10,\,i,\,p} * \sum_{i=1}^{M} (C_{DWSLASH,\,i,\,p\backslash\,BSL}/10) + (C_{WP\,100,\,i,\,p\backslash\,BSL}/20) \tag{12}$$

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^{-1};

$\Delta\ C_{WP100,i,p,BSL}$ 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^{-1};

$A_{2-10,p}$ 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:

$$\Delta C_{NET,\,BSL(11-20)} = \sum_{i,p} A_{11-20,\,i,\,p} * \sum_{i=1}^{M} (C_{WP\,100,\,i,\,p\backslash\,BSL}/20) \tag{13}$$

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^{-1};

$A_{11\text{-}20,i,p}$	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 are calculated according to equation 14 below. Note that there will be no more emissions quantified from decay of logging slash or wood products.

$$\Delta C_{NET,\,BSL(1+)} = \sum_{i,p} A_t * \sum_{i=1}^{M} (-\Delta C_{RG,\,i,\,p \setminus BSL}) \qquad (14)$$

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^{-1};
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:

$$\Delta C_{NET,\,BSL,\,t*} = \sum_{p=1}^{p} \Delta C_{NET,\,p,\,BSL(1)} + \Delta C_{NET,\,p,\,BSL(2-10)} + \Delta C_{NET,\,p,\,BSL(11-20)} + \Delta C_{NET,\,p,\,BSL(1+)} \qquad (15)$$

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;
$\Delta\ C_{NET,BSL(2\text{-}10)}$	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:

$$GHG_{NET,BSL,t^*} = \Delta C_{NET,BSL,t^*} * \frac{44}{12} \quad (16)$$

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_2e;

$\Delta C_{NET,BSL}$ 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_2-e tC^{-1}.

3.2 Project Emissions

In consistence with the methodology, this section calculates $GHG_{NET,PRJ}$, the net greenhouse gas emissions in the project scenario, in tCO_2e with the following procedure.

3.2.1 Ongoing forest growth in the project scenario

This section calculates $\Delta C_{AB,t,PRJ}$ annual carbon stock change in aboveground biomass of trees in the project scenario, in tCO_2e.

3.2.1.1 Allometry

Select the appropriate allometric equation for forest type/group of species j (e.g. tropical humid forest or tropical dry forest) or for each species or family j (group of species) found in the inventory (hereafter referred to as species group) that converts tree dimensions from field timber inventories on sample plots to aboveground biomass of trees.

3.2.1.2 Measurements

Only the individual trees, species and strata which were to be harvested in the baseline scenario are to be measured. Any minimum values employed in inventories are held constant for the duration of the project.

3.2.1.3 Determining Sample Plot Carbon Stocks

The carbon stock in aboveground biomass for each individual tree of species group j in the sample plot located in stratum i will be estimated using the selected allometric equation applied to the tree dimensions resulting from section above.

Therefore, the sum of the carbon stock in each sample plot will be calculated as:

$$C_{AB,\ j,\ i,\ t,\ sp,\ PRJ} = \sum_{l=1}^{Lj,i,sp,t} f_j(X, Y...) * CF \qquad (17)$$

Where:

$C_{AB,j,i,t,sp,PRJ}$	carbon stock in aboveground biomass of trees of species j in plot sp in stratum i at time t in the project scenario, tC;
CF_j	carbon fraction of biomass for tree group j, tC t d.m.-1;
$f_{j(X,Y...)}$	aboveground biomass of trees based on allometric equation for species group j based on measured tree variable(s), t. d.m. tree-1;
i	1, 2, 3, …M strata;
j	1, 2, 3 … J tree species;
l	1, 2, 3, … Lj,i,t,sp sequence number of individual trees of species group j in stratum i at time t in sample plot sp;
t	0, 1, 2, 3, …t* years elapsed since start of the project activity; and
sp	1, 2, 3 …SP sample plots.

3.2.1.4 Determining Stratum Carbon Stocks

The total carbon stock in the aboveground biomass of all trees present in sample plot sp in stratum i at time t, must be calculated as:

$$C_{AB,\ i,\ t,\ sp,\ PRJ} = \sum_{J=1}^{J} C_{AB,\ j,\ i,\ sp,\ PRJ} \qquad (18)$$

Where:

$C_{AB,i,t,sp,PRJ}$	aboveground biomass carbon stock of all trees of stratum i at time t

in sample plot sp in the project scenario, tC;

$C_{AB,j,i,t,sp,PRJ}$	carbon stock in aboveground biomass of trees of species j in stratum i at time t in plot sp in the project scenario, tC;
i	1, 2, 3, ⋯M strata;
j	1, 2, 3 ⋯ J tree species;
t	0, 1, 2, 3, ⋯t* years elapsed since start of the project activity.

3.2.1.5 Determining Mean Carbon Stocks

Therefore, the mean carbon stock in aboveground biomass for each stratum per unit area is calculated as:

$$C_{AB,i,t,PRJ} = \frac{1}{SP} * \sum_{sp=1}^{SP} \left(\frac{C_{AB,i,t,sp,PRJ}}{A_{sp}} \right) \qquad (19)$$

Where:

$C_{AB,i,t,PRJ}$	mean aboveground biomass carbon stock of trees in stratum i at time t, tC ha^{-1};
$C_{AB,i,t,sp,PRJ}$	aboveground biomass carbon stock of trees in stratum i at time t in sample plot sp, tC;
A_{sp}	area of sample plot sp, ha;
sp	1, 2, 3 ⋯ SP sample plots;
i	1, 2, 3, ⋯M strata; and
t	0, 1, 2, 3, ⋯t* years elapsed since start of the project activity.

3.2.1.6 Determining Carbon Stock Changes

The annual carbon stock change in aboveground biomass of trees in year t is the difference in mean carbon stock in aboveground biomass between sampling events and, when expressed in tCO_2e, is calculated as:

$$C_{AB,t,PRJ} = \left(\sum_{i=1}^{M} \left(Ai * \frac{C_{ABi,t2,PRJ} - C_{AB,i,t1,PRJ}}{T} \right) \right) * \frac{44}{12} \qquad (20)$$

Where:

$\Delta\, C_{AB,t,PRJ}$ annual carbon stock change in aboveground biomass of trees in year t, $tCO_2e\ yr^{-1}$;

$C_{AB,i,t,PRJ}$ mean aboveground biomass carbon stock of trees in stratum i at time t, $tC\ ha^{-1}$;

A_i area covered by stratum i, ha;

sp 1, 2, 3 ⋯ SP sample plots;

T number of years between monitoring time t1 and t2 (T=t2 – t1); years;

i 1, 2, 3, ⋯M strata;

t 0, 1, 2, 3, ⋯t* years elapsed since start of the project activity; and

44/12 ratio of molecular weights of carbon dioxide and carbon, $tCO_2e\ tC^{-1}$.

The carbon stock change in aboveground biomass of trees ($\Delta\ C_{AB,t|PRJ}$) is the output of this section and is necessary to calculate net greenhouse gas emissions in the project scenario.

3.2.2 Forest disturbance in the project scenario

This section calculates $\Delta\ C_{DIST_FR,t,PR}$J, carbon stock change due to fire disturbance in the project scenario; tCO_2-e, $\Delta\ _{CDIST,t,PRJ}$, carbon stock change due to non-fire natural disturbance in the project scenario; tCO_2-e

3.2.2.1 Natural disturbance

3.2.2.1a Natural Disturbance – Fire

Where fires occur ex post in the project area, the area burned shall be delineated. Therefore, based on the IPCC 2006 Inventory Guidelines, estimation of greenhouse gas emissions from biomass burning shall be calculated as:

$$\Delta C_{DIST-FR,\mathrm{t},\mathrm{PRJ}} = \sum_{i=1}^{M} A_{burn,i,t} * B_{i,t,PRJ} * \mathrm{COMF_i} * \mathrm{G_{g,i}} * 10 - 3.\mathrm{GWP_{CH\,4}} \qquad (21)$$

Where:

$\Delta\ C_{DIST\_FR,t,PRJ}$ net greenhouse gas emissions resulting from fire disturbance in year t, tCO_2e ;

$A_{burn,i,t}$ area burnt for stratum i at time t, ha;

$B_{i,t,PRJ}$	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^{-1};
$COMF_i$	combustion factor for stratum i, dimensionless;
$G_{g,i}$	emission factor for stratum i for methane, g kg^{-1} dry matter burnt;
GWP_{CH4}	global warming potential for CH_4 (IPCC default: 21), tCO_2e tCH_4^{-1};
i	1, 2, 3, ⋯M strata;
t	0, 1, 2, 3, ⋯t* years elapsed since start of the project activity.

The average aboveground biomass stock present in the project scenario but absent in the baseline scenario before burning for a particular stratum shall be calculated as:

$$B_{i,t,PRJ} = \sum_{j=1}^{J} \{V_{EX,i,j,BSL} * BCEF_R\} \quad (22)$$

Where:

$B_{i,t,PRJ}$	average aboveground biomass stock present in the project scenario but absent in the baseline before burning for stratum i, time t, t d. m. ha^{-1};
$V_{EX,j,I,BSL}$	mean volume of extracted timber per unit area for species j in stratum i, $m^3 \cdot ha^{-1}$;
$BCEF_R$	biomass conversion and expansion factor applicable to wood removals in the project area, t.d.m m^{-3};
GWP_{CH4}	global warming potential for CH_4 (IPCC default: 21), tCO_2e tCH_4^{-1};
i	1, 2, 3, ⋯M strata;
j	1, 2, 3 ⋯J tree species; and
t	0, 1, 2, 3, ⋯t* years elapsed since start of the IFM project activity.

3.2.2.1b Natural Disturbance – Non-Fire

There are no fire disturbance occurred in the project area, therefore, $\Delta C_{DIST\_FR,t|PRJ}=0$.

Where non-fire natural disturbances occur ex post in the project area, the area disturbed must be delineated.

$$\Delta C_{DIST,t,PRJ} = \sum_{i=1}^{M}(A_{dist,i,t} * \sum_{j=1}^{J}\{C_{AB,j,i,BSL}\}) * \frac{44}{12} \quad (23)$$

Where:

$\Delta\ C_{DIST,t,PRJ}$	net greenhouse gas emissions resulting from non-fire natural disturbance in year t, tCO_2e ;
$A_{dist,i,t}$	area disturbed for stratum i at time t, ha;
$C_{AB,i,BSL}$	carbon stock in aboveground biomass per unit area in stratum i, $tC \cdot ha^{-1}$;
44/12	ratio of molecular weights of carbon dioxide and carbon, $tCO_2e\ tC^{-1}$;
i	1, 2, 3, …M strata;
j	1, 2, 3 …J tree species; and
t	0, 1, 2, 3, …t* years elapsed since start of the IFM project activity.

