



**Verified Carbon
Standard**

NATIONAL SHALE OIL LOW-CARBON INTELLIGENT DEMONSTRATION BASE CARBON SINK AFFORESTATION PROJECT



Draft Document Prepared by Beijing MD Energy Technology Co., Ltd.

Project title	<i>National Shale Oil Low-Carbon Intelligent Demonstration Base Carbon Sink Afforestation Project</i>
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1 PROJECT DETAILS

1.1 Summary Description of the Project

National Shale Oil Low-Carbon Intelligent Demonstration Base Carbon Sink Afforestation Project (hereafter referred to as “the Proposed Project”) is located in Madengbian Residential Area, Xinbao¹ Village, Yule Town, Huachi County, Qingyang City, Gansu Province, People’s Republic of China.

In the absence of the Proposed Project, the sites of the project are all low-nutrient, low-supply land, and the terrain is steep, with few herbaceous plants growing, and no agricultural activities and no yield. Without its implementation, all the sites will keep the same circumstances with no natural renewal and afforestation within the project area. At the same time, there is no agricultural activity on the project site. Through the implementation of the proposed project, it enhances ecosystem services through carbon storage, and soil and water conservation. It has a significant potential to mitigate the effects of climate change effects through microclimate moderation and natural resources conservation in the short run and through carbon sequestration in the long run. It also provides employment to rural population, and promote the sustainable development of local economy and society.

PetroChina Company Limited Changqing Oilfield Shale Oil Development Branch (hereafter refers to “the Project Proponent”), as a natural gas production enterprise with a sense of social responsibility, hopes to develop an afforestation project for a single location, and achieve ecosystem conservation and climate change mitigation. The major aims of the proposed project are to enhance the forest cover, improve local livelihood opportunities, and adopt sustainable forest management practices.

From 2023 to 2024, approximately 51,800 saplings will be planted, covering one continuous land with area of around 33.35ha (500 mu). A total of around three tree species are proposed for mixed plantation within the project. The species selected for afforestation include Mongolian pine, Spruce, and Xinjiang poplar, due to the high survival rate, better ecological benefits, ability to withstand extreme weather disasters, strong resistance to pests and diseases, their acceptability by local people, and carbon sequestration potential. Among them, the total planting area of the above three species and the number of saplings are shown in the following table.

Species of tree	Total planting quantity
Mongolian pine	27750

¹ The Chinese name of the Xinbao Village is “新堡村”, because “Bao” is a polysyllabic character, this village is also called Xinbu Village locally.

Spruce	16650
Xinjiang poplar	7400
Total	51800

The trees planted of the project are used as shelterbelts for soil and water conservation. Standard forestry techniques like sowing of seeds, dig pitting, planting, weeding and casualty planting as recommended by the state forest department were followed by the project proponent. These activities are carried out by engaging local human capital so as to avoid project emissions and meet the objectives of employment generation for the local communities. Under the project for crediting period, harvesting is not part of the project activities²³.

The project estimates the GHG removals occurring from afforestation activities in accordance with the methodology AR-AMS0007: “Afforestation and reforestation project activities implemented on lands other than wetlands”, Version 03.1 developed under Clean Development Mechanism (CDM) for small-scale plantations. The project intends to generate carbon credits for the voluntary market under the VCS standard. The total GHG emission reduction quantified under the project for crediting period of 20 years is 9,933tCO₂e, including buffer reductions (1489.950tCO₂e), with average CO₂ removal of 497tCO₂e per year.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	15-August-2023 – 28-December-2023	VCS	China Classification Society Certification Co., Ltd	One year

1.3 Sectoral Scope and Project Type

Sectoral scope	VCS Sector 14 “Agriculture, Forestry, and other Land uses (AFOLU)”
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² According to Forest Harvesting and Regeneration Management Practices and the industry standard “Age Class and Age Group Division of Major Tree Species” (LY/T2908-2017) issued by the State Forestry Administration (SFA), the age of renewal and harvesting of plantation forests for protection forests is clearly stipulated: a. Xinjiang poplar, 31-40 years; b. Mongolian pine, 61-80 years; c. Spruce, 121-160 years. These documents above harvesting cycle of forests is a requirement for timber forests.

³ There is no mandatory harvesting requirement for protection forests (shelterbelts) in China, and according to the Forest Law of the People's Republic of China, shelterbelts can only be maintained and renewed, and no harvesting is allowed.

AFOLU project category ⁴	Afforestation, Reforestation and Revegetation (ARR)
Project activity type	Non-grouped project

1.4 Project Eligibility

1.4.1 General eligibility

The project activity is included under the scope of the VCS Program and not excluded under Table 2.1 of the VCS Standard.

The project will generate GHG removals through small-scale afforestation activity on a non-forest and non-wetlands. Thus, the project falls under the Afforestation/Reforestation (A/R) Small-scale Methodology AR-AMS0007, approved under the CDM, which is recognized and used under the VCS Standards. The project shall comply with all rules and requirements stated in the following documents:

Verified Carbon Standard (VCS) Program guide Version 4.4,

VCS Standard, Version 4.5,

VCS Methodology Requirements, v4.4,

AFOLU Non-Permanence Risk Tool, v4.2

As a result, the Proposed Project is included under the scope of the VCS Program and not excluded under Table 2.1 of the VCS Standard.

