

HECHU AFFORESTATION PROJECT IN ANHUI PROVINCE



Document Prepared By Shanghai Libra Investment & Management Co., Ltd

Project Title	Hechu Afforestation Project in Anhui Province
Version	03
Date of Issue	08-04-2019
Project Location	Anhui Province, China.
Project Proponent(s)	Hefei Zhuoya Landscaping Engineering Co., Ltd Contact: Yaqing Zhang Email: hfzhuoya@sina.com Phone: +86 13917344437
Prepared By	Shanghai Libra Investment & Management Co., Ltd Contact: Shaohui Zhong Email: kvz@libracarbon.com Phone: +86-21-64693022
Validation Body	TÜV NORD Contact: Fancy Zhao Email: fzhao@tuv-nord.com
Project Lifetime	22/04/2014~21/04/2044; 30-year lifetime
GHG Accounting Period	22/04/2014~21/04/2034; 20-year total period
History of CCB Status	N/A
Gold Level Criteria	N/A
Expected Verification Schedule	May 2019

Table of Contents

1	Summary of Project Benefits	3
1.1	Unique Project Benefits	3
1.2	Standardized Benefit Metrics	4
2	General	8
2.1	Project Goals, Design and Long-Term Viability	8
2.2	Without-project Land Use Scenario and Additionality	18
2.3	Stakeholder Engagement	19
2.4	Management Capacity	23
2.5	Legal Status and Property Rights	25
3	Climate	27
3.1	Application of Methodology	27
3.2	Quantification of GHG Emission Reductions and Removals	33
3.3	Monitoring	45
3.4	Optional Criterion: Climate Change Adaptation Benefits	54
4	Community	54
4.1	Without-Project Community Scenario	54
4.2	Net Positive Community Impacts	55
4.3	Other Stakeholder Impacts	58
4.4	Community Impact Monitoring	58
4.5	Optional Criterion: Exceptional Community Benefits	58
5	Biodiversity	59
5.1	Without-Project Biodiversity Scenario	59
5.2	Net Positive Biodiversity Impacts	60
5.3	Offsite Biodiversity Impacts	63
5.4	Biodiversity Impact Monitoring	63
5.5	Optional Criterion: Exceptional Biodiversity Benefits	63

1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Improve local production conditions and ecological environment, enhance the quality of life, create a good investment and development environment and play a leading and demonstration role.	4.2
2) Provide experience of forest planting and management in hilly land	4.2.3
3) Improve the ecological environment of Chao Lake Nature Reserve	5.2.3

1.2 Standardized Benefit Metrics

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	9,383,744 tCO ₂ e	3.2.4
	Net estimated emission reductions in the project area, measured against the without-project scenario	N/A	N/A
Forest ¹ cover	For REDD ² projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	N/A	N/A
	For ARR ³ projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	30,057 Ha	2.1
Improved land management	Number of hectares of existing production forest land in which IFM ⁴ practices are expected to occur as a result of project activities, measured against the without-project scenario	N/A	N/A
	Number of hectares of non-forest land in which improved land management practices are expected to occur as a result of project activities, measured against the without-project scenario	N/A	N/A

¹ Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)

² Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)

³ Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)

⁴ Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	22,543	2.3
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	15,780	2.3
Employment	Total number of people expected to be employed in project activities, ⁵ expressed as number of full-time employees ⁶	22,543	2.3
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	15,780	2.3
Livelihoods	Total number of people expected to have improved livelihoods ⁷ or income generated as a result of project activities	22,543	2.3
	Number of women expected to have improved livelihoods or income generated as a result of project activities	15,780	2.3
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	N/A	N/A

⁵ Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.

⁶ Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

⁷ Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	N/A	N/A
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	N/A	N/A
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	N/A	N/A
Well-being	Total number of community members whose well-being ⁸ is expected to improve as a result of project activities	22,543	2.3
	Number of women whose well-being is expected to improve as a result of project activities	15,780	2.3

⁸ Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Livelihoods, Health, Education and Water), and may also include other benefits such as strengthened legal rights to resources, increased food security, conservation of access to areas of cultural significance, etc.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation, ⁹ measured against the without-project scenario	30,057	5.2
	Expected number of globally Critically Endangered or Endangered species ¹⁰ benefiting from reduced threats as a result of project activities, ¹¹ measured against the without-project scenario	1	5.2

⁹ Managed for biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation, e.g. enhancing the status of endangered species

¹⁰ Per IUCN's Red List of Threatened Species

¹¹ In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

Hechu Afforestation Project in Anhui Province (hereafter referred as “the project”) is located in Hefei City and Chuzhou City, Anhui Province, China. The project is to establish forest on the barren land to generate GHG emission reductions and contribute to local sustainable development. The project is implemented by Hefei Zhuoya Landscaping Engineering Co., Ltd. 30,057ha of forest was established by direct planted on barren lands in two cities of Hefei City and Chuzhou City, Anhui Province.

The project activity aims to:

- Sequester carbon dioxide and mitigating climate change;
- Enhance biodiversity conservation by increasing the connectivity of forests;
- Improve the quality and quantity of the vegetation;
- Improve soil and water conservation in the lower reaches of the Yangtze River and the Jianghuai hilly area.
- Generate income and job opportunities for local communities.

There is no natural renewal and reforestation before the project, and all sites were covered by the barren land. The main objective specie are *Koelreuteria paniculata*, *Quercus robur*, *Celtis sinensis* Pers and *Zelkova schneideriana* which are native species according to the baseline survey.

The implementation of the project would reduce the GHG emissions for 9,383,744 tCO₂e in 20 years, with an average annual GHG emission of 469,187 tCO₂e.

2.1.2 Project Scale

Project Scale	
Project	
Large project	✓

2.1.3 Project Proponent (G1.1)

Organization name	Hefei Zhuoya Landscaping Engineering Co., Ltd
Contact person	Yaqing Zhang
Title	Project Manager

Address	No. 28, Building 6, Block A, Wangdaying Village, Feihe Road, Baohe District, Hefei, Anhui, China
Telephone	+86 13917344437
Email	hfzhuoya@sina.com

2.1.4 Other Entities Involved in the Project

Organization name	Shanghai Libra Investment & Management Co., Ltd
Contact person	Shaohui Zhong
Title	Manager
Address	Room H, Floor 20, Aibang Mansion, No.585 Lingling Road, Xuhui District, Shanghai, China
Telephone	+86-21-64693022
Email	kvz@libracarbon.com

2.1.5 Physical Parameters (G1.3)

The project is located in Hefei City and Chuzhou City of Anhui Province, China. The geographical coordinates of the project are between 116° 41' and 119° 13' east longitude and between 30° 57' and 33° 13' north latitude.

According to CCB standard, the Hefei City and Chuzhou City are defined as the project zone, and the planting area in these two cities is defined as project area. The boundaries of project area and project zone is shown in Figure 1, and the KML file has also been submitted.

The basic physical parameters of the project are summarized as follows:

Topography

The types of landforms in Anhui are complex and diverse, with mountains, hills and plains arranged in the north and south. The terrain of the province is high in the southwest and low in the northeast. The Yangtze River and the Huai River traverse the whole territory from west to east. Hefei City and Chuzhou City, where the project is located, are located in the Jianghuai hilly area. The ground is mainly composed of hills, terraces and a part of the river valley plains embedded in the period. The environment has been eroded and denuded for a long time, and the ground has been basically flattened, showing undulating hills and valley plains. The terrain of the Jianghuai hilly area is inclined from the northwest to the southeast, with an altitude of between 100 and 300 meters. The Huangpu Mountain in western Chuzhou is 399 meters high and is the highest peak of the hills.

Soils

In Hefei City, there are three kinds of landforms in hilly land, low mountain mounds and low-lying plains. The hilly land is the main site, and the Jianghuai watershed traverses from west to east.

The soil in Hefei is mainly composed of yellow brown soil and paddy soil, accounting for about 85% of the total soil. The rest are lime (rock) soil, purple soil, sand black soil. The soil is counted as 5 soil types, 12 sub-categories, and 103 soil types. The soil pH in the city is moderate, generally neutral and acidic, suitable for a variety of crop growth.

The Chuzhou City spans the Yangtze River and Huaihe River basins. The main body is the lower reaches of the Yangtze River and the Jianghuai hilly area. The landform of the city can be roughly divided into three types: hilly area, downland area and plain area. The terrain is high in the west and low in the east.

Because it is located in the lower reaches of the Yangtze River and the Jianghuai hilly area, it is dominated by fertile paddy soil, and the vegetation is mostly artificial vegetation, mostly rice fields. Natural vegetation the north of the Yangtze River is mainly the evergreen broad-leaved and deciduous broad-leaved mixed forest, and the south is mainly the evergreen broad-leaved forest. The soil in Jiangbei is yellow brown soil and the south of the river is red soil. There are 9 soil types in the Chuzhou area. Paddy soil, yellow cinnamon soil, purple soil, coarse soil, yellow brown soil, sand black soil, fluvo-aquic soil, limestone soil and stone soil also have scattered distribution.

Climate

Hefei is located in the mid-latitude zone and belongs to the subtropical monsoon humid climate. The monsoon is obvious, the four seasons are distinct, the climate is mild, and the rainfall is moderate. The annual average temperature is 15.7 °C, the average annual precipitation is about 1000 mm, the annual sunshine time is about 2000 hours, and the average relative humidity is 77%.

Chuzhou is located in the middle and lower reaches of the Yangtze River and the hilly area between the Jianghuai, Chuzhou City is a humid subtropical climate in the north subtropical zone with four distinct seasons, warm and humid. The climate characteristics can be summarized as: cold and dry in winter, warm and cold in spring, hot and rainy in summer, and sunny in autumn. The annual average temperature of the city is 15.4 °C, the annual average maximum temperature is 20.1 °C, the annual average minimum temperature is 11.4 °C, and the annual average precipitation is 1035.5 mm. The plum rain period is 23 days long. The total annual sunshine hours is 2073.4 hours.

Hydrology

The main inland rivers in Hefei include Nanfei River, Dianbu River, Fengle River and Pai River. The highest water level in history is 78.87 meters. The average annual precipitation is 976 mm, mainly concentrated in the summer.

The main inland rivers in Cangzhou City include Baita River, Chi River, Chu River, Huai River and Qingliu River. The highest water level in history is 22.18 meters. The average annual precipitation is 1035.5 mm. The average annual surface water raft flow is about 2.78 billion cubic meters, and the per capita possession is 716 cubic meters. More than 1,000 large, medium and small reservoirs have been built, with a total water storage capacity

of 2.308 billion cubic meters. The external water conditions such as the Yangtze River and Huai River can be used better. Groundwater resources are not abundant.

Types of vegetation

There are 179 species of trees and shrubs in Hefei, belonging to 59 families and 111 families of evergreen trees, such as *Pinus bungeana*, *Pinus massoniana*, *Pinus tabulaeformis*, *Pinus koraiensis*, *Osmanthus fragrans*, and *Magnolia*. Common deciduous trees include *metasequoia*, cedar, cedar, plum, acacia, acacia, *Dalbergia*, sandalwood, hedgehog, eucalyptus, weeping willow and so on. Common shrubs include tea tree, cypress, sea paulownia, boxwood, big leaf boxwood, bay laurel, lobular privet, and so on.

There are 414 species of 187 genera and 85 genera of plant species in Chuzhou, more than 900 kinds of Chinese herbal medicines. The city's rare tree species include *Ulmus chenmoui*, *Ulmus gaussenii*, Fishscale bamboo, and Pearl dragon tung.

2.1.6 Social Parameters (G1.3)

The basic social parameters of the project are summarized as follows:

Main settlements

The project zone covers 1 county-level city and 4 counties in Hefei. Chaohu county-level City has 5 streets, 11 towns and 1 township. The population is about 792,000 and there are 6 ethnic groups. Changfeng County has 14 townships under its jurisdiction, the population is about 769,600, of which the agricultural population is 669,700. Feidong County has 18 townships under its jurisdiction. The population is about 888,000 and there are 23 ethnic groups. Feixi County has 8 towns and 4 townships, the population is about 771,000 and there are 29 ethnic groups. Lujiang County has 17 towns under its jurisdiction, the population is about 10.01 million and there are 32 nationalities.