There are non-fire natural disturbances occur ex post in the project area, therefore, $\Delta\ C_{DIST,t,PRJ}=0$

3.2.2.2 Illegal logging

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:

$$\Delta C_{DIST-1L,t,PRJ} = \sum_{i=1}^{M}(A_{Dist-1L,j} * \frac{C_{DIST-1L,i,t,PRJ}}{AP_i}) \quad (24)$$

Where:

$\Delta\ C_{DIST\_IL,t,PRJ}$	net carbon stock changes as a result of illegal logging at time t, tCO_2e;
$A_{dist,i,t}$	area disturbed for stratum i at time t, ha;
$C_{DIST\_IL,i,t,BSL}$	biomass carbon of trees cut and removed through illegal logging in stratum i at time t, tCO_2e;
A_{Pi}	total area of illegal logging sample plots in stratum i, ha;
i	1, 2, 3, …M strata;
t	0, 1, 2, 3, …t* years elapsed since start of the IFM project activity.

3.2.3 Net greenhouse gas emissions in the project scenario

This section calculates $\Delta C_{NET,t,PRJ}$, the net greenhouse gas emissions in the project scenario in year t, in tCO_2e.

The net greenhouse gas emissions in the project scenario are the sum of net greenhouse gas emissions resulting from fire and non-fire forest disturbance, plus any carbon stock changes that occur as a result of illegal logging, minus the annual carbon stock change in the aboveground biomass of trees due to forest growth.

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

$$\Delta C_{NET,t,PRJ} = (\Delta C_{DIST-FR,t,PRJ} + \Delta C_{DIST,t,PRJ} + \Delta C_{DIST-1L,t,PRJ}) - \Delta C_{AB,t,PRJ} \quad (25)$$

Where,

$\Delta C_{NET,t,PRJ}$	net greenhouse gas emissions in the project scenario in year t, tCO_2-e;
$\Delta C_{DIST\_FR,t,PRJ}$	net greenhouse gas emissions resulting from fire disturbance in year t, tCO_2e
$\Delta C_{DIST,t,PRJ}$	net greenhouse gas emissions resulting from non-fire natural disturbance in year t, tCO_2e;
$\Delta C_{DIST\_IL,t,PRJ}$	Net carbon stock changes as a result of illegal logging at time t, tCO_2e;
$\Delta C_{AB,t,PRJ}$	annual carbon stock change in aboveground biomass of trees in year t, $tCO_2e\ yr^{-1}$; and
t	0, 1, 2, 3, ···t* years 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:

$$GHG_{NET,PRJ} = \sum_{t=1}^{t^*} \Delta C_{NET,t,PRJ} \quad (26)$$

Where:

$GHG_{NET,PRJ}$	net greenhouse gas emissions in the project scenario since the start of the project activity, tCO_2e
$\Delta C_{NET,t,PRJ}$	net greenhouse gas emissions in the project scenario in year t, tCO_2e; and

t 0, 1, 2, 3, …t* years since start of the project activity.

3.3 Leakage

3.3.1 Activity shifting leakage

After the implementation of the project, the commercial logging is prohibited in Lianhe and Zhuanlong, the place where the project locates, only tending and managing is allowed, therefore, it is impossible for the project proponents to cut more outside the project boundary to make up for the financial loss due to the project activity.

Secondly, the project boundary covers almost all the commercial forest of Lianhe and Zhuanlong, leaving only some small fraction of inferior forest, the project proponent has no access to other forest resource. Then according to the methodology, the only type of leakage emissions calculated is GHG emissions due to market effects that result from project activity.

3.3.2 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:

$$GHG_{LK,\,LtPF,\,t*} = LF_{ME} * GHG_{NET,\,BSL,\,t*} \qquad (27)$$

Where:

$GHG_{LK,Lt,PF}$	is total market leakage as a result of IFM LtPF activities, tCO_2e;
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.

According to the methdology, the leakage factor is defined as 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.

For the project,

- According to the 11th Five-year plan issued by State Forest Bureau (Guofa [2005] No.41), the annual extracted volume from 2006 to 2009 is 24,815.5*10^4 m^3, and the annual extracted volume of the project is 2.90*10^4 m^3, accounting 0.01% of the national extracted volume, which will not result in the significant national concession and illegal logging;
- The *Notice of the Review Opinion* published by the State Council, the extracted volume could not be increased within existing national concessions AND, Illegal logging is strictly forbidden and severely punished.

Therefore,

$LF_{ME} = 0$

The actual value will be monitored when verification.

3.4 Net GHG Emission Reductions and Removals

3.4.1 Net Project Greenhouse Gas Emission Reductions

Knowledge of the greenhouse gas emission level calculations for baseline scenario, project scenario and leakage allows an ex-ante estimation of the level of net GHG emission reductions resulting at the end of each year over the project crediting period from the implementation of the proposed Logged to Protected Forest (LtPF)-IFM project.

Therefore, the project GHG credits are calculated as:

$$GHG_{CREDITS,\,LtPF,\,t^*} = GHG_{NET,\,BSL,\,t^*} - GHG_{NET,\,PRJ,\,t^*} - GHG_{LK,\,LtPF,\,t^*} \qquad (28)$$

Where:

$GHG_{CREDITS,Lt,PF,t^*}$	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_2e
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;
GHG_{NET,PRJ,t^*}	net greenhouse gas emissions in the project scenario in the year t* since the start of the project activity, tCO_2e; and
GHG_{LK,Lt,PF,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_2e

3.4.2 Project Verified Carbon Units

The number of Verified Carbon Units (VCUs) for each year t in the project crediting period is the greenhouse gas emission reductions and removals adjusted for uncertainty and risk.

3.4.2.1 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 the project is calculated as:

$$U_{TOTAL,\,LtPF} = \sqrt{U^2_{PRJ} + U^2_{BSL}} \qquad (29)$$

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:

$\text{Credits}_{\text{total,LtPF}} = \text{GHG}_{\text{credits,LtPF}} \cdot (1 - \text{U}_{\text{total,LtPF}})$ (30)

Where:

$\text{Credits}_{\text{total|LtPF}}$ total greenhouse gas credits adjusted for uncertainty for each year t in the project crediting period;

$\text{GHG}_{\text{credits|LtPF}}$ project greenhouse gas credits associated with the implementation of improved forest management (IFM) activities in the project scenario, $tCO_2e \cdot year^{-1}$; and

$\text{U}_{\text{total|LtPF}}$ total uncertainty for LtPF Project, dimensionless.

3.4.2.2 Calculation of verified carbon units

The amount of greenhouse gas credits estimated at section 3.4.2.1 above shall be adjusted to account for risk.

They shall be subject to deductions based on application of the most recent version of the VCS Tool for "AFOLU Non-Permanence Risk Analysis and Buffer Determination. "

Therefore, the amount of VCU's that can be issued at time t=t2(the date of verification) for monitoring period T=t2-t1, is calculated as:

$\text{VCU}_{\text{net,LtPE}} = \left(\text{Credits}_{\text{total,t2,LtPF}} - \text{Credits}_{\text{total,t1,LtPF}}\right) - \text{Bu}_{\text{IFM-VCS}}$ (31)

Where:

$\text{V}_{\text{CUnet|LtPF}}$ number of verified carbon units; dimensionless;

$\text{Credits}_{\text{total.t1|LtPF}}$ net anthroprogenic greenhouse gas removals by sinks, as estimated for t*=t1 in tCO_2e;

$\text{Credits}_{\text{total.t2|LtPF}}$ net anthroprogenic greenhouse gas removals by sinks, as estimated for t*=t2 in tCO_2e; and

$\text{Bu}_{\text{|IFM-VCS}}$ total number of credits withheld in VCS buffer account.

3.4.3 the calculation process

3.4.3.1 The calculation of $\text{GHG}_{\text{NET|BSL}}$, according to section 3.1, the process is shown below:

Stratum	Area(ha)	$V_{EX,j,I,BSL}$(m3/ha)	BEF	D(tdm/m3)	BCEF(tdm/m3)	CF(tc/tdm)	$C_{HB,J,I,BSL}$(tc/ha)	$C_{EX,j,I,BSL}$(tc/ha)	$C_{DW,slash,I,p,BSL}$(tc/ha)	WW_k	SLF_k	$C_{WP,0,I,BSL}$(tc/ha)	$C_{WP,I,BSL}$(tc/ha)
LQ-BR-1	2,905.37	43.59	1.514	0.482	0.730	0.5	15.91	10.51	5.40	24%	0.12	3.78	6.72
LQ-Pine-2	3,973.83	50.54	1.587	0.405	0.643	0.5	16.24	10.23	6.01	24%	0.12	3.68	6.55

Stratum	OFk	$C_{WP,100,BSL}$(tc/ha)	Ai,p(ha)	△ $C_{NET,BSL(1)}$(tc)	△ $C_{NET,BSL(2-10)}$(tc)	△ $C_{NET,BSL(11-20)}$(tc)	regrowth amount(m3/mu/year)	△ $C_{NET,BSL(1+)}$(tc)	△ CNET,BSL,t (tc)	GHGNEt,BSL,t（tCO2）
LQ-BR-1	0.86	5.78	193.70	893.23	160.61	56.00	0.25	265.04	844.80	3,097.61
LQ-Pine-2	0.86	5.63	264.90	1209.65	233.73	74.60	0.25	319.24	1198.74	4,395.39

Parameter	Data Source	Notes
Forest Area(a) and Volume	Calculated from the forest second class investigation data	$V_{j,i,BSL}$ is divided by the two parameters.
$V_{EX,j,I,BSL}$	Calculated from the historical timber harvest plan.	
BEF and D	Chapter "Land Use Change and Forestry GHG Inventory (2013)" of "Second national information notification on China Climate Change"	
CF,WW_k,SLF_k and OF_k	Adopted as the default value from the methodology.	
Regrowth amount	Adopted from the growth expertise stated by the local forest authority.	RGR_i is calculated by this parameters，BEF, D and CF.