The project meets requirements related to the pipeline listing deadline, the opening meeting with the validation/verification body, and the validation deadline.

The project start date is 26 February 2023 according to the afforestation log provided by the afforestation engineering company.

The date of submission is 3 November 2023 which is earlier than the date specified by the VCS standard, AFOLU projects shall initiate the pipeline listing process (as set out in the Registration and Issuance Process) within three years of the project start date.

The project is eligible under the scope of the VCS Program as the project includes AFOLU activities (project category ARR), it with ex-ante emission removal estimates is 497tCO₂e per year, less than 60,000tCO₂e per year stipulated by VCS Standard. The project will complete validation within eight years of the project start date according to the time specified by VCS Standard.

⁴ See Appendix 1 of the VCS Standard

The applied methodology is eligible under the VCS Program.

The project is not a fragmented part of a larger project or activity according to the commitment of the Project Proponent about non-repetition of declaration.

1.4.2 AFOLU project eligibility

All selected AFOLU project categories are appropriate and that all related category requirements are met.

The project is eligible ARR activity that increase carbon sequestration and reduce GHG emissions by establishing, increasing, or restoring vegetative cover through the planting, sowing, or human-assisted natural regeneration of woody vegetation.

The native ecosystems have not been converted, cleared, drained, or degraded to generate GHG credits.

In the absence of the Proposed Project, the sites of the project are all low-nutrient, low-supply land, and the terrain is steep, with few herbaceous plants growing. Thus, the native ecosystems have not been converted, cleared, drained, or degraded to generate GHG credits.

The project area were not cleared of native ecosystems within the 10-year period prior to the project start date.

- According to Contract for the transfer of management and Afforestation Operation Design Report, the sites of the project are all low-nutrient, low-supply land, and the terrain is steep, with few herbaceous plants growing.
- And according to the supporting documents issued by the Villagers Committee of Xinbao Village, Yule Town, Huachi County, the project areas were not cleared of existing natural non-degraded ecosystems due to the project activity, and has not an invasive species and threatening ecosystem health.

The project areas shall not be cleared of existing natural non-degraded ecosystems due to the project activity.

- The project do not allowed timber harvesting in their management plan, according to the supporting documents issued by the Villagers Committee of Xinbao Village, Yule Town, Huachi County and the commitment issued by the Project Proponent, the project proponent do not cut down trees in the project area within the 10-year period to the project start date.
- No clearance of the native ecosystems will be taken place during the project activities. The project area has distributed native species and/or species that have adapted to local ecological conditions, these include Mongolian pine, Spruce, and Xinjiang

populous. And these trees species of the project have passed quarantine inspection, doesn't any invasive species. The project area does not take place clearing or conversion within 10 years of the project start date.

- According to the commitment issued by the Project Proponent, the project area shall not be cleared of native ecosystems within the project crediting period from the project start date.

1.4.3 Transfer project eligibility

The project is not a transfer project or CPAs seeking registration, as a result, not applicable.

1.5 Project Design

- ☒ Single location or installation
- ☐ Multiple locations or project activity instances (but not a grouped project)
- ☐ Grouped project

The project is designed to afforestation and carried out in one plot, in Madengbian Residential Area, Xinbao Village, Yule Town, Huachi County, Qingyang City, Gansu Province, People's Republic of China as described in section 1.1, and the project proponent is PetroChina Company Limited Changqing Oilfield Shale Oil Development Branch which is single project proponent.

1.5.1 Grouped project design

The project is not a grouped project, as a result, not applicable.

1.6 Project Proponent

Organization name	<i>PetroChina Company Limited Changqing Oilfield Shale Oil Development Branch</i>
Contact person	<i>Zhang Haibing</i>
Title	<i>Manager</i>
Address	<i>No.1, Building 51, No.7 Yucai Road, Fengchengyuan Community, Qingcheng Base, Qingcheng County, Qingyang City, Gansu Province, P. R. China</i>
Telephone	<i>+86 13993431513</i>
Email	<i><u>zhanghb1_cq@petrochina.com.cn</u></i>

1.7 Other Entities Involved in the Project

Organization name	Beijing MD Energy Technology Co., Ltd.
Role in the project	Project Developer
Contact person	Elva. Feng
Title	Project Manager
Address	Room 18-B, International Metro Centre Office Building, Chaoyang District, Beijing, P.R. China
Telephone	+86-010-65566632
Email	elva.feng@mdenergy.cn

1.8 Ownership

According to the Certificate of title issued by the local government in accordance with relevant laws in the P.R. China, the proposed project land is owned by Madengbian Residential Area, Xinbao Village, Yule Town, Huachi County, Qingyang City, Gansu Province, People's Republic of China.