The project zone covers 4 counties, 1 county-level city and 1 district in Chuzhou. Fengyang County has jurisdiction over 1 township and 14 towns, the population is about 674,000 and there are 21 ethnic groups. Mingguang county-level City has 12 towns and 1 township. It has a population of about 455,000 and has 25 nationalities. Langya District has jurisdiction over 8 streets with a total population of 240,000, total area is 126 square kilometers. Dingyuan County has 22 townships under its jurisdiction, the population is about 807,000 and there are 30 ethnic groups. Quanjiao County has 10 towns under its jurisdiction, with a population of about 400,000. It is dominated by the Han nationality and has ethnic minorities such as Manchu and Hui. Lai'an County has 12 townships and towns with a population of 490,900. It is dominated by the Han people and has many ethnic minorities such as Hui, Tibetan and Yi.

Land use and economic activities

The project is adjacent to the political, economic, cultural and transportation centers of Anhui Province. The main land use and economic activities are agriculture. The project area for planting is mostly barren land.

Relevant historic conditions

Hefei, one of the project zone, is an ancient city with a history of more than 2,000 years. It is located in the East China region of China, between the Jianghuai and Huaihe, and is surrounded by Chaohu Lake. It is the provincial capital of Anhui Province and the sub-center of the Yangtze River Delta urban agglomeration.

The other location of the project is Chuzhou, which located in the eastern part of Anhui Province, where Jiangsu and Anhui meet. It is the gateway to Jiangbei, the ancient capital of the Six Dynasties, and looks across the river from the main city of Nanjing. According to the Yangtze River in the south of Chuzhou, the East-controlled Beijing-Hangzhou Grand Canal has been the “land of fish and rice” near the Yangtze River in the lower reaches of the Yangtze River.

Socio-cultural information

Anhui Province is a typical land in the south of the Yangtze River and the land of fish and rice. The population is 70.592 million and the urbanization rate is 53.5%. The existing minority population is about 500,000. Among them, Hui, Manchu and She are the ethnic minorities living in our province. The sex ratio of the population is about 51:49. The per capita disposable income is about 29,156 CNY / year.

2.1.7 Project Zone Map (G1.4-7, G1.13, CM1.2, B1.2)

The project is located in Hefei City and Chuzhou City, Anhui Province, China. The geographical coordinates of Hefei City are 30° 57' -32° 32' north latitude and 116° 41' -117° 58' east longitude. The geographic coordinates of Chuzhou City are 31° 51' -33° 13' north latitude and 117° 09' -119° 13' east longitude.

The location of the project activity in Anhui Province is illustrated in Figure 1. According to CCB standard, the Hefei City and Chuzhou City are defined as the project zone, and the planting area in these two cities is defined as project area. The boundaries of project area and project zone is shown in Figure 1, and the KML file has also been submitted.

The geographical coordinates of the project activity are listed below.

Table 1 Geographical Coordinates of the Project Activity in Two Cities

	East longitude	North latitude
Hefei City	116° 41' -117° 58'	30° 57' -32° 32'
Chuzhou City	117° 09' -119° 13'	31° 51' -33° 13'

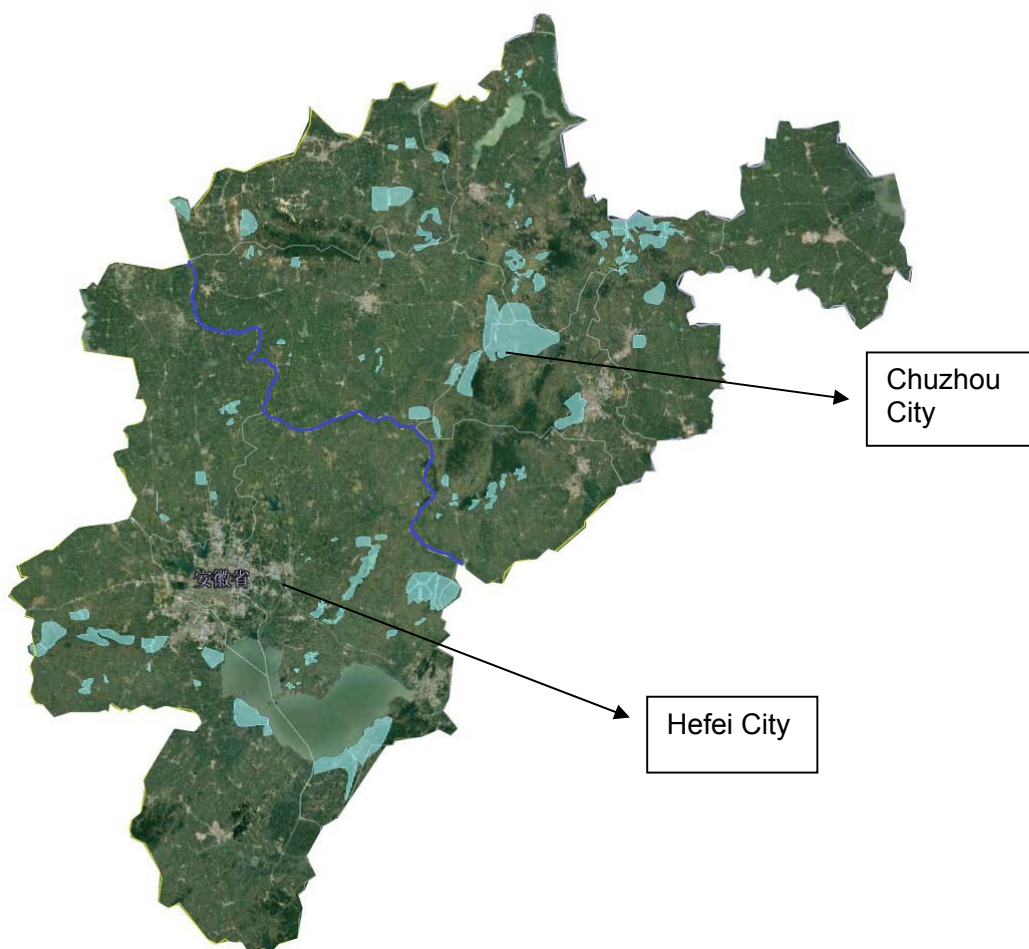


Figure1 The project location

2.1.8 Stakeholder Identification (G1.5)

4 counties and 1 county-level city in Hefei City and 4 counties, 1 county-level city and 1 district in Chuzhou City are affected by project activities, so all local residents in these areas are identified as stakeholders. Forest planting needs to be approved by the local government and the local forestry bureau should be identified as a stakeholder. In addition, in order to assess the environmental and social benefits of project outcomes, local governments in two cities were identified as stakeholders. In addition, entities and organizations that could have interest in the project activity, like VCSA and CCBA were identified as stakeholders.

2.1.9 Stakeholder Descriptions (G1.6, G1.13)

Stakeholder	Rights, Interest and Overall Relevance to the Project
Residents in Hefei City and Chuzhou City	Local residents who owns the using right of the project land through the village communities, some of them participate the implementation of the project by working on site clearing, digging, planting, watering and follow-up management. They will be directly affected by the project.
Forest Bureaus of Hefei City and Chuzhou City.	The local administration who is in charge of the official approval and management of the forest projects.
Governments of Hefei City and Chuzhou City.	The local administration who is responsible for the local social and environmental management.
VCSA and CCBA	These entities and organizations could have interest in the project. And there is no local specific NGOs.

2.1.10 Sectoral Scope and Project Type

The project is developed under VCS scope 14 “Agriculture, Forestry and Other Land Use (AFOLU)” with a project category of Afforestation, Reforestation and Revegetation (ARR). The project is not a grouped project.

2.1.11 Project Activities and Theory of Change (G1.8)

Aiming to contribute to the local sustainable development, especially to mitigating the water and soil erosion, 30,057ha of forest would be established by direct planting on degraded land in Hefei and Chuzhou. According to Biodiversity Survey Report of the project, all the project area were previously degraded barren land without agricultural activities since 1970s. There is no natural renewal and reforestation before the project, and some sites were covered by sparse shrub. Therefore the project does not include activities that convert native ecosystems to generate GHG credits, the eligibility criteria of VCS AFOLU projects are fulfilled.

Considering the goal of the project activity, the native species *Koelreuteria paniculata*, *Quercus robur*, *Celtis sinensis* Pers and *Zelkova schneideriana* are chosen as the target species. Seedling planting is chosen as the forestation method. Seedling must be robust with developed root system, has no mechanical damage and no diseases, and has complete crown. According to the completion acceptance report of the project, all the trees planted have met the requirements of the project design and have good quality evaluation.

The local government developed a comprehensive control mode, improve local production conditions and ecological environment, enhance the quality of life, create a good investment and development environment and play a leading and demonstration role.

The project is estimated to generate GHG emission removals of 9,383,744tCO₂e in 20 years, with an average annual GHG emission removal of 469,187tCO₂e.

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Plant native species of trees, including preparing land for planting	Establish a forest, create job opportunities	Improve the local environment	Generate GHG emission removals	Climate
Offer permanent and temporary job opportunities related to forest planting and management	Increase household incomes of local residents	Improve living level of local villages	Improve well-being of local residents	Community
Provide technical skills and training of forest planting and management	Improve motivation of community groups	Enhance capabilities of local residents	Enhance social cohesion	Community
Conduct continuous management and protection of the forest	Improve local ecological environment	Provide better habitat for wild lives	Increase local biodiversity	Biodiversity

2.1.12 Sustainable Development

The project will contribute to achieving sustainable development as following:

- Sequester carbon dioxide and mitigating climate change;
- Enhance biodiversity conservation by increasing the connectivity of forests;
- Improve the quality and quantity of the vegetation;
- Improve soil and water conservation in the lower reaches of the Yangtze River and the Jianghuai hilly area.
- Generate income and job opportunities for local communities.

2.1.13 Implementation Schedule (G1.9)

Date	Milestone(s) in the project's development and implementation
23-09-2013	Started the baseline survey.
01-12-2013	The Project Design for Afforestation Operation was finished.
16-01-2014	Hefei City and Chuzhou City's afforestation plan received approval by the local forestry department
29-01-2014	Biodiversity survey report of the project was completed.
10-03-2014	Participatory Rural Appraisal (PRA) report of the project was completed.
22-04-2014	Started planting (start date of crediting period)
15-11-2015	Completed planting

2.1.14 Project Start Date

According to VCS standard, the project start date is the date on which activities that lead to the generation of GHG emission reductions or removals are implemented, for this project, the project start date is 22-04-2014 when the preparing land for planting started.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

Planting started: Apr. 2014, the date in which the native community starts its activities and leads to reducing greenhouse gas emissions. The project crediting period is from 22-04-2014 to 21-04-2034, and lifetime of the project is 30 years from 22-04-2014 to 21-04-2044.

2.1.16 Differences in Assessment/Project Crediting Periods (G1.9)

The project's climate adaptive capacity and resilience, community, and/or biodiversity assessment period is longer than the GHG emissions accounting period.

2.1.17 Estimated GHG Emission Reductions or Removals

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
22/04/2014-21/04/2015	54,034
22/04/2015-21/04/2016	72,786
22/04/2016-21/04/2017	57,327
22/04/2017-21/04/2018	77,733
22/04/2018-21/04/2019	103,302
22/04/2019-21/04/2020	134,687

22/04/2020-21/04/2021	172,472
22/04/2021-21/04/2022	217,130
22/04/2022-21/04/2023	268,994
22/04/2023-21/04/2024	328,227
22/04/2024-21/04/2025	394,797
22/04/2025-21/04/2026	468,480
22/04/2026-21/04/2027	548,851
22/04/2027-21/04/2028	635,285
22/04/2028-21/04/2029	726,990
22/04/2029-21/04/2030	823,014
22/04/2030-21/04/2031	922,290
22/04/2031-21/04/2032	1,023,655
22/04/2032-21/04/2033	1,125,898
22/04/2033-21/04/2034	1,227,792
Total estimated ERs	9,383,744
Total number of crediting years	20
Average annual ERs	469,187

2.1.18 Risks to the Project (G1.10)

For the identification of probable natural risks and those induced by man, the tool approved by the VCS Standard was used: "Tool for the Risk of Non-Permanence of the Agriculture, Forestry and Other Land Uses" sector.