The baseline emission during the crediting period is listed as follows:

Year	△$C_{NET,BSL(1+)}$(tc)	△$C_{NET,BSL,t}$(tc)	Conversion factor	$GHG_{NET,BSL,t}$（tCO_2）
1	584.27	1,518.60	3.67	5,568.20
2	1,168.55	1,328.66	3.67	4,871.77
3	1,752.82	1,138.73	3.67	4,175.34
4	2,337.10	948.79	3.67	3,478.91
5	2,921.37	758.86	3.67	2,782.48
6	3,505.64	568.92	3.67	2,086.05
7	4,089.92	378.99	3.67	1,389.62
8	4,674.19	189.05	3.67	693.19
9	5,258.46	-0.89	3.67	-3.25
10	5,842.74	-190.82	3.67	-699.68
11	6,427.01	-644.49	3.67	-2,363.12
12	7,011.29	-1,098.15	3.67	-4,026.56
13	7,595.56	-1,551.82	3.67	-5,690.00
14	8,179.83	-2,005.48	3.67	-7,353.44
15	8,764.11	-2,459.15	3.67	-9,016.88
16	9,348.38	-2,912.82	3.67	-10,680.32
17	9,932.65	-3,366.48	3.67	-12,343.76
18	10,516.93	-3,820.15	3.67	-14,007.21
19	11,101.20	-4,273.81	3.67	-15,670.65
20	11,685.48	-4,727.48	3.67	-17,334.09

3.4.3.2 ex-ante estimation of project emissions

The ex-ante estimation of project emission of the proposed project is as follows:

Stratum	Area(ha)	Ongoing growth rate(m3/mu/yr)	BEF	D(tdm/m3)	BCEF(tdm/m3)	CF(tc/tdm)	Conversion factor	∆ CAB,t,PRJ(tCO2)	∆ CDIST-FR,t,PRJ(tCO2)	∆ CDIST,t,PRJ(tCO2)	∆ CDIST_IL,I,t,PRJ(tCO2)	∆ CNET,t,PRJ(tCO2)
LQ-BR-1	2,905.37	0.4	1.514	0.482	0.730	0.50	3.67	23,322.04	0	0	0	-23,322.04
LQ-Pine-2	3,973.83	0.5	1.587	0.405	0.643	0.50	3.67	35,119.17	0	0	0	-35,119.17

$\triangle C_{DIST\text{-}FR,t,PRJ}$,$\triangle C_{DIST,t,PRJ}$,$\triangle C_{DIST\_IL,I,t,PRJ}$ are assumed to be zero ex-ante. As for the project tree species, there are no allometric equation ($f_j(x,y)$) applied in the project area, the average annual growth is adopted for the estimated calculation of carbon stock change. Therefore, the on-going growth rate is adopted based on the expertise issued by the statement of local forest authority, and in the monitoring report, the actual sampling data will be adopted.

Year	$\triangle C_{DIST\text{-}FR,t,PRJ}(tCO_2)$	$\triangle C_{DIST,t,PRJ}(tCO_2)$	$\triangle C_{DIST\_IL,l,t,PRJ}(tCO_2)$	[2]$\triangle C_{AB,t,PRJ}(tCO_2)$	$\triangle C_{NET,t,PRJ}(tCO_2)$
1	0	0	0	58,441.21	-58,441.21
2	0	0	0	58,441.21	-58,441.21
3	0	0	0	58,441.21	-58,441.21
4	0	0	0	58,441.21	-58,441.21
5	0	0	0	58,441.21	-58,441.21
6	0	0	0	58,441.21	-58,441.21
7	0	0	0	58,441.21	-58,441.21
8	0	0	0	58,441.21	-58,441.21
9	0	0	0	58,441.21	-58,441.21
10	0	0	0	58,441.21	-58,441.21
11	0	0	0	58,441.21	-58,441.21
12	0	0	0	58,441.21	-58,441.21
13	0	0	0	58,441.21	-58,441.21
14	0	0	0	58,441.21	-58,441.21
15	0	0	0	58,441.21	-58,441.21
16	0	0	0	58,441.21	-58,441.21
17	0	0	0	58,441.21	-58,441.21
18	0	0	0	58,441.21	-58,441.21
19	0	0	0	58,441.21	-58,441.21
20	0	0	0	58,441.21	-58,441.21

[2] As for the project tree species of broad leaf tree and pine, there are no allometric equation applied in the project area, the average annual growth is adopted for the estimated calculation of carbon stock change.

3.4.4 Uncertainty for the Baseline Scenario

According to the methodology, 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 becomes:

$$U_{total} = \frac{\sqrt{(U_1 * E_1)^2 + (U_2 * E_2)^2 + \ldots + (U_n * E_n)^2}}{E_1 + E_2 + \ldots + E_n} \quad (32)$$

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);

Ei and Ui 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:

$$U_{total} = \sqrt{U_1^2 + U_2^2 + \ldots + U_n^2} \quad (33)$$

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);

Ui are the percentage uncertainties associated with each of the quantities.

The uncertainty are 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 second class forestry investigation and forest right certificate, 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 details is listed in the following table.

For broad-leaf tree:

Parameters	Sample size	Stand deviation	Stand error	Mean	U
BEF	39	0.337	0.054	1.586	6.893%
D	189	0.013	0.001	0.443	0.445%
BCEF					6.907%

For Pine:

Parameters	Sample size	Stand deviation	Stand error	Mean	U
BEF	20	0.241	0.054	1.785	6.332%
D	14	0.017	0.005	0.396	2.728%
BCEF					6.894%

3) Uncertainty of carbon stock:

The calculation of uncertainty of carbon stock is based on the uncertainty of volume in every stratum multiply by the uncertainty of expansion factors.

Parameters	Species	Sample Size	Stand deviation	Stand Error	t	Mean	U
BEF	Broad-Leaf Tree	39	0.337	0.054	2.024	1.586	6.893%
	Pine	20	0.241	0.054	2.093	1.785	6.332%
D(tdm/m^3)	Broad-Leaf Tree	189	0.013	0.001	1.973	0.443	0.445%
	Pine	14	0.017	0.005	2.160	0.396	2.728%
BCEF	Broad-Leaf Tree					0.703	6.907%
	Pine					0.707	6.894%
Volume (m^3/ha)	Broad-Leaf Tree	19	56.130	12.877	2.101	127.72	21.182%
	Pine	21	48.160	10.509	2.086	130.23	16.833%
Carbon Stock (tc/ha)	Broad-Leaf Tree					6.309	22.280%
	Pine					5.209	18.191%
RGR (m^3/ha/yr)	Broad-Leaf Tree					3.750	10%
	Pine					3.750	10%

4) Uncertainty of regrowth

The uncertainty of regrowth is only associated with the parameter RGR_i, as for the value quoted from the expertise of the local forest authority, the uncertainty of 10% is adopted from the National Forest Resource Continuous Investigation Technical Regulation issued by the State Forestry Bureau . And this uncertainty is adopted for the project for conservative.

Baseline Emission Uncertainty calculation

Based on the calculation of the 4 parameters and coefficients above, the U_{total} is 11.640%, the detailed calculation is listed as follows:

Stratum	Parameter	Area(ha)	$V_{EX,j,I,BSL}$(m3/ha)	BEF	D(tdm/m3)	BCEF(tdm/m3)	CF(tc/tdm)	$C_{HB,J,I,BSL}$(tc/ha)	$C_{EX,j,I,BSL}$(tc/ha)	$C_{DW,slash,I,p,BSL}$(tc/ha)
		a	b	c	d	e=c*d	f	g=b*e*f	h=b*d*f	i=g-h
								$U_g = \sqrt{U_b{}^2 + U_e{}^2}$	$U_h = \sqrt{U_b{}^2 + U_d{}^2}$	$U_i = \frac{\sqrt{(E_g * U_g)^2 + (E_h * U_h)^2}}{(E_g + E_h)}$
Broad Leaf Trees	E	2,905.37	43.59	1.586	0.443	0.703	0.5	15.313	9.655	5.658
	U	0	21.18%	6.893%	0.445%	6.907%		22.280%	21.187%	15.932%
Pine	E	3,973.83	50.54	1.785	0.396	0.707	0.5	17.862	8.631	9.232
	U	0	16.83%	6.332%	2.728%	6.894%		18.191%	17.053%	13.464%

Stratum	Parameter	WW_k	SLF_k	$C_{WP,0,l,BSL}$(tc/ha)	$C_{WP,l,BSL}$(tc/ha)	OF_k	$C_{WP,100,BSL}$(tc/ha)	$A_{i,p}$(ha)	△$C_{NET,BSL(1)}$(tc)
		j	k	l=h*(j+k)	m=h-l	n	o=m*n	p	q=(i/10+l+o/20)*p
				$U_l=U_h$	$U_m=\frac{\sqrt{(E_h*U_h)^2+(E_l*U_l)^2}}{(E_h+E_l)}$		$U_o=U_m$	$U_p=0$	$U_q=\frac{\sqrt{(U_l*E_l)^2+(U_m*E_m)^2+(U_o*E_o)^2}}{(E_l+E_m+E_o)}$
Broad Leaf Trees	E	24%	0.12	3.476	6.179	0.62	3.831	193.69	819.937
	U			21.187%	16.557%		16.557%		10.225%
Pine	E	24%	0.12	3.107	5.524	0.62	3.425	264.92	1113.066
	U			17.053%	13.327%		13.327%		9.047%

Stratum	△$C_{NET,BSL(2-10)}$(tc)	△$C_{NET,BSL(11-20)}$(tc)	regrowth amount(tdm/ha/year)	△$C_{NET,BSL(1+)}$(tc)	△CNET,BSL,t,BSL(tc)
	r=(i/10+o/20)*p	s=o/20*p	t	v=e*f*p*t	w=q+r+s-v
	$U_r=\frac{\sqrt{(U_m*E_m)^2+(U_o*E_o)^2}}{(E_m+E_o)}$	$U_s=U_o$	U_t=30%	$U_v=\sqrt{{U_e}^2+{U_t}^2}$	$U_w=\frac{\sqrt{(U_q*E_q)^2+(U_r*E_r)^2+(U_s*E_s)^2+(U_v*E_v)^2}}{(E_q+E_r+E_s+E_v)}$
Broad Leaf Trees	146.692	37.103	3.750	255.163	748.570
	11.616%	16.557%	10%	12.153%	7.245%
Pine	289.928	45.364	3.750	1,475.217	-26.858
	10.462%	13.327%	10%	12.146%	7.110%

U_{BSL} 7.519%

3.4.5 Project Emission Uncertainty

Stratum	Parameter	Area(ha)	BEF	D(tdm/m3)	BCEF(tdm/m3)	CF(tc/tdm)	△VAB,t,PRJ(m3/ha)	△CAB,t,PRJ(tCO2)
		a	b	c	d=b*c	e	f	g=f*a*d*e*44/12
							Uf=10%	$U_E=\sqrt{E_f^2+E_a^2}$
Broad Leaf Trees(<=40)	E	2,905.37	1.586	0.443	0.703	0.5	6.000	22,454.353
	U	0.00	6.893%	0.445%	6.91%		10.000%	12.153%
Pine (>20)	E	3,973.83	1.785	0.396	0.707	0.5	7.500	38,622.978
	U	0.00	6.332%	2.728%	6.89%		10.000%	12.146%

U_{PRJ}=8.886%

Therefore, $U_{total}=\sqrt{{U_{BSL}}^2+{U_{PRJ}}^2}=\sqrt{7.519\%^2+8.886\%^2}=11.640\%$

According to the methodology, if $U_{total,LtPF} \leqslant 0.15$ then no deduction will result for uncertainty, therefore, it is unnecessary for the project to deduct for the uncertainty.