The land owners signed a contractual agreement with the Project Proponent on 1 August 2022, authorizing the rights of control and operate project activities according to relevant laws, including activities of afforestation, management and development of GHG removals within the project boundary during the project crediting period. According to the Agreement, the Project Proponent is authorized the legal rights to control, develop and manage the carbon credits generated by the proposed project during the crediting period. More details could be referred in the Agreement for specific allocation of carbon credits.

Beijing MD Energy Technology Co., Ltd. is the entity authorized by the Project Proponent to the provide technical support and consultancy on adopting VCS standards for emission reduction of their afforestation project, as well as access the Verra Registry and communicate with Verra on their behalf for specified activities related to the Project. The project of the carbon credits generated on the forest land during the crediting period will be managed by Beijing MD Energy Technology Co., Ltd. Carbon credits will be managed and allocated via Beijing MD Energy Technology Co., Ltd. in strict accordance with the contract. And the financial benefits accrued from the sale of carbon credits under the project are intended for the Project Proponent.

1.9 Project Start Date

Project start date	26-February-2023
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Justification	<i>The project start date is the date on which activities such as land preparation and planting are carried out which resulted in removal of the GHG emissions. The afforestation work has begun on 26 February 2023, according to the Afforestation Log provided by the afforestation engineering company.</i>
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1.10 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☐ Ten years, fixed ☒ Other (The project of sectoral scope is AFOLU, and according to VCS Standard, for all AFOLU projects other than ALM projects the initial projects crediting period shall be a minimum of 20 years up to a maximum of 100 years, which may be renewed at most four times, thus the project crediting period will be of 20 years starting four times renewable.)
Start and end date of first or fixed crediting period	26-February -2023 to 25-February -2043

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

- ☒ < 300,000 tCO₂e/year (project)
☐ ≥ 300,000 tCO₂e/year (large project)

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO ₂ e) ⁵
26-February-2023 to 25-February-2024	0
26-February-2024 to 25-February-2025	0
26-February -2025 to 25-February-2026	6
26-February -2026 to 25-February-2027	19
26-February -2027 to 25-February-2028	58
26-February -2028 to 25-February-2029	120
26-February -2029 to 25-February-2030	241

⁵ The total GHG emission reduction quantified under the project for crediting period of 20 years is 9,933 tCO₂e, including buffer reductions, with average CO₂ removal of 497tCO₂e per year.

26-February -2030 to 25-February-2031	298
26-February-2031 to 25-February-2032	390
26-February-2032 to 25-February-2033	401
26-February-2033 to 25-February-2034	432
26-February-2034 to 25-February-2035	448
26-February-2035 to 25-February-2036	515
26-February-2036 to 25-February-2037	664
26-February-2037 to 25-February-2038	732
26-February-2038 to 25-February-2039	856
26-February-2039 to 25-February-2040	950
26-February-2040 to 25-February-2041	1099
26-February-2041 to 25-February-2042	1297
26-February-2042 to 25-February-2043	1408
Total estimated ERRs during the first or fixed crediting period	9933
Total number of years	20
Average annual ERRs	497

1.12 Description of the Project Activity

The project is located in Madengbian Residential Area, Xinbao Village, Yuele Town, involves one sub-compartment, covering an area of around 33.35ha. The techniques/measures for project implementation are described below.

- Provenance and Seedling Raising

The seedlings must have a phytosanitary certificate and quality inspection certificate, and it is prohibited to use unqualified without a license, unclear sources, and diseases and pests. The seedlings go up the hill to plant trees. In order to reduce carbon leakage caused by long-distance transportation of seedlings, carbon sink afforestation gives priority to local seedling cultivation or nearby seedling transfer.

- Planting Technique

The project areas were not cleared of existing natural non-degraded ecosystems due to the project activity, and has not an invasive species and threatening ecosystem health, according to the supporting documents issued by the Villagers Committee of Xinbao Village, Yule Town, Huachi County.

This project adopts the planting method of trees with soil balls. When planting, first dig a planting hole in the center of the planting hole that is slightly larger than the mud head of the seedling, remove the insoluble materials that bind the seedling, put the soil lightly in the planting hole, and then backfill the fine soil around the seedling, and compacted the fill when filling, so that the seedling and the original soil are in close contact.

The project area shall not be cleared of native ecosystems within the 10-year period from the project start date, according to the commitment issued by the Project Proponent.

- Afforestation Model

This area belongs to the semi-arid area, with mountainous terrain as the main terrain. The species selected for afforestation include Mongolian pine, Spruce, and Xinjiang poplar. In order to preserve the existing vegetation and biodiversity as much as possible, the land preparation method adopts the method of local consolidation, digging pits of size 0.80m × 0.60m (length × width) at a spacing of 2m × 3m is equal to a coverage of 8 per cent⁶.

The species selected for mixed afforestation include Mongolian pine, Spruce, and Xinjiang poplar, and the total planting area of the three species and the number of saplings are shown in Section 1.1.

Implementation schedule of the project activity or activities

Date	Documents	Milestones
June-2022	Afforestation Operation Design	The AOD of the project was completed by a qualified third party which is Gansu Changhong Environmental Engineering Co., LTD.
10-January-2023	Afforestation Contract	The Project Proponent signed the afforestation contract with Xingrun Construction Group Co., LTD. (Section I) The contract specifies the number and type of saplings, the way of land preparation and the duration of the project.