Identify Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Fire	The planting area is mostly flat barren land, thus the risk of fire is quite low in the early phase of the project. After the trees grow to a certain age (about 30 years), the risk of fire may increase, and the project owner will adopt the necessary measures for fire preventing.	Strengthen the work of forest fire prevention publicity education to increase the awareness of forest fire prevention in the whole society. Education activities, mainly covering forest law and forest fire prevention regulation, are carried out to popularize the basic knowledge of fire prevention and extinguishing. Relying on the masses, we will implement mass prevention and control and effectively raise the people's awareness of forest fire prevention.
Diseases and Insects	There could be diseases and insects that may damage the planted trees, but the diseases and insects will be prevented by routine overseeing.	Upon routine overseeing, the diseases will be treated immediately by biological control once occurred. The chemical pesticides are allowed to be used only if there is a serious pest problem erupted in the project area, and the pesticides will be used in accordance with the National Pesticides Policy.
Pesticide	Improper pesticide application would be harmful to natural environment, including	Pesticide will be strictly managed by well trained staff to minimize the potential effect.

	polluting soil, water and air conditions, as well as the habitat of the wildlife.	Also, the environmental friendly measures will be adapted such as mixed species arrangement, seed and seedling quarantine. Especially the biological measures to control pests and diseases will be adopted. Therefore, the pesticide application will be limited
--	---	---

Also, please refer to Non-Permanence Risk Report of the project for more detailed analysis of project risk.

2.1.19 Benefit Permanence (G1.11)

To maintain and enhance the climate, community and biodiversity benefits, the native tree species with relative long mature age (e.g. Koelreuteria Paniculata, Celtis sinensis Pers, Quercus robur and zelkova schneideriana) were selected to be planted in the project, which could guarantee the long term benefit through and beyond the project lifetime. In addition, according to Forest Management Manual, the primary purpose of this afforestation project is to improve the local environment by establishing forest of native trees, commercial logging will be forbidden and human interference will be minimized.

The project proponent Hefei Zhuoya Landscaping Engineering Co., Ltd. will be responsible for the implementation and management of the project during the project lifetime, and the local government will take over of the responsibility beyond the project lifetime.

2.1.20 Financial Sustainability (G1.12)

According to the afforestation plan data reported by the project owner, the forestry departments at all levels counted and approved the afforestation area, and allocated the funds and provincial funds and local funds issued by the state to the counties.

Stakeholder seriously considered the carbon revenue and thought the revenue could help to mitigate the economic barrier. Hefei Zhuoya Landscaping Engineering Co., Ltd (hereinafter referred to as "Hefei Zhuoya") signed Emission Reduction Purchase Agreement (ERPA) with Shanghai Libra Investment & Management Co., Ltd who will purchase the carbon credits generated from the project in the following years. The project owner will use the carbon revenue for the continuous management and maintenance of the forest.

2.1.21 Grouped Projects

N/A.

2.2 Without-project Land Use Scenario and Additionality

2.2.1 Land Use Scenarios without the Project (G2.1)

The baseline scenario is the same as the conditions existing prior to the project initiation. There is no forestry land in the project area before the project. The lands will remain barren without the project.

2.2.2 Most-Likely Scenario Justification (G2.1)

The most-likely scenario is the same as baseline scenario, please refer to section 3.1.4 for detailed information.

2.2.3 Community and Biodiversity Additionality (G2.2)

The community and biodiversity additionality is demonstrated by using “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” (Version 01), please refer to section 3.1.4 for detailed information.

2.2.4 Benefits to be used as Offsets (G2.2)

Community benefits: To maximize the socio-economic benefit, the afforestation design was prepared with a participatory approach. PRA methods were adopted in interviewing and consulting with farmer households in the project areas to understand the local farmers/communities’ preferences, wishes and concerns, so that the proposed project activity would better respond to their desires for livelihood development. Please refer to section 4 for detailed information regarding community benefits.

Biodiversity benefits: Restoring forest vegetation on degraded or barren lands will create a corridor, hence enhance the connectivity between forests, and provide much needed expansion of important wildlife habitat areas. This will facilitate gene flow through allowing once-isolated wildlife groups to interact and enhance the viability of their populations, thus improve the local climate adaptation and resilience.

Also, the biodiversity benefits will be obtained by establishing a forest ecosystem and alleviating conflicts between environment conservation and economic activities of local communities due to income increase of local residents. Please refer to section 5 for detailed information regarding biodiversity benefits.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The full project documentation will be published on VCS and CCB website for public comments, as well as the project summary in Chinese version, and the local communities and other stakeholders can easily download from the website. The project owner will notice local stakeholders through the routine villager assembly regarding every milestones of the project development, including listing, registered, issuance, etc.

2.3.2 Dissemination of Summary Project Documents (G3.1)

Along with the project implementation, the project documentation will be published on VCS and CCB website for all stakeholders to obtain the detailed project information and development progress. Also, the summary of project description in local language will also be disseminated to local communities through local government, as long as the summary of monitoring reports during each verification.

2.3.3 Informational Meetings with Stakeholders (G3.1)

In order to ensure the effectiveness of all parties involved, the investigation team conducted a participatory rural assessment (PRA) of the two cities before the start of the project, so as to obtain basic data and information on the local socio-economic status and environmental issues, and to further understand the stakeholders. The main socio-economic and environmental issues, collect opinions and suggestions from project participants, and analyze the potential impact of the project.

2.3.4 Community Costs, Risks, and Benefits (G3.2)

During PRA surveys and stakeholder meetings, project owner explained potential costs, risks, and benefits to relevant communities and stakeholders, and then asked them to give their feedback and collected their willingness to participate..

2.3.5 Information to Stakeholders on Validation and Verification Process (G3.3)

The status and process of the project for CCB and VCS validation and verification were published through routine villager assembly and posted on local bulletin boards, also the mobile phone number of contact person of the project was provided to all the stakeholders so they can directly make a call in case they have any problem about the project.

2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

The auditor surveyed the site plots and forests of the project. At the same time, the project owner arranged a stakeholder meeting with auditor during the site visit, the Forestry Bureau, local farmers and technicians were interviewed to verify the project status.

2.3.7 Stakeholder Consultations (G3.4)

Stakeholder consultations include PRA surveys and stakeholder meetings, requiring stakeholders to present their opinions on project design and their willingness to participate.

Collect feedback on the questionnaire, which is summarized as follows:

- Most local residents are well aware of the benefits of afforestation. They understand that forestry can reduce soil erosion, clean the air, protect the land, and reduce natural disasters. And they also have a strong sense of protection for animals and plants.
- Most local residents have never heard of carbon trading or carbon credits. After the introduction, they strongly agreed that the project should be registered as a carbon sink project and joined the carbon trading market.

- Local residents believe that the project can 1) create jobs; 2) get more benefits from selling carbon credits; 3) improve the local environment, protect cultivated land, and reduce natural disasters; 4) create more education opportunities for local people.
- All the stakeholders agreed with the project design and willing to participate the implementation and follow-up management of the project activity.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

There is a Suggestion Book published on the notice board of the local village throughout the lifetime of the project. Stakeholders can write their comments or suggestions in the book anytime. The project owner will check the book regularly and collect all the comments received.

2.3.9 Stakeholder Consultation Channels (G3.5)

Local residents directly impacted by the project were invited through their most convenient way: the routine villager assembly. Local policy makers and forest experts were also invited by phone calls. All the stakeholders have been informed directly or through their legitimate representatives.

2.3.10 Stakeholder Participation in Decision-Making and Implementation (G3.6)

In the project planning phase, stakeholders were fully involved in the land selection, planting pattern selection, etc, through villagers meeting and PRA methods. During the project implementation, the local communities and government will play as the direct implementers of the project, and the project proponent will play as coordinator who is in charge of the overall management. All the critical information regarding decision-making will be published to local stakeholders, and the decision should be revised according to further discussion in case there is any feedback from stakeholders.

2.3.11 Anti-Discrimination Assurance (G3.7)

The project owner should obey Labor Law of the People's Republic of China with anti-discrimination assurance, and workers will sign up voluntarily regardless of gender, race, religion or any other basis. In case of any discrimination proved to be true, the person who is responsible for the discrimination shall be fired immediately and the project owner will find someone else to take over his/her job.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

If there is a conflict of interest between the parties, the stakeholders can appeal through the village representative or directly to the owner of the project, which is the most effective way to solve the problem. They appeal through the phone number of the relevant contact or file a complaint during the meeting. In addition, community villagers participate in project implementation and can identify or seek to resolve conflicts and dissatisfaction in the project.

The project owner has appointed a staff member to record and collect conflicts and dissatisfaction between local communities and individual farmers. Employed forest patrols will play an important role in dealing with common conflicts and dissatisfaction. Upon receipt of the patrolman's report, the project owner will contact and discuss with the relevant community or other stakeholders within 3 days. The specific staff member shall propose a solution and mediation plan within one week based on all the information collected by the relevant parties, and the conflict shall be handled within 30 days.

2.3.13 Accessibility of the Feedback and Grievance Redress Procedure (G3.8)

All the feedback and grievances of the project will be recorded in time and kept by project owner during the whole project lifetime. The record is published to every stakeholders who can check at any time..

2.3.14 Worker Training (G3.9)

Interview with local communities indicated that local farmers/communities were usually short of access to quality seed sources and lack skills for producing high quality seedlings and for successful tree planting, as well as for preventing planted trees from being subject to fire, pest and disease attack. This is one of the important barriers of local communities in planting trees on their lands. In the proposed project activity, the local forestry bureau as well as project owner had organized the training for local communities on seed and seedling selection, nursery management, site preparation, planting models and integrated pest management. Without this project, local people would have trouble with developing alternative livelihood, resulting in a worse economy. The training for employees is held once a year, starting from every September from 2013, mainly in the aspects of employee safety and health and technology. The training content is related to the knowledge of forest land clearing, how to plant trees, afforestation and management, carbon sink afforestation and carbon emission.

2.3.15 Community Employment Opportunities (G3.10)

The project will mobilize the whole community involvement, including the community of women, minorities and poor people. All people from the communities will be given an equal opportunity to fill all work positions if the job requirements are met.

During the implementation of the project, the total number of local farmers involved in planting was approximately 22,543 of which 70% were women. In addition, approximately 110 locals were employed for project management and are regularly trained in relevant skills.

2.3.16 Relevant Laws and Regulations Related to Worker's Rights (G3.11)

The local people would be under the protection of Labor Law of the People's Republic of China and no forced labor is allowed, and they are free to establish and join any labor organizations as they wish. There will be regular training provided to workers before they start the job, which will clearly indicate their rights and mechanism for grievance appeal, and the worker's rights are guaranteed in the labour contracts for each workers.