3.4.6 Calculation of verified carbon units

The amount of greenhouse gas credits estimated at section 3.4.2 above shall be adjusted to account for risk.

They shall be subject to deductions based on application of the most recent version of the VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination.

Therefore, 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:

$$VCU_{net,\,LtPF} = (Credits_{total,\,t2,\,LtPF} - Credits_{total,\,t1,\,LtPF}) - Bu_{IFM-VCS} \qquad (34)$$

Where:

$VCU_{net,LtPF}$	number of verified carbon units; dimensionless;
$Credits_{total.t1,LtPF}$	net anthroprogenic greenhouse gas removals by sinks, as estimated for $t^*=t_1$ in tCO_2e;
$Credits_{total.t2,LtPF}$	net anthroprogenic greenhouse gas removals by sinks, as estimated for $t^*=t_2$ in tCO_2e; and
$Bu_{IFM-VCS}$	total number of credits withheld in VCS buffer account.

Based on the analysis in NON-PERMANENCE RISK REPORT, the overall risk rating is 25, then

25% of the total emission reductions shall be deducted .

Therefore, the emission reduction detail is listed:

Year	$GHG_{NET,BSL,t}$	$GHG_{NET,PRJ,t}$	$GHG_{LK,LtPF,t}$	$GHG_{CREDITS,LtPF,t}$	$U_{total,LtPF}$	$Credits_{total,LtPF}$	Risk Score	$VCU_{net,IFM,}$
1	5,568.20	-58,441.21	0.00	64,009.41	11.640%	64,009.41	25	48,007.00
2	4,871.77	-58,441.21	0.00	63,312.98	11.640%	63,312.98	25	47,484.00
3	4,175.34	-58,441.21	0.00	62,616.55	11.640%	62,616.55	25	46,962.00
4	3,478.91	-58,441.21	0.00	61,920.12	11.640%	61,920.12	25	46,440.00
5	2,782.48	-58,441.21	0.00	61,223.69	11.640%	61,223.69	25	45,917.00
6	2,086.05	-58,441.21	0.00	60,527.26	11.640%	60,527.26	25	45,395.00
7	1,389.62	-58,441.21	0.00	59,830.83	11.640%	59,830.83	25	44,873.00
8	693.19	-58,441.21	0.00	59,134.40	11.640%	59,134.40	25	44,350.00
9	-3.25	-58,441.21	0.00	58,437.97	11.640%	58,437.97	25	43,828.00
10	-699.68	-58,441.21	0.00	57,741.54	11.640%	57,741.54	25	43,306.00
11	-2,363.12	-58,441.21	0.00	56,078.10	11.640%	56,078.10	25	42,058.00
12	-4,026.56	-58,441.21	0.00	54,414.66	11.640%	54,414.66	25	40,810.00
13	-5,690.00	-58,441.21	0.00	52,751.22	11.640%	52,751.22	25	39,563.00
14	-7,353.44	-58,441.21	0.00	51,087.77	11.640%	51,087.77	25	38,315.00
15	-9,016.88	-58,441.21	0.00	49,424.33	11.640%	49,424.33	25	37,068.00
16	-10,680.32	-58,441.21	0.00	47,760.89	11.640%	47,760.89	25	35,820.00
17	-12,343.76	-58,441.21	0.00	46,097.45	11.640%	46,097.45	25	34,573.00
18	-14,007.21	-58,441.21	0.00	44,434.01	11.640%	44,434.01	25	33,325.00
19	-15,670.65	-58,441.21	0.00	42,770.57	11.640%	42,770.57	25	32,077.00
20	-17,334.09	-58,441.21	0.00	41,107.13	11.640%	41,107.13	25	30,830.00
Total								821,001.00
Average								41,050.00

In order to issue the credits separately for each vintage, the credits during the whole crediting period in every calendar year is calculated based on days proportion as listed in the following:

Year	$Credits_{total,LtPF}$	Risk Score	$VCU_{net,IFM,}$
01/04/2011-31/12/2011	48,094.50	25	36,070.00
01/01/2012-31/12/2012	63,659.13	25	47,744.00
01/01/2013-31/12/2013	62,787.81	25	47,090.00
01/01/2014-31/12/2014	62,091.38	25	46,568.00
01/01/2015-31/12/2015	61,227.67	25	45,920.00
01/01/2016-31/12/2016	60,865.79	25	45,649.00
01/01/2017-31/12/2017	60,002.08	25	45,001.00
01/01/2018-31/12/2018	59,305.65	25	44,479.00
01/01/2019-31/12/2019	58,449.56	25	43,837.00
01/01/2020-31/12/2020	58,072.46	25	43,554.00
01/01/2021-31/12/2021	56,487.14	25	42,365.00
01/01/2022-31/12/2022	54,823.70	25	41,117.00
01/01/2023-31/12/2023	53,016.13	25	39,762.00
01/01/2024-31/12/2024	51,640.95	25	38,730.00
01/01/2025-31/12/2025	49,833.38	25	37,375.00
01/01/2026-31/12/2026	48,169.93	25	36,127.00
01/01/2027-31/12/2027	46,380.54	25	34,785.00
01/01/2028-31/12/2028	44,969.00	25	33,726.00
01/01/2029-31/12/2029	43,179.61	25	32,384.00
01/01/2030-31/12/2030	41,516.17	25	31,137.00
01/01/2031-31/03/2031	10,108.31	25	7,581.00
Total	1,094,680.89		821,001.00
Average	54,734.04		41,050.00

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	$V_{l,j,i,sp}$
Data unit	m^3
Description	Merchantable volume for tree *l* of species *j* in sample plot *sp* in stratum *i*
Source of data	Calculated from volume tables or equations linking diameter at breast height (DBH, at typically 1.3 m aboveground level), and/or merchantable height (MH), to commercial (merchantable) volume of trees in the sample plots above the minimum DBH set in the timber harvest and management plan. 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).
Value applied:	The local second forest inventory issued by the qualified

	investigation institute give all the detailed information including the area and volume of every spot.
Justification of choice of data or description of measurement methods and procedures applied	It is necessary to verify the applicability of equations used. Allometric equations can be verified by both: 1. Verification of equation conditions 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 r2 value of greater than 0.5 (50%) and a p value that is significant (<0.05 at the 95% confidence level). 2. Additional field verification The following limited measures method must be used for field verification: • 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) ; • measure DBH, and height to a 10 cm diameter top or to the first branch; • calculate stem volume from measurements; and • 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 >75% of the measured trees have a volume lower than the predicted curve. In this instance another equation must be selected.
Purpose of Data	Calculation of baseline emissions
Comments	The value can adopt the local second forest inventory issued by the qualified investigation institute.

Data / Parameter	CF_j
Data unit	tC/t d.m.
Description	Carbon fraction of dry matter for species j
Source of data	Either the default value 0.5 tC·t d.m.$^{-1}$ or species specific values from the literature must be used. The same value, however, must be used in all instances where this parameter is used.
Value applied:	0.5, as the default value recommended in the methodology.
Justification of choice of data or description of	N/A

measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	

<table>
<tr><td>Data / Parameter</td><td>D_j</td></tr>
<tr><td>Data unit</td><td>t d.m./m^3</td></tr>
<tr><td>Description</td><td>Basic wood density of species *j* in t d.m. m-3</td></tr>
<tr><td>Source of data</td><td>Must be chosen with priority from higher to lower preference as follows:
a) National species-specific or group of species-specific values (eg, from National GHG inventory);
b) Species-specific or group of species-specific values from neighbouring countries with similar conditions. When species-specific data from neighbouring 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;
c) Global species-specific or group of species-specific (eg, IPCC 2006 INV GLs AFOLU Chapter 4 Tables 4.13 and 4.14).

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.
For the project activity, a) National species-specific or group of species-specific values is applied.</td></tr>
<tr><td>Value applied:</td><td><table><tr><td>Species</td><td>D(tdm/m3)</td><td>Data Source</td></tr><tr><td>Broad leaf trees fixture</td><td>0.482</td><td rowspan="2">Chapter "Land Use Change and Forestry GHG Inventory (2013)" of "Second national information notification on China Climate Change"</td></tr><tr><td>Needle Leaf trees fixture</td><td>0.405</td></tr></table></td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td>N/A</td></tr>
<tr><td>Purpose of Data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Comments</td><td>Default values must be updated whenever new guidelines are</td></tr>
</table>

	produced by the IPCC

Data / Parameter	$f_j(X,Y)$
Data unit	t d.m./tree
Description	Allometric equation(s) for species *j* linking measured tree variable(s) to aboveground biomass of living trees
Source of data	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 r2 that is ≥ 0.8. The source of equation(s) must be chosen with priority from higher to lower preference, as available, as follows: a) National species-, genus-, family-specific; b) Species-, genus-, family-specific from neighbouring countries with similar conditions (ie, broad continental regions); c) National forest-type specific; d) Forest-type specific from neighbouring countries with similar conditions (ie, broad continental regions); 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. Oecologia 145: 87-99. 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 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).
Value applied:	Referred 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	As for the project tree species, there are no allometric equation applied in the project area, the average annual growth is adopted for the estimated calculation of carbon stock change. The average annual growth is determined as 0.4 and 0.5

	m^3/mu/year for broad leaf trees and pines respectively, which is adopted from the statement by the local forest authority. During the monitoring period, the average annual growth will be monitored by the total growth divided by the length of the monitoring period.