⁶ The digging pits of size 0.80 m × 0.60 m (length × width) at a spacing of 2 m × 3 m is equal to a coverage of 8 per cent, 8%=(0.80×0.60)÷(2×3).

		The Project Proponent signed the afforestation contract with Zhongjing Garden Co., LTD. (Section II) The contract specifies the number and type of saplings, the way of land preparation and the duration of the project. The Project Proponent signed the afforestation contract with Gansu Xinhongji Engineering construction Co., LTD. (Section III) The contract specifies the number and type of saplings, the way of land preparation and the duration of the project.
26-February -2023	Afforestation Log(Section III) (the starting date of the project activity)	Gansu Xinhongji Engineering construction Co., LTD. organized workers to begin construction on 26 February 2023.
9-March-2023	Certificates of saplings	Qingcheng County forest pest control and quarantine station conducted quarantine on the purchased saplings and found no harmful organisms. (Section I) The certificate describes the type, quantity, and specifications of the saplings in detail.
21-March-2023		Xifeng district forest pest control and quarantine station conducted quarantine on the purchased saplings and found no harmful organisms. (Section II) The certificate describes the type, quantity, and specifications of the saplings in detail.
24-April-2023		Ningxian forest pest control and quarantine station conducted quarantine on the purchased saplings and found no harmful organisms. (Section III) The certificate describes the type, quantity, and specifications of the saplings in detail.
20-July-2023	Project Acceptance Confirmation Sheet	The Project Proponent shall check and accept the implementation of the project. The information of sapling type, number, DBH and height is
20-July-2023		
20-July-2023		

described in detail in the acceptance form. (Section I -III)

The project is not a REDD+ project and is not located within a jurisdiction covered by a jurisdictional REDD+ program.

1.13 Project Location

The project is located in Madengbian Residential Area, Xinbao Village, Yule Town, Huachi County, Qingyang City, Gansu Province, People's Republic of China. The total geographical area of the project is 33.35ha and is situated between Latitude 36°13'41" and 36°14'06" (North) & Longitude 107°55'02" and 107°55'51" (East). The project has a central geographical coordinates of the Latitude 36.2026 North and 107.9286 East.



Figure 1-1: Location of Gansu Province in China

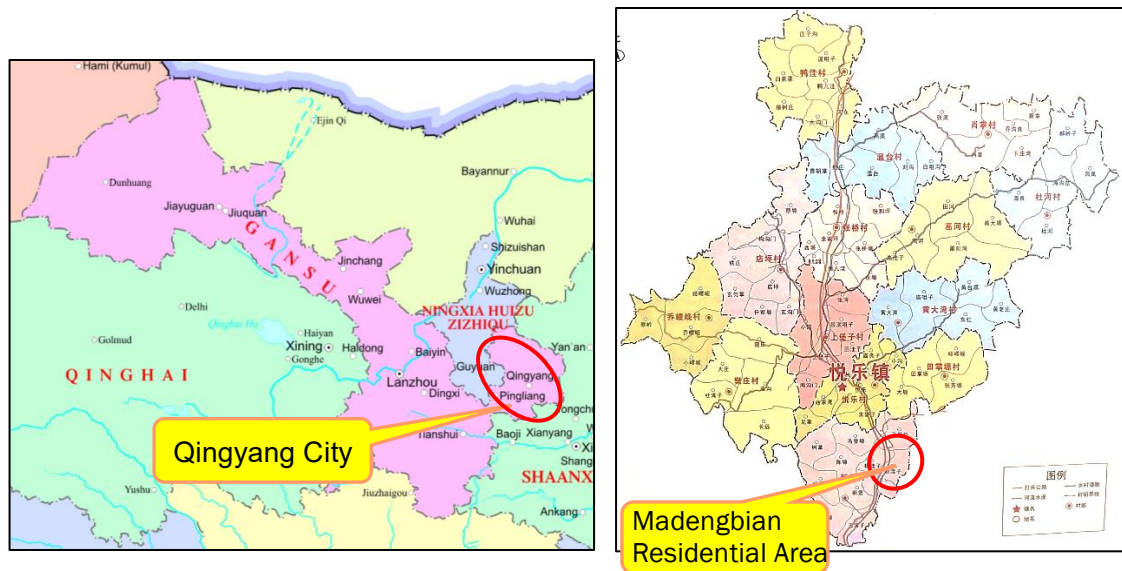


Figure 1-2: Location of Madengbian Residential Area



Figure 1-3: Location of the Project

1.14 Conditions Prior to Project Initiation

Ecosystem type: Before the initiation of the project the ecosystem type of the proposed project area was classified as barren land.

Current and historical land-use: Currently the project area is forested land. The condition of the selected land under project activity instance prior to the project initiation will be designated barren 10 years before the project start date.