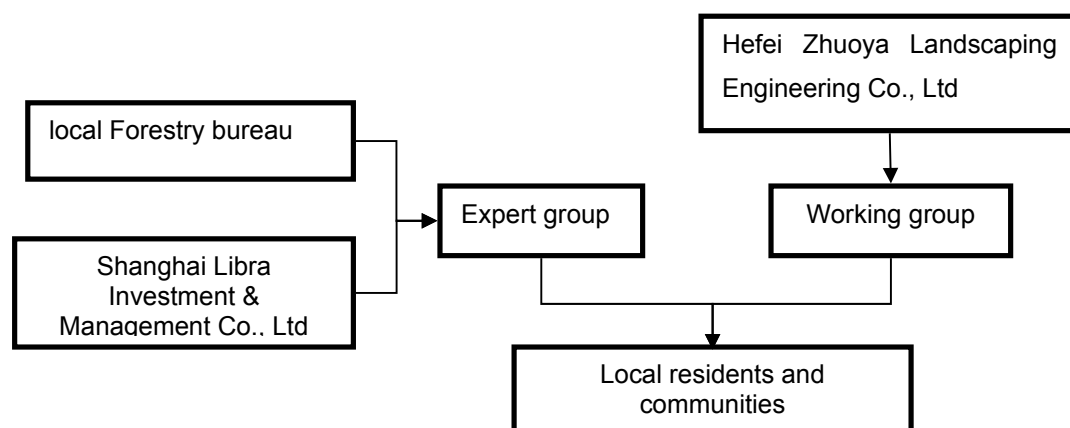
2.3.17 Occupational Safety Assessment (G3.12)

The project owner has referenced Safety and Healthy in Forestry Work published by ILO and Labor Law of the People's Republic of China and adapted them to meet the local conditions to ensure workers' health and safety. The workers' health and safety policy, including items covering the health insurance scheme for workplace accidents and evacuation plans is made available for workers and implemented by the village committee.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

In order to ensure the development and implementation of the project, the project proponent has established a project work group and the expert group. The local Forestry bureau will provide technical advice and training to technicians and project entity staff to measure and monitor actual greenhouse gas removals and leakages from proposed project activities. Shanghai Libra Investment & Management Co., Ltd has relevant experience in implementing carbon emission projects, and has set up a project expert group with relevant technical personnel from the forestry bureau to manage the project.



2.4.2 Required Technical Skills (G4.2)

For the development of the Project, are required skills and experience related to:

- Experience in management of natural resources conservation projects
- Ability to interact with different actors,
- Development of Projects with rural populations,
- Experience in the development of carbon projects and environmental services

- Experience in the evaluation and monitoring of biodiversity

2.4.3 Management Team Experience (G4.2)

As mentioned above, local Forestry bureau and Shanghai Libra Investment & Management Co., Ltd. will play as the expert group (Management team) who is in charge of guiding and coordinating the project's overall implementation and decision-making.

The project proponent Hefei Zhuoya Landscaping Engineering Co., Ltd. is in rich experience in forest management, including artificial afforestation, forest protection and management, forest damage control and technical training.

Shanghai Libra Investment & Management Co., Ltd. is experienced in carbon measurement and monitoring. In the past, Shanghai Libra Investment & Management Co., Ltd. has successfully developed many different carbon projects in China, including validation and verification under GS, VCS and CDM standard. These experience will help project proponent to ramp up the capability of project implementing and management.

2.4.4 Project Management Partnerships/Team Development (G4.2)

The management team of the project is experience in forest project management and carbon project development, including local Forestry Bureau will provide instruction of afforestation and forest management, conduct the specific supervision of the implementation. The local Forestry Bureau and local government would provide technical support for forest management.

2.4.5 Financial Health of Implementing Organization(s) (G4.3)

All the project participators are legally registered company in China, and according to the public information listed in National Enterprise Credit Information Publicity System, none of them were involved in nor complicit in any form of corruption such as bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion.

2.4.6 Avoidance of Corruption and Other Unethical Behavior (G4.3)

As legally registered companies, the project owner and other involved entities have the obligation to comply with relevant regulations, including anti-corruption law. The annual audit by the government makes sure that it operates with full compliance with China law and regulations.

2.4.7 Commercially Sensitive Information (Rules 3.5.13 – 3.5.14)

None of the project documents will be considered as commercially sensitive information, and all of the documentations are available to any stakeholders.

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

According to the "Constitution of the People's Republic of China" and the "Forest Law of the People's Republic of China", the land is village collective property, that is, Local farmers have the right to use the land within the project boundary, and the project owner and forestry department are responsible for the comprehensive implementation and management of the project.

2.5.2 Recognition of Property Rights (G5.1)

The ownership of the forest land of the afforestation project belongs to the village collective, and the right to use the forest land belongs to the farmers. The land is a barren land suitable for planting trees. Since these lands are all legal forestry land, the ownership is clear, and there is no dispute over land ownership in the project site.

2.5.3 Free, Prior and Informed Consent (G5.2)

Prior to the project initiation, all of the project land are collective-owned by local villages. To make sure the successful development of the project, the project owner and the village collective which had the ownership of forest land had signed a carbon sink afforestation cooperation and development agreement, which clarifies the forest land rights by all parties during the project crediting period. So the project will not encroach uninvited on private property, community property or government property.

2.5.4 Property Rights Protection (G5.3)

Prior to the project implementation, the project area is mainly barren land, farmers voluntarily use these lands to plant trees, therefore the project activities will not lead to involuntary removal or relocation of property rights holders from their lands or territories, and does no force rights holder to relocate activities important to their culture or livelihood.

2.5.5 Illegal Activity Identification (G5.4)

Under current law of China, any illegal logging activities will be fined or sentenced to punishment. Currently all project lands are defined for forestry purpose by local government. Deforestation must be carried on under the approval of local Forestry Bureau, and the forests are nursed by project staff regularly as a result of the implementation of the project, so there will not be illegal deforestation. The project benefits are gained from legal activities. Therefore, the project's climate, community and biodiversity impacts will not be affected by the illegal activities.

2.5.6 Ongoing Disputes (G5.5)

Because the project owner signed a cooperative development agreement with the village collective, the forest land was developed reasonably and legally., so there is neither ongoing or unresolved conflicts or disputes over rights to lands, territories and resources nor any disputes that were resolved and recorded during the last twenty years.

2.5.7 National and Local Laws (G5.6)

The project conforms to all kinds of regulations in the forestry field, as listed below:

PRC Constitution, PRC Forest Law, PRC Forest Law Implementing Regulations, PRC Wildlife Protection Law, Forest Fire Prevention Regulations, Insect Control Regulation, PRC Production Safety Law, PRC Labour Law;

Technology regulation of national ecological public welfare forest construction;

Inspection and acceptance regulation of ecological public welfare forest construction;

The main provisions of technical design and investigation of forest resources;

Measurement and monitoring guide to afforestation project carbon sinks;

Design code for afforestation operation;

Technical specification for afforestation;

Regulations for tending of forest;

The planning and design principles of ecological public welfare forest construction;

Seedling quality classification of main afforestation tree species.

According to the Inspection and Acceptance Report of the project, the project has complied with the above regulations and laws during construction period and will be under regular inspection by local government during the implementation period to ensure the continuous compliance.

2.5.8 Approvals (G5.7)

The Forestry Bureau of Heifei and Forestry Bureau of Chuzhou approved the afforestation plan.

2.5.9 Project Ownership (G5.8)

According to the "Constitution of the People's Republic of China" and the "Forest Law of the People's Republic of China", the land is village collective property. Local farmers have the right to use the land within the project boundary, and the project owner and forestry department are responsible for the comprehensive implementation and management of the project.

2.5.10 Management of Double Counting Risk (G5.9)

This project will not seek to generate or has received any form of environmental or social credit.

2.5.11 Emissions Trading Programs and Other Binding Limits

The project is not involved in an emission trading program or any other mechanism that includes GHG allowance trading.

2.5.12 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit.

2.5.13 Participation under Other GHG Programs

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

2.5.14 Projects Rejected by Other GHG Programs

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

2.5.15 Double Counting (G5.9)

The credits generated from the project will be sold as offsets on VCS registry, the series number of the issued credits can be tracked to avoid any potential double counting.

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

Consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM0003/Version 2.0.0 "Afforestation and reforestation of lands except wetlands" is applied.

<http://cdm.unfccc.int/methodologies/DB/C9QS5G3CS8FW04MYXDFQDPXWM4OE>

The following methodological tools, to which the selected methodology refers to, are used:

Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 01)

- Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2).

3.1.2 Applicability of Methodology

Consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM0003/Version 2.0.0 "Afforestation and reforestation of lands except wetlands" is applicable under the following conditions:

- a) The subject to the project activity does not fall in wetland category.

The land subject to the project activity does not fall in wetland category.

- b) Soil disturbance attributable to the project activity does not cover more than 10 per cent of area in each of the following types of land, when these lands are included within the project boundary:

- i. Land containing organic soils.

The soil disturbance in the afforestation activities of this project is in line with the requirements of soil and water conservation, and the land is made up of cavitation. Afforestation density was 1,700 plant/Ha, soil disturbance area ratio was 2.72%¹², less than 10%, and there was no repeated disturbance.

- ii. Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in Appendix 1 and Appendix 2 in the methodology.

The afforestation plot of this project belongs to the forestry land stipulated by the state, and there is no agricultural activity before or after the afforestation activity of this project; Therefore, there is no situation where existing agricultural activities have been transferred.

Therefore, AR-ACM0003 (Version 2.0.0) is applicable for the proposed project.

Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 01) is applicable under the following conditions:

- a) Forestation of the land within the proposed project boundary performed with or without being registered as the VCS project activity shall not lead to violation of any applicable law even if the law is not enforced.

Forestation of the land within the project boundary does not lead to violation of any applicable law.

¹² Proportion of soil disturbed area: $0.16 \text{ m}^2 \times 1700 / 10000 \text{ m}^2 = 2.72\%$. Among them, 0.16 m^2 was derived from the surface area calculated from the specification of artificial afforestation cavities in the Project Design (40cm*40cm)

- b) The tool is not applicable to small-scale afforestation and reforestation project activities.

The proposed project is large-scale afforestation project.

Therefore, combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 01) is applicable for the proposed project.

Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2) has no internal applicability conditions.

3.1.3 Project Boundary

The boundaries are the administrative boundaries of cities & counties and forest farm, which is illustrated from Figure 1-1 before. The project location has the following qualifications:

- All the project plots were not forestry land on January 1st 2000 and even before.
- The afforestation land ownership is clear.
- The project is aiming to protect local biodiversity, mitigate water and soil erosion, and stimulate the development of local economy.

Source		Gas	Included?	Justification/Explanation
Baseline	Above-ground biomass	CO ₂	Yes	This is the major carbon pool subjected to project activity
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
	Below-ground biomass	CO ₂	Yes	Carbon stock in this pool is expected to increase due to the implementation of the project activity
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
	Dead wood Litter and Soil organic carbon	CO ₂	No	Insignificant and exclusion is conservative.
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
Project	Above-ground biomass	CO ₂	Yes	This is the major carbon pool subjected to project activity
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
	Below-ground biomass	CO ₂	Yes	Carbon stock in this pool is expected to increase due to the implementation of the project activity

Source		Gas	Included?	Justification/Explanation
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
	Burning of woody biomass	CO ₂	No	CO ₂ emissions due to burning of biomass are accounted as a change in carbon stock
		CH ₄	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology
		N ₂ O	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology

3.1.4 Baseline Scenario

The baseline scenario is defined by using “Combined tool to identify the baseline scenario and demonstrate additionally in A/R CDM project activities” (Version 01).

STEP 0. Preliminary screening based on the starting date of the A/R project activity

The project start date is 22/04/2014, when the activities that lead to the generation of GHG emission removals were first implemented. The planting activity was conducted from Apr 2014 to November 2015.

According to the Project Design for Afforestation Operation, before the project implementation, the local Forest Bureau has seriously considered the incentive from carbon trading, which also has been confirmed by the Project Approval.

STEP 1. Identification of alternative land use scenarios to the proposed A/R CDM project activity

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

According to additionality tool, the alternative land use scenario of the proposed project includes:

1. Continuation of pre-project land use (i.e. Lands remain barren.)
2. Agricultural use of the land
3. Forestation of the land within the project boundary without being registered as the VCS project

In identification of the alternative land use scenario, field survey and data from the local forestry bureau has been applied. The identified scenarios are deemed realistic and credible.

Sub-step 1b: Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

National, local and sectoral land-use policies or regulations since 1980s are listed below:

China has successively issued and revised a series of laws and administrative regulations related to forestry, such as the Regulations for Implementing the Forest Law, the Regulations for Grain for Green, the Regulations for the Protection of Wild Plants and Animals, the Regulation for Nature Reserve, the Regulation for Forest Fire Control, and the Regulation for Forest Diseases and Pests Control, etc.