Data / Parameter	$BCEF_R$
Data unit	t d.m./m^3
Description	Biomass conversion and expansion factor applicable to wood removals in the project area
Source of data	The source of data must be chosen with priority from higher to lower preference as follows: a) Existing local forest type-specific; b) National forest type-specific or eco-region-specific (eg, from national GHG inventory); c) Forest type-specific or eco-region-specific from neighbouring countries with similar conditions. Sometimes (c) might be preferable to (b); d) Global forest type or eco-region-specific (eg, IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.5). Alternatively: BCEFR = BEFR * D Where BCEF values are not directly available, they can be calculated as Biomass Expansion Factor (BEF)* basic wood density (D). 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.
Value applied:	BCEF is calculated from BEF and D. <table><tr><td>Speices</td><td>BEF</td><td>D(tdm/m3)</td><td>BCEF(tdm/m3)</td></tr><tr><td>Broad leaf trees fixture</td><td>1.514</td><td>0.482</td><td>0.730</td></tr><tr><td>Needle Leaf trees fixture</td><td>1.587</td><td>0.405</td><td>0.643</td></tr><tr><td colspan="4">Data source of BEF and D is from Chapter "Land Use Change and Forestry GHG Inventory (2013)" of "Second national information notification on China Climate Change"</td></tr></table>

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 must be updated whenever new guidelines are produced by the IPCC

Data / Parameter	G_{gi}
Data unit	g/kg 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:	Not applicable to the project activity, as there is no fire.
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 must be updated whenever new guidelines are produced by the IPCC

Data / Parameter	OF, SLF, WW
Data unit	Kg kg^{-1}
Description	*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 *WW* = Fraction of extracted biomass effectively emitted to the atmosphere during production Wood waste fraction (WW): 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. Short-lived fraction (SLF) Winjum et al 1998 give decay rates for proportions of wood products, which were converted to with short-term (<3 yr) uses (applicable internationally) as below: Sawnwood 0.12 Woodbase panels 0.06 Other industrial roundwood 0.18 Paper and Paperboard 0.24

	Additional oxidized fraction (OF) Winjum et al 1998 gives annual oxidation fractions for each class of wood products split by forest region (boreal, temperate and tropical). This methodology projects these fractions over 95 years to give the additional proportion that is oxidized between the 3rd and 100th years after initial harvest:
Source of data	The source of data is the published paper of Winjum et al. 1998.
Value applied:	0.86
Justification of choice of data or description of measurement methods and procedures applied	N/ A
Purpose of Data	Calculation of baseline emissions.
Comments	

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

Data / Parameter	RGR_i
Data unit	tC/ha yr
Description	Forest regrowth rate post timber harvest for stratum *i*
Source of data	Regrowth rate must be calculated from either a) data generated in a reference area using measurements of timber volume in a chronosequence of replicated sample plots; or b) published data on forest growth after timber harvest of the same forest type within the same region as the project; or c) the IPCC default values for aboveground net biomass growth in natural forests.
Value applied:	

Species	Regrowth amount(m3/mu/yr)	RGRi(tc/ha/ yr)

<table>
<tr><td rowspan="2"></td><td>Broad Leaf Trees</td><td>0.25</td><td>1.37</td></tr>
<tr><td>Pines</td><td>0.25</td><td>1.21</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td colspan="3">Method b is applied. The average annual regrowth is confirmed by the local forest authority based on their expertise.
And the RGRi can therefore be calculated by the biomass expansion factor, density and carbon fraction of the separate species.</td></tr>
<tr><td>Purpose of Data</td><td colspan="3">Calculation of baseline emissions</td></tr>
<tr><td>Comments</td><td colspan="3">Default values must be updated whenever new guidelines are produced by the IPCC</td></tr>
</table>

Data / Parameter	$V_{EX,j,i,BSL}$
Data unit	m^3/ha
Description	Mean volume of extracted timber per unit area for species *j* in stratum *i*
Source of data	The timber harvest and management plan sets the allowable mean extracted volume from the merchantable volume of timber in the forest second class investigation ($V_{j,i\|BSL}$), based on legal limits
Value applied:	Referred 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	

Data / Parameter	$A_{i,p}$
Data unit	Ha
Description	Area covered by stratum *i* over land parcel *p*
Source of data	Geodetic coordinates and/or Remote Sensing data and/or legal parcel records
Value applied:	Referred 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	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	Geodetic coordinates, GIS Files or legal parcel records
Value applied:	Referred 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	

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	Geodetic coordinates, GIS Files or legal parcel records
Value applied:	Referred 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	

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 years ago
Source of data	Geodetic coordinates, GIS Files or legal parcel records
Value applied:	Referred 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	

Data / Parameter	A_{t*}
Data unit	Ha
Description	Cumulative area harvested until time t*
Source of data	Geodetic coordinates, GIS Files or legal parcel records
Value applied:	Referred 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	

Data / Parameter	A_{sp}
Data unit	Ha
Description	Area of sample plot sp
Source of data	Recording and archiving of size of sample plots
Value applied:	Referred to the spreadsheet (0.4ha)
Justification of choice of data or description of measurement methods and procedures applied	Standard procedure for plot delineation in forest timber inventory surveys must be used (see reference in Box 3 for example procedures)
Purpose of Data	Calculation of baseline emissions
Comments	Ex-ante the size of the plots must be defined and recorded in the monitoring plan.

4.2 Data and Parameters Monitored

Data / Parameter	Illegal Logging PRA Results
Data unit	/
Description	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.

Source of data	PRA
Description of measurement methods and procedures to be applied	The PRA must evaluate whether timber harvest may be occurring in the project area and must consist of semi-structured interviews / questionnaires. If ≥ 10% of those interviewed/surveyed believe that illegal logging may be occurring within the project boundary then the limited on-the-ground illegal logging survey must be triggered An additional output of the PRA must be a depth of penetration of illegal logging pressure. A maximum distance must be recorded for penetration into the forest from access points (such as roads, rivers, already cleared areas) for the purpose of harvesting timber.
Frequency of monitoring/recording	Every two years
Value applied:	Ex-ante zero. In addition to the national and local law and policy to prevent the illegal logging, the project proponent has also taken comprehensive prevention measures. The actual situation will be confirmed by the forest authority during the monitoring period.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Not applicable.
Purpose of data	For the calculation of project emissions.
Calculation method	Interview/Survey.
Comments	Ex ante estimation must 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. For the project activity, the forest is managed by the forestry authority, the illegal logging is strictly prohibited and severely punished. It is impossible to happen.

Data / Parameter	$A_{burn,l,t}$
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	At Least every five years
Value applied:	Ex-ante zero based on historic incidence. In addition to the national and local law and policy to prevent fire, the project proponent has also taken comprehensive prevention measures. The actual situation will be confirmed by the forest authority during the monitoring period.
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 must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of data	For the calculation of project emissions.
Calculation method	The common practice method for the calculation of area.
Comments	Ex ante estimations of areas burned must 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 must be monitored at least every five years
Value applied:	Ex-ante zero based on historic incidence, since there is no disturbance other than fire. In addition to the national and local law and policy to prevent other natural disturbance, the project proponent has also taken comprehensive measures.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest second class investigation including field data collection and data management must be applied. Use or adaptation of

	QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of data	For the calculation of project emissions.
Calculation method	The common practice method for the calculation of area.
Comments	Ex ante estimations of areas disturbed must be based on historic incidence of natural disturbance 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	ADIST_IL,i 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 must 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 zero. In addition to the national and local law and policy to prevent illegal logging, the project proponent has also taken comprehensive prevention measures. The actual situation will be confirmed by the forest authority during the monitoring period.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Not applicable
Purpose of data	For the calculation of the project emissions.
Calculation method	Based on the results of illegal logging survey.
Comments	Ex ante a limited survey can be used to determine a likely depth of degradation penetration

Data / Parameter	$C_{DIST\_IL,t,PRJ}$
Data unit	tCO_2e

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 (ADIST_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 must 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 must 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 ADIST_IL, indicates illegal logging
Value applied:	Ex-ante zero, in addition to the national and local law and policy to prevent illegal logging, the project proponent has also taken comprehensive prevention measures. The actual situation will be confirmed by the forest authority during the monitoring period.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest second class investigation including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of data	For the calculation of the project emission.
Calculation method	Not applicable, since no illegal logging occurs during the monitoring period within the project boundary.
Comments	If species-specific equations are used and species cannot be identified from stumps then it must be assumed that the harvested species is the species most commonly harvested. A PRA must 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:	Ex-ante zero. In addition to the national and local law and policy to prevent illegal logging, the project proponent has also taken comprehensive prevention measures. The actual situation will be confirmed by the forest authority during the monitoring period.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest second class investigation including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of data	For the calculation of the project emissions.
Calculation method	Not applicable, as no illegal logging occurs during the monitoring period within the project boundary.
Comments	Ex ante estimation should be made of area of plots. This should be set to exactly 3% of the buffer zone ADIST_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 15 cm DBH or larger) by the summed total of aboveground three biomass.
Description of measurement methods and procedures to be applied	Not applicable, as the leakage factor of this project is zero, it is unnecessary to calculate PMP_i .
Frequency of monitoring/recording	Not more than five years.
Value applied:	Not applicable, as there is no leakage of the project activity, 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 must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the *IPCC GPG LULUCF 2003*, is recommended.
Purpose of data	For the calculation of the project emissions.
Calculation method	Not applicable.
Comments	Ex-ante a time zero measurement must 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 (Vj,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><td>Species</td><td>Area(ha)</td></tr><tr><td>Broad-Leaf Tree</td><td>2,905.37</td></tr><tr><td>Pine</td><td>3,973.83</td></tr></table>Ex-ante, based on the recent forest inventory.
Monitoring equipment	Tape mesure.
QA/QC procedures to be applied	

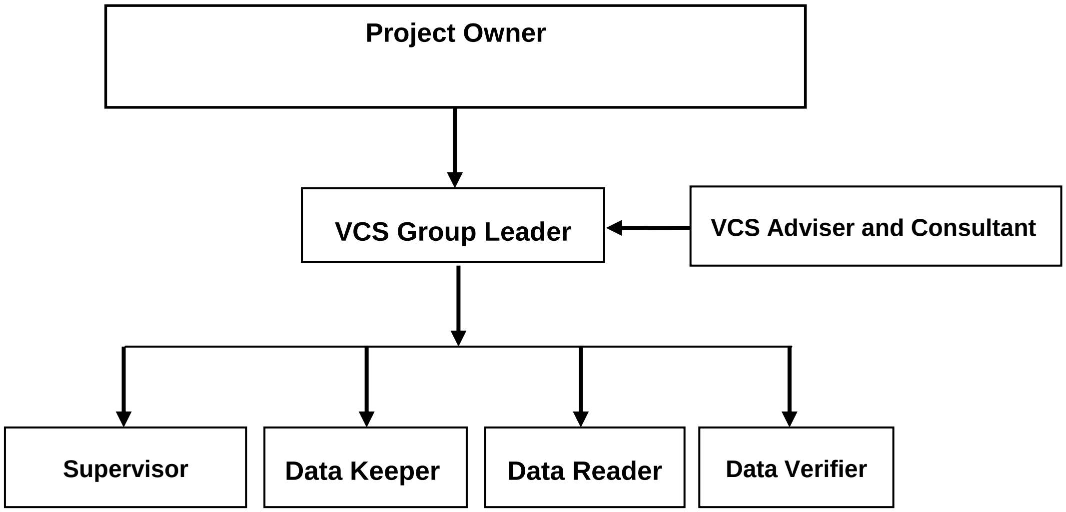
Purpose of data	For the calculation of the baseline and project emissions.
Calculation method	Not applicable, as no illegal logging occurs during the monitoring period within the project boundary.
Comments	In the baseline scenario strata areas must not change through time. In the project scenario it 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:	Not more than five years
Monitoring Equipment:	Tape Measure
Purpose of Data	Calculation of tree volume, then to carbon stock change further to the project emissions.
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 owner will set up a team, the director of which will be assigned accordingly. The team is in charge of collecting, monitoring and verifying the data, while the team director will be assisted by the consultant company. The findings from Consult Company should be reported. Then the team director together with Consult Company can collect overall information 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-CO2 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 (eg, using Geodetic coordinates) or by using georeferenced spatial data (eg, maps, GIS datasets, aerial photography, or georeferenced remote sensing images);
- commonly accepted principles of forest second class investigation and management are implemented;
- standard operating procedures (SOPs) and quality control/quality assurance (QA/QC) procedures for forest second class investigation including field data collection and data management must be applied. Use or adaptation of SOPs already applied in national forest monitoring or available from published handbooks or from the IPCC GPG LULUCF 2003 is recommended; and
- the project plan, together with a record of the plan as actually implemented during the project, must be available for validation or verification as appropriate.