Present and prior environmental conditions of the project area:

- Climate

Madengbian Residential Area, Xinbao Village, Yuele Town, Huachi County, where the project is located, is a semi-arid area with a climate characterized by low temperature, large temperature difference between day and night, dry air. The average annual temperature in

this area is 18°C, the annual extreme maximum temperature is 38°C, the minimum temperature is -22°C, and the average daily temperature difference is 11°C.

- Hydrology

Rainfall in this area is small and uneven, with annual precipitation of more than 400 mm, mostly concentrated in July, August and September.

- Topography

The terrain of this area is mainly mountainous, the site conditions are more complex, the landform is undulating, the mountains and rivers have both, belongs to the Longdong loess Plateau landform type, the terrain is high in the north and low in the south, from the northwest to the southeast inclined.

- Relevant historic conditions

Huachi County, where the project is located, is a special cultural zone with profound heritage on the Silk Road and the source of farming culture. There are 43 red sites in Huachi County, such as the former site of the Soviet government of Shaanxi-Gansu Border area and the old residence of celebrities.

- Soils

The main soil types in this area are yellow loam soil, Hailu soil, and a small amount of alluvial loess, meadow soil, red colloidal soil, and secondary salin-alkali soil. The soil type in this project area is mainly yellow spongy soil, is not belong to the category of wetland and organic soil.

- Vegetation

The project area belongs to semi-arid area with vegetation coverage between 20% and 40%. The main afforestation species are apricot, spruce, camphor pine, poplar, platycypress and so on. Herbs are stipa, reed grass, Gaertn and so on.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

As a tree planting program that takes place voluntarily on non-forest land, there are several laws/regulations supporting relevant activities in line with the designed project activities of this project. To demonstrate that the project activity is in compliance with all the applicable legal and regulatory requirements, the applicable Government laws and regulations which are implemented prior to 2023 are scrutinized.

- People's Republic of China is a member of the UNFCCC (United Nations Framework Convention on Climate Change). The project complies with this regulatory framework,

because in the AFOLU scope, Afforestation/Reforestation is one of several mechanisms by which GHG emissions are expected to be reduced.

- The project is compliant with the national and regional legal framework of the Government of China. The development of the project is in line with all current applicable law and regulations in China, but doesn't belong to mandatory scope.

The following are the list of such laws which are implemented:

- According to the Forestry Law of the People's Republic of China, people's governments at all levels encourage all walks of life and urban and rural residents to carry out afforestation activities, so afforestation activities are in line with national laws and regulations. And this forest Law indicates that State owned and collectively owned barren mountains, wastelands and beaches suitable for afforestation may be contracted by units or individuals for afforestation.⁷
- The guideline of The General Office of the State Council on scientific greening encourages afforestation of barren mountains, wasteland and beaches, degraded woodland and grassland.⁸
- The project is developed in accordance with Afforestation Technical Regulations which is the standard specifies the basic principles of afforestation.⁹

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

⁷ https://www.gov.cn/xinwen/2019-12/28/content_5464831.htm

⁸ https://www.gov.cn/zhengce/zhengceku/2021-06/02/content_5614922.htm

⁹ Artificial afforestation technical regulations (GB/T 15776-2016)

☐ Yes ☒ No

1.17 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.17.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the VCS Program Definitions for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

The Project Proponent belongs to the oil and gas extraction industry, which is not covered by the National Carbon Emission Trading¹⁰, according to Notice on the Key Work of Starting the National Carbon Emission Trading Market.

The Project Proponent itself does not have any binding limits on GHG emissions and does not look for any compliance with an emissions trading program.

1.17.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the VCS Program Definitions for definition of GHG-related environmental credit system.

☐ Yes ☒ No

There is no other form of environmental credit included in the project framework. The project has not participated in any other program of environmental crediting for GHG emission removals. The project does not intend to generate any other kind of environmental crediting for GHG emission removals.

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

The project activity does not involve any trees felling and does not result products or services, thus the project does not affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain.

¹⁰ https://www.gov.cn/xinwen/2016-01/22/content_5035432.htm

1.18 Sustainable Development Contributions

The project is expected to generate substantial sustainable development benefits. The following tables focus on the sustainable development benefits generated by the project, whilst demonstrating their contribution to the United Nations Sustainable Development Goals (SDGs) shown in the following table.

SDG	Example of relevant SDG targets	Description of project benefits
SDG 1 “No Poverty” End poverty in all its forms everywhere 	1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance 1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	The proposed project carry out usually on unused or underused land, and the Project Proponent signed Contract for the Transfer of Contracted Management with more than 30 local villagers. So this income is supplemental to existing income streams. Provision of long-term benefits for communities in economically disadvantaged rural areas. Income diversification will reduce reliance on the highly vulnerable agricultural sector and increase the resilience of farmers to climate change. It in term contributes to improvements in living conditions in economically disadvantaged rural areas.
SDG 4 “Quality Education” Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. 	4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship	According to national census data, 36%¹¹ of local villagers have a primary education or less. The technical support for the project supports skill development of men and women of diverse ages and backgrounds to increase and diversify their household income. In addition, the project proponent employs a majority of its staff from the rural areas in which it operates and provides them with extensive vocational and technical training.