To facilitate the restoration of forest resources, Chinese government has launched several programs over the past years, such as the Grain for Green Program (started in 2001) that subsidizes farmers to convert degraded cropland to forests, the Natural Forest Conservation Program (launched in 1998), the Nature Reserve Development and Wild Conservation Program (started in 2000), etc.

Although these programs had set overall development goals for forestry development and were started before the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001), none of the programs mandate the forestation on barren lands. Moreover, these programs have not been written in laws. Whether these programs can meet the initial targets highly depends on whether the program is fully funded, but the funding gap is very big. Finally, the project area is very remote, which makes the timber less competitive in the market. Thus, the project activity can hardly get any subsidy from the government. Thus Scenario 1 remains possible baseline scenario.

The afforestation activity location is legally defined as forestry land. Farming and grazing is not allowed in these plots. Thus, the second scenario "agricultural use of land" is not feasible.

Scenario 3 faces the investment and technical barrier which will be discussed in the next section. However, it does not violate any existing enforced mandatory applicable laws and regulations.

In sum, scenario 1 and 3 are in compliance with mandatory legislation and regulations.

STEP 2. Barrier analysis

Sub-step 2a: Identification of barriers that would prevent the implementation of at least one alternative land use scenario

1. Investment barrier

Debt funding not available for the land use scenarios. Commercial loan from banks for the purpose of afforestation is very unlikely due to the high risk and the economical unattractiveness in the context of remote lands.

In addition, no credit mechanisms are in place for farmers to make long term investment in plantation forestry. Based on the "Community baseline survey" published by Anhui province academy of social sciences in February 2014, it shows that the project area farmers average annual income of 8,989-9,521 yuan/year, and according to the statistics of Anhui, the 2013 statistics bulletin of the national economy and social developments of Anhui Province, rural residents per capita income is 11,468 yuan/year, the income of farmers in the project area is lower than the general level of local townships and counties.

Therefore, there would be no direct revenue from the implementation of the afforestation project except for environmental and ecological benefits, the project definitely has the financial barrier.

2. Technological barriers

The project is located in eleven nearby counties. It is hard for them to register their afforestation projects as individual project and apply for financial support. So these farmers were gathered up by Hefei Zhuoya and signed contracts with Hefei Zhuoya, and Hefei Zhuoya then represented these local farmers to sign contracts with consulting firm (Shanghai Libra in this project). Therefore, although the forest companies and organizations are project proponents, local farmers are actually the project participants who planted trees and enjoyed the benefits thereafter.

Local farmers lack access to good quality saplings or seedlings as well as the necessary tending and forest management technique. They also lack the skills needed to produce high quality seedlings and successful tree planting, and lack the skills needed to prevent planted trees from being subject to fire, pest and disease attack. In addition, the lack of organizational instruments also prevents them from overcoming technological barriers.

The technical barriers are summarized as 1) lack of access to planting materials; 2) lack of silvicultural and forest management technology; and 3) lack of skilled or properly trained labor force. If planting trees within the project boundary without registration as a VCS project (scenario 3), these technical barriers would be applied to the local farmers, and lead to the failure of the project.

Hefei Zhuoya invited local farmers to discuss whether registered the project to be a VCS or not. The locals agreed to register the project as a VCS project and apply for additional carbon fund, they agreed Hefei Zhuoya to be their representatives. Then, Hefei Zhuoya works with the VCU buyer to work out better implementation plan for the project, and help local farmers to conduct the planting activity better. Without applying for VCS, local farmers would face the above-mentioned technical barriers.

Sub-step 2b: Elimination of land use scenarios that are prevented by the identified barriers.

Scenario 1 does not require extra investment or labor force. Thus it is not prevented by any of the identified barriers.

Scenario 3 faces the investment and technical barriers.

In sum, Scenario 3 is not feasible. Scenario 1, continuation of pre-project use (i.e. lands remain barren), remains the possible baseline scenario.

STEP 3. Investment analysis (if needed)

Scenario 1 remains the only possible baseline scenario, which makes investment analysis not necessary.

STEP 4. Common practice analysis

Only converting farmland to forest is eligible for the subsidy. Planting activities that changing barren land such as this project is not eligible for the subsidy. Forest in Anhui Province is mainly Public welfare forest and economic forest.

There has been some afforestation and reforestation in the project regions on lands similar to the degraded lands of the proposed A/R CDM project activity, but this has been limited. In Anhui Province, the afforestation and was mainly established several years ago by a small number of relatively wealthy communities and farmers at a time when there were not many alternative investment opportunities. As it was not profitable and there was little market incentive, the activities could not be extended by investors. As the forestry industry has developed rapidly

in recent years in Anhui and the cost of labour and planting materials including seedling has increased significantly, the farmers and forest companies turn to plant short-rotation and fast-growth species in accessible areas rather than planting long-term local species in remote, degraded land, which is not economically attractive, due to slow tree growth, low land productivity and high transportation costs. Also, in recent years, large increases in the price of seedling, as well as the cost of labour, has greatly reduced the expected economic return.

All the above reasons explain that it is very difficult to conduct non-profit afforestation activity in project zone. So that's why there is no similar afforestation activity in the Anhui Province. Since there is no similar afforestation activity within the common practice boundary. No similar projects in Anhui Province have successfully applied for CDM, VCS, GS projects or CCER projects.

Thus, the proposed project is not a common practice.

3.1.5 Additionality

The additionality has been demonstrated in the above section 3.1.4..

3.1.6 Methodology Deviations

N/A.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

Baseline net GHG removals by sinks

As described above, the baseline scenario is the continuation of existing land use i.e. lands remain barren. Based on the applied methodology AR-ACM0003 (Version 2.0.0), the baseline net GHG removals by sinks is estimated as follows:

错误!未找到引用源。 (1)

Where:

- $\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks in year t; t CO₂-e
- $\Delta C_{TREE_BSL,t}$ = Change in carbon stock in baseline tree biomass within the project boundary in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO₂-e
- $\Delta C_{SHRUB_BSL,t}$ = Change in carbon stock in baseline shrub biomass within the project boundary, in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO₂-e
- $\Delta C_{DW_BSL,t}$ = Change in carbon stock in baseline dead wood biomass within the project boundary, in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO₂-e

$\Delta C_{L_BSL,t}$ = Change in carbon stock in baseline litter biomass within the project boundary, in year t , as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO₂-e

With baseline scenario, dead wood biomass and litter biomass would not be changed by local farmers. All the plots in two cities have been barren and do not change after 1970s and before the project. Thus, the change in carbon stock in baseline dead wood biomass and litter biomass can be negligible. For the purpose of this project, because the project is on the barren lands suitable for afforestation, forest floor only bushes and scattered raw wood, to protect diversity, at the time of afforestation retained the original shrubs and bulk raw wood, based on the principle of cost effectiveness, the baseline scenario $\Delta C_{TREE_BSL,t}$, $\Delta C_{SHRUB_BSL,t}$ is zero.

Therefore, set the project baseline carbon variation of zero, $\Delta C_{BSL,t=0}$.

3.2.2 Project Emissions (Actual net GHG removals by sinks)

Actual net GHG removals by sinks

According to the applied methodology AR-ACM0003 (Version 2.0.0), GHG emissions resulting from removal of herbaceous vegetation, combustion of fossil fuel, fertilizer application, use of wood, decomposition of litter and fine roots of N-fixing trees, construction of access roads within the project boundary, and transportation attributable to the project activity shall be considered insignificant and therefore accounted as zero.

The actual net GHG removals by sinks shall be calculated as the sum of the changes in carbon stocks in the project minus the increase in non-CO₂ GHG emissions within the project boundary, which is shown as follows:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t} \quad (2)$$

Where:

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; t CO₂-e

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; t CO₂-e

$GHG_{E,t}$ = Increase in non-CO₂ GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t , as estimated in the tool "Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO₂-e

According to the tool, the use of fire for site preparation and/or to clear the land of harvest residue prior to replanting is specifically excluded from the project management and therefore non-CO₂ GHG emissions are estimated as zero.

$$GHG_{E,t} = 0$$

Change in the carbon stocks in project, occurring in the selected carbon pools in year t shall be calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} + \Delta C_{SHRUB_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LI_PROJ,t} + \Delta SOC_{AL,t} \quad (3)$$

Where:

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO₂-e

$\Delta C_{TREE_PROJ,t}$ = Change in carbon stock in tree biomass in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO₂-e

$\Delta C_{SHRUB_PROJ,t}$ = Change in carbon stock in shrub biomass in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO₂-e

$\Delta C_{DW_PROJ,t}$ = Change in carbon stock in dead wood in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO₂-e

$\Delta C_{LI_PROJ,t}$ = Change in carbon stock in litter in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO₂-e

$\Delta SOC_{AL,t}$ = Change in carbon stock in SOC in project, in year t, in areas of land meeting the applicability conditions of the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", as estimated in the same tool; t CO₂-e

For conservativeness, only change in carbon stock in tree biomass of project will be considered. Therefore, the above equation can be simplified as:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} \quad (4)$$

And the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activity” (Version 04.2) is used to estimate the change in carbon stock above the ground. According to the tool, change in carbon stock in trees between two points of time is estimated by using one of the following methods or a combination thereof:

- (a) Difference of two independent stock estimations;
- (b) Direct estimation of change by re-measurement of sample plots;
- (c) Estimation by proportionate crown cover;
- (d) Demonstration of “no-decrease”.

Method (b) is efficient when there is a significant correlation between the plot biomass values on the two occasions (e.g. when there has been no harvest or disturbance in a stratum and therefore no significant spatial re-distribution of biomass has occurred in the stratum after the first estimation) For the project, there will be no harvest or disturbance during the project period, thus Method (b) should be selected to be selected, but this method is applicable only in ex-post estimation of change in carbon stock in trees for monitoring of project activities. Therefore, Method (a) is used for the ex-ante estimation during validation, and method (b) will be used in the monitoring of the following verification.

Under Method (a), the change in carbon stock in trees and the associated uncertainty are estimated as follows:

$$\Delta C_{TREE} = C_{TREE,t1} - C_{TREE,t2} \quad (5)$$

$$u_{\Delta C} = \frac{\sqrt{(u_1 \times C_{TREE,t1})^2 + (u_2 \times C_{TREE,t2})^2}}{|\Delta C_{TREE}|} \quad (6)$$

Where:

ΔC_{TREE}	=	Change in the carbon stocks in trees during the period between two points of time t1 and t2; t CO ₂ -e
$C_{TREE,t1}$	=	Carbon stock in trees as estimated at time t1; t CO ₂ -e
$C_{TREE,t2}$	=	Carbon stock in trees as estimated at time t2; t CO ₂ -e
$u_{\Delta C}$	=	Uncertainty in ΔC_{TREE}
u_1, u_2	=	Uncertainties in $C_{TREE,t1}$ and $C_{TREE,t2}$ respectively

Carbon stock in trees at a point of time is estimated by using one of the following methods or a combination thereof:

- (a) Estimation by measurement of sample plots;

- (b) Estimation by modelling of tree growth and stand development;
- (c) Estimation by proportionate crown cover;
- (d) Updating the previous stock by independent measurement of change.

For the project, Method (b) is used for the ex-ante estimation during validation.

According to the Tool, under Method (b), existing data are used in combination with tree growth models to predict the growth of trees and the development of the tree stand over time, and ex-ante estimation (projection) of carbon stock in tree biomass is not subjected to uncertainty control.

Stand parameters such as stocking (e.g. number of stems per hectare or basal area per hectare), age-class structure, and species composition at different points of time are simulated from assumed (planned) tree planting and management practices (e.g. planting density, survival rate, thinning and pruning operations and their timing).

Tree growth (e.g. diameter or height increment) is simulated by taking into account local tree-growth data from past experience (e.g. age-diameter curves, yield tables, yield curves) while also considering relevant site factors (e.g. soil, terrain, slope, aspect, precipitation) and stand parameters.