4.3.4 Stratification

This methodology requires that an ex ante stratification of the project area in the project scenario is described in the VCS-PD as documented in the timber harvest and management plan, or developed by project proponents through sampling in the project area.

The monitoring plan may include 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.

4.3.5 Monitoring of actual carbon stock changes

Carbon stocks will be measured according to the stock assessment equations in this methodology with field sampling based on forest second class investigation 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 (or areas) the inventory plan must be specified in the VCS-PD and include:

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

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

To determine the sample size and allocation among strata, this methodology uses the most recent version of the tool for the "Calculation of the number of sample plots for measurements within A/R CDM project activities"44 approved by the CDM Executive Board.

The National Forest Resource Continuous Investigation Technical Regulation issued by the State Forestry Bureau has detailed requirement of the measurement method for the sample plot, data collection, checking, reporting, wood volume & precision calculation, related quality control and assessment.

The sample plot calculation process is shown below:

Parameter	Unit	Description
n	dimensionless	Number of sample plots required for estimation of biomass stock within the project boundary
n_i	dimensionless	Number of sample plots allocated to stratum I for estimation of biomass stocks within the project boundary.

The sample plot is 0.04ha with the radius of 11.29m and at least 5 samples is selected in every 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 are(6,879.2*5%=344.0 ha). Therefore, the following simplified equation can be used for estimating the number of sample plots:

$n = (\frac{t_{VAL}}{E})^2 * (\sum_i \omega_i * S_i)^2$ (35)

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; tdm (or tdm· ha-1), i.e. in the units used for Si

ω_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 tdm· ha^{-1})

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:

$$n_i = n * \frac{\omega_i * S_i}{\sum_i \omega_i * S_i} \quad (36)$$

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

ω_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^{-1})

i1, 2, 3,⋯ biomass stock estimation strata within the project boundary

For the project actibity:

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

I.D	Stratum	Species	Area (ha)	Carbon Stock (t CO_2)	Deviation factor	s_i	w_i	w_i*s_i	n_i	Adjusted ni
1	PROJ-1	Broad-Leaf Tree	2,905.37	484,197.34	0.35	58.33	42.23%	24.63	19.0	19
2	PROJ-2	Pinus	3,973.83	622,680.24	0.3	47.01	57.77%	27.15	21.0	21

Where the confidence level is 95% as required in the methodology VM0010 ver 1.2 and Df is ∞, therefore, t_{VAL} is 1.96.

Carbon stock changes over time must be estimated by taking measurements in plots at each monitoring event. Monitoring events must take place at intervals of 5, or preferably 3 years. For intermittent years it is good practice to use extrapolations of trends as they have occurred up till that moment. Monitoring reports can use such extrapolated parameter values for the determination of net emissions by sources and removals resulting from the project.

The design of the sampling regime will be determined by the number of strata and timber harvest the baseline case.

4.3.6 Conservative approach and uncertainty

Project proponents 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 must 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 ENVIRONMENTAL IMPACT

According to the latest "EIA category management list for construction projects" issued by the Ministry of Environmental Protection of People's Republic of China on Mar 19th ,[3] 2015, the forest protection project is excluded from environmental impact analysis as it is beneficial to the environmental and ecological diversity.

6 STAKEHOLDER COMMENTS

Questionnaires were distributed by the Project owner to the resident who lives in the community for the purpose of better understanding stakeholders' concerns and opinions regarding the Project. The questionnaires together with the related information of the Project were provided to the residents in Aug, 2015, including the issues on the technology applied, economic and social benefit and environmental protection etc. The content of the questionnaire includes the following information:

1. Introduction of the proposed project

2. Basic information about the interviewee

3. Questions:

1) What is your attitude towards the proposed project?

2) Whether or not the proposed project will impact to the local social/natural environmental situation?

3) What do you think the proposed project will bring to you?

4) What is your opinion and suggestion regarding the proposed project?

The Survey was conducted through distributing and collecting responses to a questionnaire. Totally 150 questionnaires returned out of 150 with 100% response rate. The following is a summary of the key findings based on returned questionnaires.

1. The level of respondents' education

The targets of this investigation are the people who will be affected by the Project. Most of them finished the middle school education, among whom 77% graduated from middle schools and 23% graduated from college or university.

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[3] http://www.zhb.gov.cn/gkml/hbb/bl/201504/t20150420_299283.htm

2. Attitude towards the local environment

The 40% of all respondents surveyed deem that the local environmental situation is very good, 60% think it is good and general, respectively.

3. Attitude of the residents toward the Project

The respondents generally deem that the Project will bring multiple benefits to them, particularly hoping that the Project can improve local environmental situation (93%) and increase employment opportunities (87%).

4. Conclusion

The survey shows that the Project receives very strong support from local people (95%).This is closely linked to the fact that the all respondents think the construction of the Project can bring multiple benefits to them.

In conclusion, the survey indicate that the Project has few negative impacts on local environment.

APPENDIX 1: <THE DETAILED LOCATION AND COORDINATES OF EVERY SMALL SPOT IN LIANHE AND ZHUANLONG >

No.	Town	compartment No.	sublot No.	Central Coordinates	
1	Lianhe	9	19	2875589	18300084
2	Lianhe	9	20	2875511	18300125
3	Lianhe	20	9	2870769	18292027
4	Lianhe	36	27	2866453	18292666
5	Lianhe	38	34	2868689	18297138
6	Lianhe	48	9	2867996	18302788
7	Lianhe	50	28	2865705	18301798
8	Lianhe	50	29	2865442	18302024
9	Lianhe	3	20	2877660	18292306
10	Lianhe	7	14	2877240	18299458
11	Lianhe	9	18	2875611	18300222
12	Lianhe	20	11	2870835	18293135
13	Lianhe	22	14	2871945	18294385
14	Lianhe	22	22	2871049	18293788
15	Lianhe	24	5	2872551	18296142
16	Lianhe	27	21	2873842	18303402
17	Lianhe	29	21	2872485	18303482
18	Lianhe	37	1	2867240	18296799
19	Lianhe	37	29	2865323	18297697
20	Lianhe	38	40	2867925	18296617
21	Lianhe	40	17	2868024	18297650
22	Lianhe	40	18	2867947	18297267
23	Lianhe	40	38	2867017	18297245
24	Lianhe	40	45	2865882	18297729
25	Lianhe	40	49	2865653	18297800
26	Lianhe	41	6	2867909	18298793
27	Lianhe	41	16	2866755	18299550
28	Lianhe	42	15	2872570	18305265
29	Lianhe	44	36	2868806	18302025
30	Lianhe	46	23	2869383	18301092
31	Lianhe	50	6	2866728	18302166
32	Lianhe	8	10	2876874	18299833
33	Lianhe	13	5	2874886	18300811
34	Lianhe	13	6	2874747	18299897
35	Lianhe	14	24	2873493	18297849
36	Lianhe	17	18	2872047	18292329
37	Lianhe	21	7	2875589	18294792
38	Lianhe	21	8	2875323	18294527

39	Lianhe	26	3	2871177	18295731
40	Lianhe	26	20	2869798	18295461
41	Lianhe	31	24	2872017	18297650
42	Lianhe	40	36	2867257	18296878
43	Lianhe	40	47	2865784	18297818
44	Lianhe	42	5	2872932	18305385
45	Lianhe	42	14	2872650	18305088
46	Lianhe	47	1	2868759	18300004
47	Lianhe	47	10	2868495	18301707
48	Lianhe	5	14	2875971	18291124
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51	Lianhe	12	6	2875437	18300616
52	Lianhe	14	20	2873796	18297532
53	Lianhe	18	20	2871443	18290802
54	Lianhe	24	33	2871247	18296416
55	Lianhe	29	2	2874007	18302044
56	Lianhe	34	20	2867916	18291709
57	Lianhe	36	18	2867114	18291507
58	Lianhe	42	16	2872592	18305604
59	Lianhe	46	13	2869801	18300929
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61	Lianhe	48	14	2867382	18300312
62	Lianhe	3	18	2877974	18292484
63	Lianhe	5	20	2875712	18291506
64	Lianhe	7	8	2877475	18298063
65	Lianhe	7	10	2877296	18298206
66	Lianhe	9	15	2875954	18300624
67	Lianhe	9	17	2875748	18299911
68	Lianhe	24	31	2871250	18295745
69	Lianhe	27	20	2873903	18303222
70	Lianhe	29	24	2872074	18301751
71	Lianhe	32	23	2870729	18300092
72	Lianhe	40	19	2867935	18298222
73	Lianhe	41	28	2865672	18299660
74	Lianhe	42	4	2872904	18305046
75	Lianhe	47	22	2867538	18299447
76	Lianhe	9	5	2876683	18300209
77	Lianhe	25	6	2870417	18295091
78	Lianhe	26	21	2869731	18295824
79	Lianhe	32	34	2870694	18297031
80	Lianhe	38	11	2870236	18298012
81	Lianhe	38	22	2869510	18297638

82	Lianhe	38	39	2868036	18296475
83	Lianhe	40	12	2868188	18297723
84	Lianhe	40	21	2867907	18298522
85	Lianhe	40	23	2867801	18296751
86	Lianhe	42	9	2872773	18305596
87	Lianhe	48	15	2867060	18300312
88	Lianhe	8	12	2876735	18297233
89	Lianhe	24	21	2871675	18296642
90	Lianhe	26	23	2869456	18296023
91	Lianhe	38	33	2868634	18296738
92	Lianhe	40	33	2867201	18297825
93	Lianhe	8	17	2876544	18298663
94	Lianhe	9	10	2876277	18300927
95	Lianhe	10	23	2875146	18296205
96	Lianhe	19	19	2871664	18292783
97	Lianhe	23	3	2873962	18295729
98	Lianhe	26	18	2870034	18296208
99	Lianhe	31	16	2872693	18297073
100	Lianhe	37	11	2866385	18296550
101	Lianhe	40	7	2868923	18298498
102	Lianhe	40	48	2865644	18297699
103	Lianhe	41	21	2866249	18298924
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111	Lianhe	42	8	2872794	18305173
112	Lianhe	37	8	2866924	18297010
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114	Lianhe	25	3	2870928	18295411
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116	Lianhe	38	29	2868912	18296838
117	Lianhe	47	16	2867731	18300531
118	Lianhe	5	18	2875795	18290842
119	Lianhe	7	15	2877166	18299698
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121	Lianhe	24	32	2871277	18296066
122	Lianhe	40	11	2868190	18297467
123	Lianhe	41	15	2866795	18299813
124	Lianhe	5	24	2875309	18291424