¹¹ https://www.hcx.gov.cn/xxgk/fdxdgknr/tjxx/content_5279

SDG 5 “Gender Equality” Achieve gender equality and empower all women and girls 	• 5.1 End all forms of discrimination against all women and girls everywhere. • 5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate. • 5.5 Ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision making in political, economic and public life	Women play a key role in the project operations. The team comprised of one third of the total members are women. The project proponent strives to ensure women’s full and effective participation and that women are able to positively benefit from the project. In addition, the labor required and support for the project is not labor intensive, and is accessible to women who often experience higher rates of time poverty in comparison to men.
SDG 8 “Decent Work and Economic Growth” Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all 	• 8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors • 8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead • 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value • 8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment	The project proponent will support green growth in China, and its development model is aligned with targets in China’s policy framework and vision 2030. Formal jobs are created in rural areas providing alternative livelihoods to subsistence agriculture. The project proponent is committed to providing a safe and secure working environment. The project proponent not only implements the HSE management system of the group company, but also formulates the implementation rules of employee health management, industrial injury (occupational disease) management and other implementation rules. The project proponent promotes equal opportunity in employment and strives to eliminate discrimination in any employment policy or practice. In respect of recruitment, training, promotion, terms and conditions of employment,

		termination of employment or other matters arising out of the employment.
SDG 13 “Climate Action” Take urgent action to combat climate change and its impact 	• 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries • 13.2 Integrate climate change measures into national policies, strategies and planning • 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	In addition to the sequestration of carbon into living biomass, tree planting will also increase soil organic carbon sequestration. The project is expected to generate additional adaptation benefits, including: • Strengthening the resilience of ecosystems: afforestation practices on land prone to land degradation and desertification, which is projected to accelerate in the future under increasing temperatures and changes in precipitation regimes. The project will help support micro climate buffering and will contribute to land restoration and erosion protection. This can further help protect productive assets and reduce losses due to climate change. • Where possible, the project proponent training and extension support will raise awareness on climate change risks, and suitable risk reduction practices in tree management. • Continuously improved data collection, and feedback systems will further enable the project proponent to provide tailored extension support and services, where climate information, and information on best practices can be effectively identified, assessed, and disseminated to local villagers.

1.19 Additional Information Relevant to the Project

1.19.1 Leakage Management

The leakage of the proposed project activities is considered as zero as it's insignificant.

1.19.2 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

1.19.3 Further Information

Not Applicable as everything is mentioned in this PD and other relevant documents.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	The project covers an area of 33.35ha, is located in Madengbian Residential Area, Xinbao Village, Yule Town, Huachi County, Qingyang City, Gansu Province, People's Republic of China. Madengbian Residential Area is a settlement, it's an autonomous group, i.e., a community. The total area of the community is 357.27ha, with 302.67ha of non-cultivated land, and the total population of the area is 206, with 116 permanent residents. All villagers in Madengbian Residential Area are stakeholders of the project. The project occupies only a small area of Madengbian Residential Area. Therefore, the outside the project area are area in Madengbian Residential Area other than the project area.
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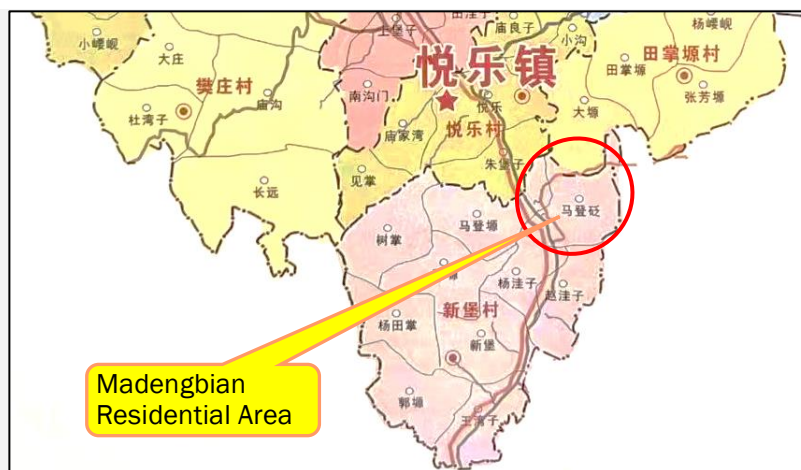


Figure 2-1: Location of Madengbian Residential Area

The stakeholder identification was carried out in a phased approach. First, by reviewing which categories of stakeholders benefit directly from the project activity, based on feedback collected from site visits by the project proponent. Then, within each category, by assessing whether specific groups or communities should be considered as stakeholder groups in their own rights. Lastly, by hosting symposiums with representatives of all major stakeholder groups and conducting a stakeholder identification activity, where the workshop participants are asked to confirm which communities and categories of people are impacted by the project activity.

Through this process, the most obvious category identified was the local villagers, who participate directly in the project activity and benefit from this project. It was identified as a relatively homogenous category in terms of livelihood, economic status, term of community, ethnicity, and culture.