For the project, the growth curve equations are used to estimate the average volume of one tree, and the carbon stock in trees in the tree biomass estimation strata is estimated as follows:

$$C_{TREE,i,j} = \sum_{i,j} A_i \times N_{i,j} \times \frac{44}{12} \times CF_{TREE,i,j} \times B_{TREE,i,j} \quad (7)$$

$$B_{TREE,i,j} = V_{TREE,i,j} \times D_j \times BBF_j \times (1 + R_j) \quad (8)$$

Where:

$C_{TREE,i,j}$	=	Carbon stock in trees of tree species j of strata i ; t CO ₂ -e
A_i	=	Area of strata i ; Mu
$N_{i,j}$	=	Number of the tree species j of strata i ; trees/ha
$CF_{TREE,i,j}$	=	Carbon fraction of tree biomass for tree species j ; t C/t d.m.
$B_{TREE,i,j}$	=	Biomass of one tree of tree species j ; t d.m.
$V_{TREE,i,j}$	=	Stem volume of one tree of tree species j ; t d.m.
D_j	=	Density of tree species j ; t d.m/m ³

BEF_j = Biomass expansion factor for conversion of tree stem biomass to above-ground tree biomass, for tree species j ; dimensionless

R_j = Root-shoot ratio for tree species j ; dimensionless

Study on biomass and growth rule of dominant tree species in oak broad-leaved forest in Qingyang County by Anhui Agricultural University.

For the ex-post estimation during the following verification, the allometric equations of each tree species will be used to calculate the stem volume, and the allometric equation used will be demonstrated to be appropriate for the purpose of estimation of tree biomass by applying the tool “Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities” in project monitoring report.

Referring to equation (12), (13) and (14) in the Tool, the mean carbon stock in trees within the tree biomass estimation strata is estimated as follows:

$$C_{TREE,i,j} = \sum_{i,j} A_i \times N_{i,j} \times \frac{44}{12} \times CF_{TREE,j} \times B_{TREE,j} \quad (9)$$

And the biomass of tree is estimated as follows by referring to equation (5) in Appendix 1 of the Tool:

$$B_{TREE,j} = V_{TREE,j} \times D_j \times BEF_j \times (1 + R_j) \quad (10)$$

Where:

$C_{TREE,i,j}$ = Carbon stock in trees of tree species j of strata i ; t CO₂-e

A_i = Area of strata i ; Mu

$N_{i,j}$ = Number of the tree species j of strata i ; trees/ha

$CF_{TREE,j}$ = Carbon fraction of tree biomass for tree species j ; t C/t d.m.

$B_{TREE,j}$ = Biomass of one tree of tree species j ; t d.m.

$V_{TREE,j}$ = Stem volume of one tree of tree species j ; m³.

D_j = Density of tree species j ; t d.m/m³

BEF_j = Biomass expansion factor for conversion of tree stem biomass to above-ground tree biomass, for tree species j ; dimensionless

R_j = Root-shoot ratio for tree species j ; dimensionless

The tree species adopted in the project is Broadleaf forest. Local growth curves are used to estimate the average merchantable volume of one tree ($V_{TREE,j}$)

Broadleaf forest ¹³	$V_{TREE,j} = 1.0554 / ((1 + 0.003545 * \exp(-0.057847 * A))^{(1/0.000485)})$
--------------------------------	---

Where,

$V_{TREE,j}$ = average merchantable volume of one tree in category i , at time t ; m³/tree

A – stand age, year

Wood density (D), biomass expansion factor (BEF), root-shoot ratio and carbon fraction for Broadleaf forest is listed in the below.

Table 3-1 Wood density, BEF, Root-shoot ratio and carbon fraction used in the proposed project activity

Parameter	factor	Source
Wood density	0.598	The tree species involved in the proposed project can be obtained from the table using the values in the second national bulletin on climate change of the People's Republic of China "list of land-use change and forest greenhouse gases"
BEF	1.674	
Root-shoot ratio	0.261	
CF	0.497	

According to the growing years of the description of the project activity, the aboveground biomass can be categorized into four Project Stratifications.

Table 3-2 Four Project Stratifications of Broadleaf forest.

Project Stratifications number	Category of tree	Plant site	Tree number per ha in category	Year to plant	Area (ha)
Proj -1	koelreuteria paniculata	Chaohu county-level City, Lujiang County, Feixi County in Hefei City	1700	2014	9324

¹³ Study on biomass and growth rule of dominant tree species in oak broad-leaved forest in Qingyang County by Anhui Agricultural University

Proj -2	Quercus robur	Changfeng County, Feidong County in Hefei City	1700	2014	6704
Proj -3	Celtis sinensis Pers	Quanjiao County, Fengyang County , Dingyuan County in Chuzhou City	1700	2015	7425
Proj -4	zelkova schneideriana	Laian County, Mingguang county-level City, Langya District in Chuzhou City	1700	2015	6604

Table 3-3 Number of trees per hectare for the four Project Stratifications

Time	Proj-1	Proj-2	Proj-3	Proj-4
year	Total number of Stratifications (Number of hectares * area)	Total number of Stratifications (Number of hectares * area)	Total number of Stratifications (Number of hectares * area)	Total number of Stratifications (Number of hectares * area)
22/04/2014-21/04/2015	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2015-21/04/2016	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2016-21/04/2017	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2017-21/04/2018	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2018-21/04/2019	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2019-21/04/2020	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2020-21/04/2021	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2021-21/04/2022	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2022-21/04/2023	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2023-21/04/2024	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2024-21/04/2025	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2025-21/04/2026	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2026-21/04/2027	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2027-21/04/2028	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2028-21/04/2029	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2029-21/04/2030	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2030-21/04/2031	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2031-21/04/2032	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2032-21/04/2033	15,850,800	11,396,800	12,622,500	11,226,800
22/04/2033-21/04/2034	15,850,800	11,396,800	12,622,500	11,226,800

Taking all the above information into the formula, we reach the table below.

Table 3-4 The GHG Removals by Sinks of the Project Activity

Year	Estimated annual project removals of Proj-1 (tCO ₂ e)	Estimated annual project removals of Proj-2 (tCO ₂ e)	Estimated annual project removals of Proj-3 (tCO ₂ e)	Estimated annual project removals of Proj-4(tCO ₂ e)	Estimated total annual project removals (tCO ₂ e)
22/04/2014-21/04/2015	31433	22601	0	0	54034
22/04/2015-21/04/2016	14830	10662	25031	22263	72786
22/04/2016-21/04/2017	20368	14645	11810	10504	57327
22/04/2017-21/04/2018	27393	19695	16219	14426	77733
22/04/2018-21/04/2019	36117	25969	21814	19402	103302
22/04/2019-21/04/2020	46739	33605	28762	25581	134687
22/04/2020-21/04/2021	59423	42726	37219	33104	172472
22/04/2021-21/04/2022	74300	53422	47320	42088	217130
22/04/2022-21/04/2023	91449	65752	59168	52625	268994
22/04/2023-21/04/2024	110896	79735	72824	64772	328227
22/04/2024-21/04/2025	132601	95341	88310	78545	394797
22/04/2025-21/04/2026	156467	112500	105594	93919	468480
22/04/2026-21/04/2027	182331	131097	124600	110823	548851
22/04/2027-21/04/2028	209975	150973	145196	129141	635285
22/04/2028-21/04/2029	239126	171933	167210	148721	726990

22/04/2029- 21/04/2030	269471	193751	190424	169368	823014
22/04/2030- 21/04/2031	300663	216178	214588	190861	922290
22/04/2031- 21/04/2032	332329	238946	239427	212953	1023655
22/04/2032- 21/04/2033	364090	261782	264644	235382	1125898
22/04/2033- 21/04/2034	395564	284413	289937	257878	1227792

3.2.3 Leakage

According to the applied methodology AR-ACM0003 (Version 2.0.0), leakage emission is estimated as follows:

$$LK_t = LK_{AGRIC,t} \quad (11)$$

Where:

LK_t = GHG emissions due to leakage, in year t; tCO₂-e

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t, as estimated in the tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”; tCO₂-e

According to the A/R Methodological tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”, leakage emission resulting from displacement of the activities is composed of decrease in carbon stock in the carbon pools of the land and change in soil organic carbon stock due to land-use change in the land.

$$LK_{AGRIC,t} = \frac{44}{12} \times (\Delta C_{BIOMASS,t} + \Delta SOC_{LUC,t})^{14} \quad (12)$$

Where:

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t; tCO₂-e

$\Delta C_{BIOMASS,t}$ = Decrease in carbon stock in the carbon pools of the land receiving the activity displaced in year t; t d.m

$\Delta SOC_{LUC,t}$ = Change in soil organic carbon (SOC) stock due to land-use change in the land receiving the displaced activity in year t; tC ha

¹⁴ Equation (1) in page 5 in the A/R Methodological tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity” (Version 02.0)

The project was implemented by manual operation, rather than mechanical operation. Besides, no weeding, chopping, pruning, intermediate cutting activities are going to be conducted during the crediting period because of the natural condition, the economic condition and the slow growth pattern. Fertilization and watering are not going to take place, neither. Therefore, there is no expected leakage due to decrease in carbon stock in the carbon pools of the land and change in soil organic carbon stock. In other words, there is no expected leakage due to the displacement of agricultural activity from the project activity.

Therefore, leakage is zero for the proposed project.

3.2.4 Net anthropogenic GHG removals by sinks

The net anthropogenic GHG removals by sinks shall be calculated as follows:

$$\Delta C_{AR,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad (13)$$

Where:

- $\Delta C_{AR,t}$ = Net anthropogenic GHG removals by sinks, in year t ; t CO₂-e
- $\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; t CO₂-e
- $\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks, in year t ; t CO₂-e
- LK_t = GHG emissions due to leakage, in year t ; t CO₂-e

The net anthropogenic GHG removals by sinks are summarized below.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
22/04/2014-21/04/2015	0	54034	0	54034
22/04/2015-21/04/2016	0	72786	0	72786
22/04/2016-21/04/2017	0	57327	0	57327
22/04/2017-21/04/2018	0	77733	0	77733
22/04/2018-21/04/2019	0	103302	0	103302
22/04/2019-	0	134687	0	134687

21/04/2020				
22/04/2020- 21/04/2021	0	172472	0	172472
22/04/2021- 21/04/2022	0	217130	0	217130
22/04/2022- 21/04/2023	0	268994	0	268994
22/04/2023- 21/04/2024	0	328227	0	328227
22/04/2024- 21/04/2025	0	394797	0	394797
22/04/2025- 21/04/2026	0	468480	0	468480
22/04/2026- 21/04/2027	0	548851	0	548851
22/04/2027- 21/04/2028	0	635285	0	635285
22/04/2028- 21/04/2029	0	726990	0	726990
22/04/2029- 21/04/2030	0	823014	0	823014
22/04/2030- 21/04/2031	0	922290	0	922290
22/04/2031- 21/04/2032	0	1023655	0	1023655
22/04/2032- 21/04/2033	0	1125898	0	1125898
22/04/2033- 21/04/2034	0	1227792	0	1227792
Total	0	9,383,744	0	9,383,744

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Data / Parameter	A _i
Data unit:	ha

Description:	Area of strata i
Source of data:	Field measurement
Value applied:	The total area is 30,057 ha, please refer to Table 3-4 for details
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	BEF _{2,j}
Data unit	Dimensionless
Description	Biomass expansion factor for conversion of stem biomass to above-ground biomass
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 3-1 for details
Justification of choice of data or description of measurement methods and procedures applied	National authority data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	CF _{TREE}
Data unit	t C t ⁻¹ d.m.
Description	Carbon fraction of tree biomass for species or group of species j
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 3-1 for details
Justification of choice of data or description of measurement methods and procedures applied	National authority data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	D_j
Data unit	t d.m.m-3
Description	Basic wood density
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 3-1 for details
Justification of choice of data or description of measurement methods and procedures applied	National authority data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	R_j
Data unit	Dimensionless
Description	Root-shoot ratio
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 3-1 for details
Justification of choice of data or description of measurement methods and procedures applied	National authority data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

3.3.2 Data and Parameters Monitored

Data / Parameter	$V_{TREE,j}$, $V_{TREE,l,p,j,i}$
Data unit	m ³
Description	Stem volume of tree species j ; Stem volume of tree l of species j in sample plot p of stratum i
Source of data	Calculated
Description of measurement methods and procedures to be applied	For ex ante estimation, the growth curve (age-volume) equations are used to estimate the stem volume. For the ex-post estimation during the following verification will use allometric equations of each tree species to calculate the stem volume.

Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under National Forest Inventory are applied. In absence of these, QA/QC procedures from published handbooks or from IPCC GPG LULUCF 2003 may be applied.
Purpose of data	The parameter is used to calculate actual net GHG removals.
Calculation method	For the ex-post estimation during the following verification, using allometric equations based on tree dimensions to calculate the stem volume. The tree dimensions usually comprise of height and diameter at breast height.
Comments	N/A

Data / Parameter	$H_{l,p,j,i}$, $DBH_{l,p,j,i}$
Data unit	m; cm
Description	Height of tree l of species j in sample plot p of stratum i ; Diameter at breast height of tree l of species j in sample plot p of stratum i
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under National Forest Inventory are applied. In absence of these, QA/QC procedures from published handbooks or from IPCC GPG LULUCF 2003 may be applied.
Purpose of data	The parameter is used to calculate actual net GHG removals.
Calculation method	These two parameters are two tree dimensions used as entry data into the volume equations for the calculation of stem volume of

	trees.
Comments	For the ex-post estimation during the following verification, the allometric equations of each tree species will be used to calculate the stem volume, and the allometric equation used will be demonstrated to be appropriate for the purpose of estimation of tree biomass by applying the tool "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities" in project monitoring report.

Data / Parameter	A_i ; $A_{PLOT,i}$
Data unit	ha
Description	Area of stratum i ; Size of sample plot in stratum i
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	The parameter is used to calculate actual net GHG removals
Calculation method	N/A
Comments	N/A

Data / Parameter	$N_{i,j}$
Data unit	tree/ha
Description	Number of the tree species j of strata i

Source of data	Field measurement
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of Data	The parameter is used to calculate actual net GHG removals
Calculation method	N/A
Comments	N/A

3.3.3 Monitoring Plan

Method for estimation of the change in carbon stock

As stated in section 3.2.2, the actual net GHG removals by sinks are calculated by the equation (4):

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t}$$

Where:

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO₂-e

$\Delta C_{TREE_PROJ,t}$ = Change in carbon stock in tree biomass in project in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO₂-e

And the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activity” (Version 04.2) is used to estimate the change in carbon stock above the ground, and Method (b) (Direct estimation of change by re-measurement of sample plots) will be applied for the monitoring during the following verification.

Under this method, the change in carbon stock and the associated uncertainty are estimated as follows:

$$\Delta C_{TREE} = \frac{44}{12} \times CF_{TREE} \times \Delta B_{TREE} \quad (14)$$

$$\Delta B_{TREE} = A \times \Delta b_{TREE} \quad (15)$$

$$\Delta b_{TREE} = \sum_{i=1}^M w_i \times \Delta b_{TREE,i} \quad (16)$$

$$u_{\Delta C} = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^M w_i^2 \times \frac{s_{\Delta b,i}^2}{n_i}}}{|\Delta B_{TREE}|} \quad (17)$$

Where:

ΔC_{TREE}	=	Change in carbon stock in trees between two successive measurements; t CO2-e
CF_{TREE}	=	Carbon fraction of tree biomass; t C/t d.m.
ΔB_{TREE}	=	Change in biomass within the biomass estimation strata; t d.m.
A_i	=	Sum of the area of the biomass estimation strata; ha
Δb_{TREE}	=	Mean change in tree biomass per hectare within the biomass estimation strata; t d.m./ha
w_i	=	Ratio of the area of stratum i to the sum of areas of biomass estimation strata (i.e. $w_i = A_i/A$); dimensionless
$\Delta b_{TREE,i}$	=	Mean change in tree biomass per hectare in strata i; t d.m./ha
$u_{\Delta C}$	=	Uncertainty in ΔC_{TREE}
t_{VAL}	=	Two-sided Student's t-value for a confidence level of 90 per cent and degrees of freedom equal to $n - M$, where n is total number of sample plots within the tree biomass estimation strata, and M is the total number of tree biomass estimation strata
$s_{\Delta b,i}^2$	=	Variance of mean change in tree biomass per hectare in stratum i; (t d.m. ha-1) ²
n_i	=	Number of sample plots, in stratum i, in which tree biomass was re-measured

Methods of plot biomass measurement

Tree biomass per hectare in a sample plot is estimated by applying one of the plot measurement methods provided in Appendix 1 of the Tool. For the project, we will choose the measurement of fixed area plots for the calculation.

In this method, sample plots of the same size (e.g. or of a hectare) are installed in a stratum. All trees in a sample plot above a minimum dimension are measured and the biomass of each tree is estimated. The biomass of the individual trees is added and the sum is divided by the area of the sample plot to obtain the plot biomass value.

The plot biomass value (i.e. per-hectare tree biomass at the centre of the plot) is estimated as follows (all time-dependent variables relate to the time of measurement):

$$b_{TREE,p,t} = \frac{B_{TREE,p,t}}{A_{PLOT,t}} \quad (18)$$

$$B_{TREE,p,t} = \sum_j B_{TREE,j,p,t} \quad (19)$$

$$B_{TREE,j,p,t} = \sum_l B_{TREE,l,j,p,t} \quad (20)$$

Where:

$b_{TREE,p,t}$ = Tree biomass per hectare in sample plot p of stratum i; t d.m./ha

$B_{TREE,p,t}$ = Tree biomass in sample plot p of stratum i; t d.m.

$A_{PLOT,t}$ = Size of sample plot in stratum i; ha

$B_{TREE,j,p,t}$ = Biomass of trees of species j in sample plot p of stratum i; t d.m.

$B_{TREE,l,j,p,t}$ = Biomass of trees l of species j in sample plot p of stratum i; t d.m.

Biomass of a tree in a sample plot is estimated by using the following equation:

$$B_{TREE,l,j,p,t} = V_{TREE,l,j,p,t} \times D_j \times BEF_j \times (1 + R_j) \quad (21)$$

Where:

$B_{TREE,l,j,p,t}$ = Biomass of tree l of species j in sample plot p of stratum i; t d.m.

$V_{TREE,l,j,p,t}$ = Stem volume of tree l of species j in sample plot p of stratum i, estimated from the tree dimension(s) as entry data into a volume table or volume equation; m³

D_j	=	Density of tree species j; t d.m/m ³
BEF_j	=	Biomass expansion factor for conversion of tree stem biomass to above-ground tree biomass, for tree species j; dimensionless
R_j	=	Root-shoot ratio for tree species j; dimensionless

For the Stem volume of tree l of species j in sample plot p of stratum i $V_{TREE,l,p,j,i}$, the tree dimensions used as entry data into a volume equations are Height of tress ($H_{l,p,j,i}$) and Diameter at breast height of trees ($DBH_{l,p,j,i}$).

Monitoring of boundary

The coordinate of the project boundary should be measured and managed strictly in accordance with regulations, and saved in GIS files. Boundary information such as original records, needs to store in both electronic and printed archive in the project owner, and participants should keep a backup. Files need to be saved at least two years after the end of the crediting period.

In order to obtain valid and reliable boundary information, monitor agency need to use the GPS or other verifiable methods to verify the project boundary. Determine the actual boundaries of afforestation. If the actual boundary is larger than the boundary in the project design, the excess section is not included in project boundary; instead, if the actual border boundary is smaller than the boundary in the project design, project boundary should be based on the actual boundary. Any change in the boundary must be located by GPS or appropriate spatial data (eg satellite imagery).

During the crediting period, the project area occurs deforestation, afforestation failure and instead other land use patterns, these plots will be transferred out the project boundary, and no longer monitoring and verification. The area that has been transferred out of the project border will no longer be allowed into the project boundary. If the area that has been transferred out of the project border has been verified, the pre-carbon stocks still is valid, included in the calculation of carbon stocks.

Post-stratification and determining the number of plots

The first time of monitoring, if there are changes in the area and boundary, the carbon stratification of the project needs to update. In addition, if the number of carbon stratum and the area change, the number of sample plots need to be recalculated.

Prior stratification from baseline survey is the basis for project monitoring in the future. But the variables in the project implementation make the actual situation deviate from plan. Therefore, the project needs to consider tree species, patterns and other factors in actual planting, and update stratification to post-stratification.

Using tool "Calculation of the number of sample plots for measurements within A/R CDM project activities (Version 02.1.0)" gets the number of plots within each stratum. In order to ensure the statistical independence of each stratum, the number of sample plots is at least 3.

Setting sample plots

Monitoring agency needs to set fixed sample plots due to measuring requirements at regular intervals. Plot size is set to be a circular area with a diameter of 30m. The plot needs to determine the location at the centre point of the plot. The location of fixed sample plot should be set systematically, but the starting fixed sample plot needs to be set randomly use GPS in field work. The location, administrative positions, number of carbon stratus and carbon sub-stratus of each plot should be documented to ensure that distribution of fixed sample plots is uniform. Fixed plots measuring methods and procedures must be in strict accordance with the technical details of Forest Resources Planning and Design Technical Regulations.

Determine the sample location

The sample is fixed rectangle land with a diameter of 30m each. When a sample on a slope is to be selected, the gradient must be monitored, and the horizontal long should be converted into oblique long. The management methodology (irrigation, fertilization, etc) within the samples must be the same as those outside the samples. If fire breaks out, another sample could be selected near the original sample.

Monitoring frequency

The monitoring of the project implementation will take place at least every five year after the project registration in order to ensure the continuity of the benefits. Periodic verification and quantitative monitoring of the project will take place every five years.

Data management

All data collected as part of monitoring is archived electronically. All information should be stored by the technology department of the project owner and all the material has a physical copy for backup. And all data collected shall be archived for a period of at least two years after the end of the last crediting period of the project activity.

3.3.4 Dissemination of Monitoring Plan and Results (CL4.2)

The monitoring plan and its results will be presented to the community representative and will be published on the internet for each verification process that is carried out.

3.4 Optional Criterion: Climate Change Adaptation Benefits

3.4.1 Regional Climate Change Scenarios (GL1.1)

N/A.

3.4.2 Climate Change Impacts (GL1.2)

N/A.

3.4.3 Measures Needed and Designed for Adaptation (GL1.3)

N/A.

4 COMMUNITY

4.1 Without-Project Community Scenario

4.1.1 Descriptions of Communities at Project Start (CM1.1)

According to the PRA community survey, the local villages' energy source is mainly electricity, and a small part of energy comes from purchased coal and the residual agricultural resource such as straw and canola. The demand for firewood is low.

The project zone covers 1 county-level city and 4 counties in Hefei. Chaohu county-level City has 5 streets, 11 towns and 1 township. The population is about 792,000 and there are 6 ethnic groups. Changfeng County has 14 townships under its jurisdiction, the population is about 769,600, of which the agricultural population is 669,700. Feidong County has 18 townships under its jurisdiction. The population is about 888,000 and there are 23 ethnic groups. Feixi County has 8 towns and 4 townships, the population is about 771,000 and there are 29 ethnic groups. Lujiang County has 17 towns under its jurisdiction, the population is about 10.01 million and there are 32 nationalities.