125	Lianhe	10	14	2875802	18295275
126	Lianhe	21	16	2874902	18295483
127	Lianhe	38	28	2869122	18297798
128	Lianhe	40	46	2865748	18297624
129	Lianhe	9	2	2876851	18300855
130	Lianhe	38	37	2868402	18297304
131	Lianhe	41	26	2865708	18299284
132	Lianhe	40	22	2867776	18297144
133	Lianhe	41	8	2867781	18299275
134	Lianhe	9	8	2876202	18300765
135	Lianhe	31	9	2872850	18297362
136	Lianhe	40	16	2867967	18297844
137	Lianhe	47	20	2867503	18300602
138	Lianhe	26	2	2871242	18296877
139	Lianhe	37	24	2865878	18297196
140	Lianhe	41	5	2868064	18298835
141	Lianhe	41	12	2867153	18299816
142	Lianhe	47	13	2867967	18300106
143	Lianhe	29	3	2873778	18302096
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145	Lianhe	40	37	2867176	18297153
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147	Lianhe	41	20	2866323	18298407
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151	Lianhe	48	10	2867413	18300878
152	Lianhe	9	27	2874893	18299732
153	Lianhe	25	4	2870735	18294730
154	Lianhe	8	20	2876158	18298819
155	Lianhe	21	15	2874829	18295228
156	Lianhe	37	9	2866636	18296772
157	Lianhe	40	43	2866315	18296839
158	Lianhe	9	12	2875993	18299881
159	Lianhe	38	36	2868358	18297117
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161	Lianhe	26	17	2870119	18296343
162	Lianhe	30	27	2871776	18299054
163	Lianhe	38	32	2868698	18296177
164	Lianhe	41	11	2867356	18299494
165	Lianhe	33	6	2870073	18291217
166	Lianhe	26	7	2871093	18297120
167	Lianhe	29	20	2872481	18303787

168	Lianhe	42	6	2872846	18305850
169	Lianhe	39	25	2868374	18298794
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171	Lianhe	40	20	2867768	18298179
172	Lianhe	41	22	2866127	18299021
173	Lianhe	42	7	2872630	18304911
174	Lianhe	41	7	2867655	18298836
175	Lianhe	5	19	2875688	18291044
176	Lianhe	37	27	2865502	18297553
177	Lianhe	41	4	2868027	18299237
178	Lianhe	44	3	2871317	18304869
179	Lianhe	40	39	2866690	18297476
180	Lianhe	5	13	2875885	18290731
181	Lianhe	25	1	2871363	18295358
182	Lianhe	25	2	2871089	18294611
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184	Lianhe	40	32	2867044	18297677
185	Lianhe	40	40	2866656	18297713
186	Lianhe	41	13	2866897	18299762
187	Lianhe	24	16	2871916	18296481
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190	Lianhe	24	2	2872208	18294838
191	Lianhe	26	5	2870941	18296554
192	Lianhe	38	14	2869917	18298135
193	Lianhe	23	1	2873849	18296190
194	Lianhe	44	1	2871715	18304843
195	Lianhe	40	5	2869109	18298320
196	Lianhe	42	12	2872473	18304378
197	Lianhe	38	21	2869489	18297207
198	Lianhe	29	12	2872955	18302924
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200	Lianhe	40	26	2867600	18297898
201	Lianhe	24	8	2871672	18295498
202	Lianhe	42	17	2872343	18305355
203	Lianhe	37	6	2866809	18296954
204	Lianhe	30	33	2870738	18301339
205	Lianhe	23	5	2873659	18295377
206	Lianhe	27	9	2874968	18303410
207	Lianhe	40	27	2867446	18298140
208	Lianhe	42	13	2872256	18304825
209	Lianhe	9	14	2875987	18300331
210	Lianhe	23	6	2873277	18294773

211	Lianhe	38	19	2869564	18296617
212	Lianhe	9	1	2876968	18301281
213	Lianhe	26	13	2869881	18296080
214	Lianhe	24	7	2871994	18295176
215	Lianhe	5	12	2875785	18291428
216	Lianhe	30	30	2871526	18300583
217	Lianhe	48	13	2867071	18300285
218	Lianhe	43	2	2872169	18304223
219	Lianhe	41	24	2865934	18299974
220	Lianhe	30	29	2871563	18301090
221	Lianhe	7	6	2877702	18298663
222	Lianhe	40	8	2868267	18298415
223	Lianhe	7	2	2878236	18299502
224	Lianhe	47	15	2867618	18299981

No.	Town	compartment No.	sublot No.	Central Coordinates	
1	Zhuanlong	2	4	288320	2883380
2	Zhuanlong	2	5	288580	2883520
3	Zhuanlong	3	6	289270	2882200
4	Zhuanlong	3	11	288750	2881700
5	Zhuanlong	3	12	288580	2881520
6	Zhuanlong	3	17	288830	2882400
7	Zhuanlong	4	8	284700	2882400
8	Zhuanlong	4	12	285550	2882530
9	Zhuanlong	4	13	285300	2882450
10	Zhuanlong	4	14	284780	2882560
11	Zhuanlong	4	15	284900	2882420
12	Zhuanlong	4	16	285050	2882370
13	Zhuanlong	5	5	286050	2881360
14	Zhuanlong	5	7	286550	2881350
15	Zhuanlong	5	12	286750	2880780
16	Zhuanlong	5	13	284700	2881430
17	Zhuanlong	6	2	284000	2881040
18	Zhuanlong	6	5	285150	2879700
19	Zhuanlong	6	7	285150	2880600
20	Zhuanlong	6	8	285500	2880200
21	Zhuanlong	6	23	286050	2879780
22	Zhuanlong	7	4	284670	2880150
23	Zhuanlong	7	11	284170	2880430
24	Zhuanlong	7	12	284410	2880120

25	Zhuanlong	7	13	284350	2879560
26	Zhuanlong	7	14	285280	2878980
27	Zhuanlong	7	15	283780	2880050
28	Zhuanlong	7	16	284070	2879900
29	Zhuanlong	8	27	284730	2877650
30	Zhuanlong	8	28	284720	2876350
31	Zhuanlong	8	32	284150	2878000
32	Zhuanlong	10	2	289360	2980900
33	Zhuanlong	10	3	288550	2881250
34	Zhuanlong	10	5	287650	2881000
35	Zhuanlong	10	6	288300	2879980
36	Zhuanlong	10	7	288050	2880570
37	Zhuanlong	10	8	288650	2880100
38	Zhuanlong	10	9	288480	2880380
39	Zhuanlong	10	10	288600	2880900
40	Zhuanlong	10	11	289000	2880900
41	Zhuanlong	10	12	287720	2880000
42	Zhuanlong	10	13	289200	2880450
43	Zhuanlong	10	14	289550	2880550
44	Zhuanlong	10	15	287900	2879730
45	Zhuanlong	13	1	290900	2881940
46	Zhuanlong	13	2	290500	2881650
47	Zhuanlong	13	8	291500	2881250
48	Zhuanlong	13	9	289920	2880920
49	Zhuanlong	13	10	290700	2880950
50	Zhuanlong	13	11	290500	2880650
51	Zhuanlong	13	12	291000	2881050
52	Zhuanlong	13	13	292500	2881000
53	Zhuanlong	13	14	291400	2880430
54	Zhuanlong	13	15	292100	2880630
55	Zhuanlong	13	19	291000	2880370
56	Zhuanlong	13	24	289600	2881300
57	Zhuanlong	13	25	289750	2880100
58	Zhuanlong	14	6	290450	2879500
59	Zhuanlong	14	8	291980	2879920
60	Zhuanlong	14	9	292100	2880050
61	Zhuanlong	14	12	292100	2880050
62	Zhuanlong	14	14	291740	2879450

63	Zhuanlong	14	15	291200	2879000
64	Zhuanlong	15	1	282200	2879530
65	Zhuanlong	15	2	282000	2879300
66	Zhuanlong	15	3	282600	2879200
67	Zhuanlong	15	4	282350	2879000
68	Zhuanlong	15	5	281500	2879000
69	Zhuanlong	15	6	282200	2878650
70	Zhuanlong	15	7	281720	2878290
71	Zhuanlong	15	8	281400	2878250
72	Zhuanlong	15	10	281650	2877830
73	Zhuanlong	15	11	281600	2877680
74	Zhuanlong	15	12	281750	2877480
75	Zhuanlong	15	13	282000	2877000
76	Zhuanlong	16	1	281300	2877400
77	Zhuanlong	16	2	281000	2876000
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79	Zhuanlong	16	4	281600	2876550
80	Zhuanlong	16	5	281850	2876740
81	Zhuanlong	16	6	280750	2875550
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83	Zhuanlong	17	1	282900	2879000
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85	Zhuanlong	17	3	282680	2878420
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87	Zhuanlong	17	5	283350	2877550
88	Zhuanlong	17	6	283840	2878140
89	Zhuanlong	17	7	282900	2877400
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91	Zhuanlong	17	9	283600	2877400
92	Zhuanlong	17	10	282800	2877000
93	Zhuanlong	17	11	283200	2876300
94	Zhuanlong	17	12	282850	2876350
95	Zhuanlong	17	14	282770	2875550
96	Zhuanlong	17	23	282750	2877750
97	Zhuanlong	17	24	283000	2876650
98	Zhuanlong	18	1	283900	2877250
99	Zhuanlong	18	2	283750	2876650
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101	Zhuanlong	18	16	284700	2875880
102	Zhuanlong	18	17	284300	2875750
103	Zhuanlong	19	5	290100	2878120
104	Zhuanlong	19	6	289550	2877340
105	Zhuanlong	19	7	289350	2877350
106	Zhuanlong	19	9	292200	2876950
107	Zhuanlong	19	10	289650	2877460
108	Zhuanlong	19	11	289900	2877300
109	Zhuanlong	20	8	288060	2876610
110	Zhuanlong	20	9	289150	2877100
111	Zhuanlong	20	10	288950	2876700
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145	Zhuanlong	27	5	285350	2872600
146	Zhuanlong	27	7	285650	2871700
147	Zhuanlong	27	9	286250	2871200
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151	Zhuanlong	27	22	284270	2871960
152	Zhuanlong	27	23	284450	2871950
153	Zhuanlong	27	24	284700	2872050
154	Zhuanlong	28	4	286900	2872650
155	Zhuanlong	28	6	285900	2872500
156	Zhuanlong	28	7	286050	2871880
157	Zhuanlong	28	8	287200	2872250
158	Zhuanlong	28	9	287550	2872300
159	Zhuanlong	28	10	287350	2871800
160	Zhuanlong	28	11	287900	2871900
161	Zhuanlong	28	12	286500	2871500
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163	Zhuanlong	28	14	287350	2871450
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165	Zhuanlong	29	3	290100	2874330
166	Zhuanlong	29	4	290350	2874100
167	Zhuanlong	29	5	289650	2873600
168	Zhuanlong	29	6	289150	2873800
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177	Zhuanlong	30	13	281550	2873900
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186	Zhuanlong	31	25	283050	2873430
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189	Zhuanlong	32	8	278900	2872800
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192	Zhuanlong	33	3	280050	2873400
193	Zhuanlong	33	4	280600	2872950
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196	Zhuanlong	33	7	281000	2872450
197	Zhuanlong	33	9	279650	2871950
198	Zhuanlong	33	10	280500	2872000
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200	Zhuanlong	33	12	281250	2871750
201	Zhuanlong	33	13	280400	2871750
202	Zhuanlong	33	14	279800	2871600
203	Zhuanlong	33	16	280600	2871450
204	Zhuanlong	34	4	282000	2873100
205	Zhuanlong	34	5	281700	2872350
206	Zhuanlong	34	6	281500	2873050
207	Zhuanlong	34	7	282000	2872650
208	Zhuanlong	34	8	281350	2872400
209	Zhuanlong	34	9	282000	2871750
210	Zhuanlong	34	10	282200	2872250
211	Zhuanlong	34	11	282500	2872500
212	Zhuanlong	34	12	282600	2872800
213	Zhuanlong	34	13	281650	2871650
214	Zhuanlong	35	1	278950	2871150