This justifies the decision to consider “the local villagers” as one coherent stakeholder category. Thus, the local villagers are the stakeholder group with the highest interests in the project, since they profit the most from the project impacts.

The other categories of stakeholders that were identified include local municipalities, and non-governmental organizations. The analysis of these stakeholders showed that even though they do not participate directly in the project activities, they contribute to the success of the project by providing relevant construction advice, coordination and organization of local villagers which support in the area of operations. A more in depth analysis can be retrieved from the table below.

Stakeholder Identification	Beneficiary local villagers	local municipalities	non-governmental organizations
Interests	High, direct: as the	High, direct and	Medium, indirect; NGOs

		project increases the prospects for income and income diversification of local villagers	indirect; authorities have an interest in the achievement of a forest cover (direct) and in economic prosperity of farmers and communities (indirect)	benefit from farmers (especially women) having a new income opportunity and increased environmental awareness, because they often pursue the same goals
	Rights	Land use right, Benefit from land transfer The project proponent signed Contract for the Transfer of Contracted Management with 34 villagers which is the original land user.	Authorities have no rights on the project, but remain a major stakeholder group for smooth implementation	Land ownership, Madengbian Residential Area is the owner of the project land, which is managed by Xinbao Village Committee.
	Relevance to the project	Very high: primary stakeholder group of the project	Medium, non focus, but important stakeholder group, especially considering land tenure and administrative issues	NGOs are relevant to the project as the members of the Village Committee of Xinbao Village can coordinate and organize local villagers and establish communication channels with villagers.
Legal or customary tenure/access rights		The land can be leased or the management right of land can be transferred, according to the Forestry Law of the People's Republic of China. Then, through the stakeholder surveys, the villagers strongly agreed to sublet the land to the project participant for afforestation, so the two sides successfully signed the contract.		

	Through the implementation of the proposed project, it also provides employment to rural population, and promote the sustainable development of local economy and society.
Stakeholder diversity and changes over time	The local people share the same faith and there is no social and no cultural difference or diversity. Madengbian Residential Area, where the project land is located, has lifted all the poor people out of poverty under the current standard¹². The economic level of the local people is the same, there is no economic difference and diversity.
Expected changes in well-being	In the absence of the Proposed Project, the sites of the project are all low-nutrient, low-supply land, and the terrain is steep, with few herbaceous plants growing. Based on the continuation of the current state of the land as described above, the environment will not improve further without human intervention. Through the implementation of the proposed project, it enhances ecosystem services through carbon storage, and soil and water conservation. It has a significant potential to mitigate the effects of climate change effects through microclimate moderation and natural resources conservation in the short run and through carbon sequestration in the long run. It also provides employment to rural population, and promote the sustainable development of local economy and society. The project gives the local villagers economic benefits as well as environmental benefits.
Location of stakeholders	The location of stakeholders is Madengbian Residential Area, Xinbao Village, Yule Town, Huachi County, Qingyang City, Gansu Province, People's Republic of China.
Location of resources	The location of resources is Madengbian Residential Area, Xinbao Village, Yule Town, Huachi County, Qingyang City, Gansu Province, People's Republic of China. All the land in this Residential Area is collectively owned by Madengbian Residential Area, and contracted for use by the villagers. The location of territories and resources which local stakeholders own or to which they have customary access is Madengbian Residential Area also.

2.1.2 Stakeholder Consultation and Ongoing Communication

¹² <https://m.gmw.cn/baijia/2021-03/01/1302139319.html>

Date of stakeholder consultation	a. 7-April-2022 Field investigation, determining stakeholder composition; b. 25-May-2022 Notification on Stakeholder Consultation Survey, the village Council officers went door-to-door to ensure that every stakeholder received the message; c. 8-June-2022 Questionnaire Survey, extensive consultation with stakeholders on the implementation of the project; d. 1- August-2022 Contracts of land lease and transfer of management, the stakeholders agree to transfer the land to the project proponent and sign a land transfer contract; e. June-2022 Afforestation Operation Design, stakeholders are involved in the selection of tree species during the design of silvicultural operations.
Stakeholder engagement process	The project proponent multiple interactions with local villages conversazione during enrollment, villagers surveys and consultations, and training for the project. During all these interactions, the villagers can ask questions, share feedback or grievances with a staff member, who, if necessary, will take it up to Village Committee of Xinbao Village, or other government department. Stakeholder survey methods and processes are described below: a) Field investigation. The site investigation team of the project carried out the site investigation on 7 April 2022. Through random field investigation and visit in and around the construction site, on the one hand, to understand the relevant opinions or demands of local residents about the project construction, and collect the public attitude and feedback of random investigation and visit, taking into account gender differences, women in particular were also surveyed; on the other hand, through field investigation, investigation and analysis of sensitive factors (such as historical relics, scenic spots, etc.), historical contradictions, and incongruity of religions and customs around the project are carried out to identify possible risk points. b) Notification on Stakeholder Consultation Survey On 25 May 2022, the project proponent posted Notification on Stakeholder Consultation Survey on the village council that focuses on information related to the project and offers villagers different channels for feedback. c) Questionnaire Survey On 8 June 2022, the project proponent conducted the questionnaire survey among local villagers. A questionnaire survey. The survey team conducted a questionnaire survey on stakeholders from two aspects: first, to understand the village government's opinions on project implementation and project participants; the second is to conduct a random sampling survey of the people around the project, and collect the opinions and attitudes of the sampled groups.