The project zone covers 4 counties, 1 county-level city and 1 district in Chuzhou. Fengyang County has jurisdiction over 1 township and 14 towns, the population is about 674,000 and there are 21 ethnic groups. Mingguang county-level City has 12 towns and 1 township. It has a population of about 455,000 and has 25 nationalities. Langya District has jurisdiction over 8 streets with a total population of 240,000, total area is 126 square kilometers. Dingyuan County has 22 townships under its jurisdiction, the population is about 807,000 and there are 30 ethnic groups. Quanjiao County has 10 towns under its jurisdiction, with a population of about 400,000. It is dominated by the Han nationality and has ethnic minorities such as Manchu and Hui. Lai'an County has 12 townships and towns with a population of 490,900. It is dominated by the Han people and has many ethnic minorities such as Hui, Tibetan and Yi.

Hefei, one of the project sites, is an ancient city with a history of more than 2,000 years. It is located in the East China region of China, between the Jianghuai and Huaihe, and is surrounded by Chaohu Lake. It is the provincial capital of Anhui Province and the sub-center of the Yangtze River Delta urban agglomeration.

Chuzhou located in the eastern part of Anhui Province, where Jiangsu and Anhui meet. It is the gateway to Jiangbei, the ancient capital of the Six Dynasties, and looks across the river from the main city of Nanjing. According to the Yangtze River in the south of Chuzhou, the East-controlled Beijing-Hangzhou Grand Canal has been the "land of fish and rice" near the Yangtze River in the lower reaches of the Yangtze River.

Anhui Province is a typical land in the south of the Yangtze River and the land of fish and rice. The population is 70.592 million and the urbanization rate is 53.5%. The existing minority population is about 500,000. Among them,

Hui, Manchu and She are the ethnic minorities living in our province. The sex ratio of the population is about 51:49. The per capita disposable income is about 29,156 yuan / year.

4.1.2 Interactions between Communities and Community Groups (CM1.1)

The local communities are mainly village collective, and due to low economic level, the community groups were barely active.

4.1.3 High Conservation Values (CM1.2)

No HCVs are identified, which means that there will not be negative affection by the project.

4.1.4 Without-Project Scenario: Community (CM1.3)

Agriculture is the main income sources of the communities. The communities have no habit to make use of the barren land for any land use. Thus continuing the “non-use” of the current land will have no effect on the livelihood and well-being conditions of the local communities and community groups under the without-project land use scenario.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

Community Group	Migrant rural workers
Impact(s)	The job positions offered by the project will give some migrant rural workers more opportunities who may choose to work in their living villages instead of to go outside.
Type of Benefit/Cost/Risk	Predicted indirect benefits
Change in Well-being	Increase local job opportunities

Community Group	Local rural workers
Impact(s)	Obtain job positions and training opportunities from the project.
Type of Benefit/Cost/Risk	Actual direct benefits
Change in Well-being	Increase household income and living level

Community Group	Surplus rural labors
Impact(s)	Obtain job positions and training opportunities from the project.

Type of Benefit/Cost/Risk	Actual direct benefits
Change in Well-being	Increase household income and living level

Community Group	Rural cooperatives
Impact(s)	The project will provide trainings for local people who work in rural cooperatives about the seeding and planting technique through local Forest Technology Extension Centre
Type of Benefit/Cost/Risk	Predict indirect benefits
Change in Well-being	Improve technical skills of artificial seedling

Community Group	Female rural workers
Impact(s)	Get more job opportunities and trainings from the project and will have more chance to participate local activities,
Type of Benefit/Cost/Risk	Actual direct benefits
Change in Well-being	Increase household income and living level, and improve local women's capability and well-being.

4.2.2 Negative Community Impact Mitigation (CM2.2)

No HCVs was identified related to community well-being in the project zone thus there is no negative well-being impacts on community groups.

4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

The main source of income for communities associated with the agricultural project area. Their production methods are backward, affected by disasters such as floods, and agricultural production is also low. The project will benefit both counties economically and socially.

1) Income improvement: During the project period, the net income generated by the project includes employment and labor income as well as carbon trading income.

2) Job creation: The project will provide permanent and temporary employment opportunities, including soil preparation, planting and care. Most of the work will belong to local farmers involved in the project.

3) Enhance social cohesion: Afforestation will form a close interaction between individuals, which will strengthen communication between communities and local governments, communities and communities.

4) Technical training and demonstration: The community generally lacks high-quality seed technology and high-quality seedlings, fire protection, forest pest control, which is also an important issue in local community forest management. The project is organized by the local forestry bureau to help farmers understand and evaluate problems in the implementation of the project, such as seedling selection, seedling management, land preparation model, pest control.

5) The project transforms the ecological benefits into the benefits of the people's livelihood, and provides a useful pilot for the national financial transfer payment and regional coordinated development, and provides policy support for the new ways of economic development and improvement of people's livelihood in multi-ethnic areas.

6) After the project is implemented, it can increase the area of green space and beautify the environment, which will not lead to deforestation and obstruction projects. In summary, the relevance of the project area does not have a negative impact on the high value of protection.

4.2.4 High Conservation Values Protected (CM2.4)

No HCVs was identified related to community well-being in the project zone thus none of the HCVs related to community well-being will be negatively affected by the project.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

No potential negative offsite stakeholder impacts have been identified. In contract the project will bring benefits to the offsite communities, like providing additional employment opportunity, improving local environment, as well as mitigating the impacts of climate change on the project zone.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

There is no negative well-being impacts on other stakeholders.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

Project will have no negative impacts within and beyond the project zones. Besides, it will increase the income of the local communities and bring positive environmental benefits. Therefore, this project will not create negative impacts on the other stakeholder groups.

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

The project proponent will submit the community monitoring plan after validation.

4.4.2 Monitoring Plan Dissemination (CM4.3)

The monitoring plan and results of every verification will be published on VCS and CCB website which can be easily download by stakeholders and the local stakeholders will be noticed through the routine villager assembly. Also, a contact person with phone numbers will be published in case any stakeholders want to directly contact the project owner and raise opinions.

4.5 Optional Criterion: Exceptional Community Benefits

N/A.

4.5.1 Exceptional Community Criteria (GL2.1)

N/A.

4.5.2 Short-term and Long-term Community Benefits (GL2.2)

N/A.

4.5.3 Community Participation Risks (GL2.3)

N/A.

4.5.4 Marginalized and/or Vulnerable Community Groups (GL2.4)

N/A.

4.5.5 Net Impacts on Women (GL2.5)

N/A.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

N/A.

4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

N/A.

4.5.8 Governance and Implementation Structures (GL2.8)

N/A

4.5.9 Smallholders/Community Members Capacity Development (GL2.9)

N/A.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

The 2 cities where the project located were wild life habitat around Anhui Province in history, however, due to long-term farming, ecological structure of most project sites is relatively homogenous, with low biodiversity in recent years. Most of the project site are wasteland, mainly covered with grass and scattered shrubs.

5.1.2 High Conservation Values (B1.2)

No HCVs was identified related to biodiversity in the project zone.

5.1.3 Without-project Scenario: Biodiversity (B1.3)

As mentioned above, the without-project land use scenario is continuing the “non-use” of the current land which will have no effect on the biodiversity conditions.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Biodiversity Element	Species of plants
Estimated Change	Increase
Justification of Change	Afforestation of this project will use local species, implement afforestation activity through scientific and reasonable configuration method with no burning and slash. When planted trees gradually grow up to forest, project sites will gradually become ecological community with the domain species of tall trees, which will improve the biodiversity.
Biodiversity Element	Species of animals
Estimated Change	Increase
Justification of Change	Scientific and rational afforestation projects can adjust the hydrological cycle, reduce drought and flood risk; promote soil nutrient cycle, improve local micro-climate and other ecological environment. Therefore the species of animals could be increased due to the better environment of habitat.

5.2.2 Mitigation Measures (B2.3)

Afforestation in this project will use local species, implement afforestation activity through scientific and reasonable method with no burning and slash, and protect the existing vegetation as much as possible. Therefore, implementation of this project will not decrease biodiversity of project sites.

5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

First, due to long-term farming, ecological structure of most project sites is relatively homogenous, with low biodiversity. The other small part is wasteland, mainly covered with grass and scattered shrubs. Afforestation of this project will use local species as much as possible, implement afforestation activity with scientific and reasonable configuration method, with no burning and slash. The use of point-like site preparation will protect the existing vegetation as much as possible. Therefore the implementation of this project will not decrease biodiversity of project sites. When planted trees gradually grow up to forest, project sites will gradually become ecological community with the domain species of tall trees, which will improve biodiversity.

Second, scientific and rational afforestation projects can adjust the hydrological cycle, reduce drought and flood risk; promote soil nutrient cycle, improve local micro-climate and other ecological environment. In addition, as the project site is located in Hefei and Chuzhou City in Anhui Province, the surrounding area is concentrated of wildlife. Project site is also adjacent Chao Lake Nature Reserve, where is habitat of many rare plants and animals. Therefore revegetation of project sites will facilitate biodiversity protection of Chao Lake Nature Reserve and the whole city.

The 14 national protected species in the area are shown in the following table.:

Animals	Plants
<i>Aquila chrysaetos</i>	<i>Pseudolarix amabilis</i> (Nelson) Rehd.
<i>Syrnaticus ellioti</i>	<i>Cercidiphyllum japonicum</i>
<i>Pavo muticus</i>	<i>Cyclocarya paliurus</i>
<i>Polyplectron</i>	<i>Emmenopterys henryi</i> Oliv
<i>Cervus nippon</i>	<i>Ulmus gaussenii</i> Cheng
<i>Cygnus columbianus</i>	<i>Tapiscia sinensis</i> Oliv
<i>Circus spilonotus</i>	

Aquila chrysaetos	
-------------------	--

One of them are globally Endangered species according to IUCN, who will benefit from reduced threats as a result of the project activities, it is shown in the following table:

Globally Endangered species
Pavo muticus

5.2.4 High Conservation Values Protected (B2.4)

No HCVs was identified related to biodiversity in the project zone thus no HCVs related to biodiversity are negatively affected by the project.

5.2.5 Species Used (B2.5)

The project will mainly use native species for the productive activities to be implemented as part of the strategy.

5.2.6 Invasive Species (B2.5)

N/A.

5.2.7 Impacts of Non-native Species (B2.6)

N/A.

5.2.8 GMO Exclusion (B2.7)

N/A.

5.2.9 Inputs Justification (B2.8)

Name	Chemical pesticides
Justification of Use	The chemical pesticides are allowed to be used only if there is a serious disease problem erupted in the project area, and the pesticides will be used in accordance with the National Pesticides Policy.
Potential Adverse Effect	Improper pesticide application would be harmful to natural environment, including polluting soil, water and air conditions, as well as the habitat of the wildlife. But for this project, pesticide will be strictly managed by well trained staff to minimize the potential effect. Also, the environmental friendly measures will be adapted such as mixed species arrangement, seed and seedling quarantine. Especially the biological measures to control pests and diseases will be adopted. Therefore, the pesticide application

	will be limited.
--	------------------

Name	Biological control agents
Justification of Use	Upon routine overseeing, the pest will be treated by biological control once occurred according to local Pest Control and Prevention Policy.
Potential Adverse Effect	The biological control agents are natural enemy of pest which are native species and have no adverse effect on local environment and communities.

5.2.10 Waste Products (B2.9)

The waste products resulting from the project activities may include:

(1) Rubbish

The farmers will regularly clean up plastic, metal, paper and other waste products in the project area. Local forest technicians will also conduct frequent visits to ensure that waste and waste products are well identified and cleaned.

(2) Human waste

There may be some waste of people, because there is no toilet on site, the amount will be very small and can be naturally degraded, so no special treatment is required and there is no impact.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

As the project activities will increase the area of the habitat, as well as improve the habitats' quality, only positive biodiversity impacts can be identified. Therefore, there are no potential negative offsite impacts on biodiversity.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

Since there are no potential negative offsite impacts on biodiversity, the net offsite biodiversity benefits are positive.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

The project proponent will submit the community monitoring plan after validation.

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The monitoring plan and results of every verification will be published on VCS and CCB website which can be easily download by stakeholders. Also, a contact person with phone numbers will be published in case any stakeholders want to directly contact the project owner and raise opinions.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

N/A.

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

N/A.