215	Zhuanlong	35	2	279700	2871100
216	Zhuanlong	35	23	282650	2870850
217	Zhuanlong	35	24	280850	2871150
218	Zhuanlong	36	1	278600	2871100
219	Zhuanlong	36	2	278850	2870800
220	Zhuanlong	36	3	279100	2870820
221	Zhuanlong	36	6	278750	2870500
222	Zhuanlong	36	9	278900	2870200
223	Zhuanlong	36	11	279300	2869800
224	Zhuanlong	36	18	278550	2870750
225	Zhuanlong	36	19	279220	2870180
226	Zhuanlong	36	20	279350	2870250
227	Zhuanlong	36	24	280900	2870350
228	Zhuanlong	37	5	281300	2869500
229	Zhuanlong	37	6	278200	2869170
230	Zhuanlong	37	23	281000	2869950
231	Zhuanlong	37	24	281250	2869950
232	Zhuanlong	39	2	277300	2868500
233	Zhuanlong	39	6	277450	2867650
234	Zhuanlong	39	7	277800	2867850
235	Zhuanlong	40	1	278650	2867700
236	Zhuanlong	40	3	278650	2867350
237	Zhuanlong	40	4	279000	2867450
238	Zhuanlong	40	5	277750	2866800
239	Zhuanlong	40	6	278250	2866750
240	Zhuanlong	40	8	278600	2866400
241	Zhuanlong	40	9	277700	2866150
242	Zhuanlong	40	11	277480	2866000
243	Zhuanlong	40	12	278450	2865850
244	Zhuanlong	40	15	279200	2865350
245	Zhuanlong	40	24	279320	2867300
246	Zhuanlong	41	1	280350	2867000
247	Zhuanlong	41	2	280600	2866750
248	Zhuanlong	41	3	280400	2866300
249	Zhuanlong	41	7	279800	2865900
250	Zhuanlong	41	8	279600	2865250
251	Zhuanlong	41	9	280000	2865500
252	Zhuanlong	41	10	280350	2865450

253	Zhuanlong	41	12	280300	2865100
254	Zhuanlong	41	14	281550	2865950
255	Zhuanlong	42	4	283200	2871100
256	Zhuanlong	42	7	283350	2870350
257	Zhuanlong	42	10	283850	2870100
258	Zhuanlong	42	13	283650	2869900
259	Zhuanlong	43	2	284170	2872000
260	Zhuanlong	43	5	285000	2871550
261	Zhuanlong	43	7	284400	2870600
262	Zhuanlong	43	10	285200	2870950
263	Zhuanlong	43	11	285650	2870750
264	Zhuanlong	44	1	283750	2869800
265	Zhuanlong	44	7	283800	2869470
266	Zhuanlong	44	9	284470	2869730
267	Zhuanlong	44	12	283150	2868850
268	Zhuanlong	44	15	284680	2869350
269	Zhuanlong	45	1	287100	2870300
270	Zhuanlong	45	3	286800	2870000
271	Zhuanlong	45	4	286350	2870250
272	Zhuanlong	45	5	286500	2869750
273	Zhuanlong	45	6	287250	2869700
274	Zhuanlong	45	7	287550	2869850
275	Zhuanlong	45	8	286500	2869400
276	Zhuanlong	45	9	287550	2869350
277	Zhuanlong	45	10	286100	2868950
278	Zhuanlong	45	11	286700	2869050
279	Zhuanlong	45	12	286450	2868800
280	Zhuanlong	45	19	285750	2870300
281	Zhuanlong	46	3	283505	2868050
282	Zhuanlong	46	4	283800	2868100
283	Zhuanlong	46	8	285350	2868350
284	Zhuanlong	46	9	283950	2867850
285	Zhuanlong	46	10	284350	2867900
286	Zhuanlong	46	11	284100	2867600
287	Zhuanlong	46	13	283400	2867350
288	Zhuanlong	46	15	284350	2867250
289	Zhuanlong	46	16	284500	2867700
290	Zhuanlong	46	17	284750	2867800

291	Zhuanlong	46	18	284900	2867650
292	Zhuanlong	46	19	284650	2867250
293	Zhuanlong	46	20	284000	2867500
294	Zhuanlong	46	22	285650	2867550
295	Zhuanlong	46	24	284900	2867150
296	Zhuanlong	46	26	285600	2867150
297	Zhuanlong	47	1	289550	2871150
298	Zhuanlong	47	3	289750	2870950
299	Zhuanlong	47	4	290600	2871300
300	Zhuanlong	47	5	290150	2871000
301	Zhuanlong	47	6	290050	2870700
302	Zhuanlong	47	7	289900	2870550
303	Zhuanlong	47	8	290350	2870600
304	Zhuanlong	47	14	288700	2872050
305	Zhuanlong	48	1	289150	2870750
306	Zhuanlong	48	2	288650	2870850
307	Zhuanlong	48	3	289350	2870750
308	Zhuanlong	48	4	288250	2870650
309	Zhuanlong	48	5	288950	2870350
310	Zhuanlong	48	6	288400	2870400
311	Zhuanlong	48	7	289500	2870500
312	Zhuanlong	48	8	289750	2870250
313	Zhuanlong	48	9	287950	2870100
314	Zhuanlong	48	10	288150	2869850
315	Zhuanlong	48	15	289250	2870150
316	Zhuanlong	48	16	289900	2870000
317	Zhuanlong	49	1	287750	2869050
318	Zhuanlong	49	2	287300	2868900
319	Zhuanlong	49	3	288100	2868900
320	Zhuanlong	49	4	288450	2868850
321	Zhuanlong	49	5	287050	2868650
322	Zhuanlong	49	6	287650	2868700
323	Zhuanlong	49	7	287900	2868450
324	Zhuanlong	49	9	287200	2868400
325	Zhuanlong	49	10	287450	2868500
326	Zhuanlong	49	11	288450	2868550
327	Zhuanlong	49	12	288100	2868300
328	Zhuanlong	49	13	288450	2868250

329	Zhuanlong	49	15	288650	2868100
330	Zhuanlong	49	16	288550	2867850
331	Zhuanlong	50	1	288800	2868800
332	Zhuanlong	50	2	289750	2869150
333	Zhuanlong	50	3	289250	2868050
334	Zhuanlong	50	4	289350	2868400
335	Zhuanlong	50	5	289800	2868600
336	Zhuanlong	50	6	288950	2867950
337	Zhuanlong	50	7	289000	2868250
338	Zhuanlong	50	12	290650	2868200
339	Zhuanlong	51	4	290950	2870200
340	Zhuanlong	51	5	291100	2870200
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342	Zhuanlong	51	9	290750	2869750
343	Zhuanlong	51	10	291200	2869750
344	Zhuanlong	51	11	290150	2869300
345	Zhuanlong	51	12	290450	2869500
346	Zhuanlong	51	13	291100	2869300
347	Zhuanlong	51	20	291750	2868600
348	Zhuanlong	52	1	291200	2867950
349	Zhuanlong	52	3	289850	2867350
350	Zhuanlong	52	6	289600	2867100
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352	Zhuanlong	52	12	289900	2866850
353	Zhuanlong	52	14	289800	2866450
354	Zhuanlong	53	1	288250	2866650
355	Zhuanlong	53	2	288950	2866300
356	Zhuanlong	53	4	288700	2866200
357	Zhuanlong	53	5	288900	2866100
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359	Zhuanlong	53	7	289250	2865750
360	Zhuanlong	53	8	289650	2865850
361	Zhuanlong	53	9	289100	2865500
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363	Zhuanlong	53	11	288000	2865300
364	Zhuanlong	53	12	288000	2865050
365	Zhuanlong	53	13	289350	2864950
366	Zhuanlong	53	15	289450	2864650

367	Zhuanlong	53	17	289400	2864400
368	Zhuanlong	53	19	288900	2863850
369	Zhuanlong	54	1	283600	2866750
370	Zhuanlong	54	2	284050	2866800
371	Zhuanlong	54	3	284550	2866950
372	Zhuanlong	54	4	284600	2866550
373	Zhuanlong	54	5	284100	2866450
374	Zhuanlong	54	6	284450	2866500
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376	Zhuanlong	54	8	285100	2866900
377	Zhuanlong	54	10	285150	2866550
378	Zhuanlong	54	12	282000	2866100
379	Zhuanlong	54	14	283350	2866000
380	Zhuanlong	54	16	283800	2866300
381	Zhuanlong	54	17	284600	2866000
382	Zhuanlong	54	19	283700	2865700
383	Zhuanlong	54	21	282850	2865400
384	Zhuanlong	54	22	283150	2865650
385	Zhuanlong	55	1	286150	2867150
386	Zhuanlong	55	4	285600	2866750
387	Zhuanlong	55	7	285550	2866400
388	Zhuanlong	55	9	285250	2866300
389	Zhuanlong	55	10	285600	2866150
390	Zhuanlong	55	11	285950	2866300
391	Zhuanlong	55	12	286900	2866000
392	Zhuanlong	55	13	284050	2865800
393	Zhuanlong	55	14	284400	2865900
394	Zhuanlong	55	16	284500	2865650