	There are 100 questionnaires in total, include all the 34 land owners of the project and the others are local residents. The information of the investigators involved is as follows.		
	Type		Proportion
Gender	Male	59%	
	Female	41%	
Standard of culture	Primary and below	38%	
	Junior-senior high school	47%	
	College or above	15%	
Occupation	Local villagers	80%	
	Local government staff	10%	
	Project staff	10%	
Consultation outcome	The comments received during the communication campaign and workshops are summarized below:		
	- The stakeholders are very supportive of the project. - The surveyed stakeholders stated that they can easily reach project associate in case of any issue. - Of those villagers who have raised an issue with the project associate, 100% of surveyed villagers indicated that they received timely resolutions for the issue raised.		
	Through understanding, the stakeholders very much agree with the implementation of the project, and there are no sensitive factors (such as historical relics, scenic spots, etc.), historical contradictions, and incongruity between religions and customs around the project.		
Ongoing communication	The planning and construction of the project have been strongly supported and helped by people from all walks of life and the broad masses of the people, and the project has shown good compatibility with the government, society and local people at the beginning of construction, and the social benefits are remarkable.		
	Mechanisms for soliciting views from stakeholders (Stakeholder management program)		
	The project proponent has developed a stakeholder management plan, which describes the project situation and potential project impacts in detail, provides methods for identifying and analysing stakeholders, and specifies information disclosure methods, communication plans and representation mechanisms.		
Stakeholder input	The project proponent regularly holds stakeholder meetings every year to collect opinions of various stakeholders during the project operation period. In order to ensure continuous communication with stakeholders and respect stakeholders' needs and preferences for information, the method of meeting is selected to disclose project information, and the frequency of communication is selected or adjusted according to the situation.		
	All stakeholders support the implementation of the project activities.		

No negative comments.

2.1.3 Free Prior and Informed Consent

Obtaining consent	The project proponent implements the following measures to ensure that the process of obtaining FPIC was accessible to all community members who wanted to participate: - Field investigation - Notification on Stakeholder Consultation Survey - Questionnaire Survey - Communicate with each stakeholder and sign Contracts of land lease and transfer of management. - Involvement in the selection of tree species during the preparation of Afforestation Operation Design The project proponent posted Notification on Stakeholder Consultation Survey on the village council to inform the local villagers about the project. And then, through consultation with the villagers, the village collective leased the land contracted by the villagers to the project proponent for afforestation project development. After that all the villagers related to the project plot agreed and signed a land transfer agreement. The land transfer agreement is how project proponent collects the written consent of project participants. It is carefully explained point by point by the project team to ensure full informed consent of the villagers. Thus, there are no ongoing or unresolved conflicts in this project.
Outcome of FPIC	In the absence of the Proposed Project, the land involved in the project was a barren mountain and wasteland, with steep site conditions, and no residents settled in the land. Before the implementation of the project, the village collective and the project proponent shall publicize the project activities to the local residents, and receive the supervision and comments of the residents. Report project progress to stakeholders during the project implementation phase. Thus, the project has not encroached on land, relocated people without consent, and forced physical or economic displacement.

2.1.4 Grievance Redress Procedure

Development process	Through communication and consultation with Xinbao Village Committee, and stakeholders, the project proponent finally decide that Xinbao Village Committee collective will receive and listen to the opinions and suggestions of stakeholders, and coordinate with project participants and resolve the corresponding complaints.
Grievance redress procedure	The project's grievance redress procedure is as follows: Complaint procedures about land transfer If the stakeholders have comments or suggestions, or when the issue arises, both parties are required to make good faith efforts to resolve the dispute through negotiations, they can report the

	situation to the Madengbian Residential Area, and Xinbao Village Committee will supervise and resolve the conflict.
	If there is any problem that cannot be solved through consultation between the stakeholders and project proponent, the Xinbao Village Committee shall mediate as a neutral third party.
	If the village collective can not solve the problem, it shall hold a meeting with the project proponent to discuss and determine the solution in time until it is satisfactorily solved.
	If mediation is not possible, it may be submitted to Huachi County Rural Land Contract Mediation and Arbitration Commission for Dispute settlement or to Huachi County People's Court for arbitration in accordance with the provisions of Contracts of Land Lease and Transfer and the Arbitration Law of the People's Republic of China, the Mediation and Arbitration Law of the People's Republic of China on Dispute Settlement and Arbitration of Rural Land Contract and Management.
	b. Complaint procedures for environmental and social impacts and mitigation measures If there is any problem that cannot be solved through consultation between the stakeholders and project proponent, the Xinbao Village Committee shall mediate as a neutral third party.
	If mediation is not possible, it may be submitted to Huachi County Natural resources Bureau filed a complaint. If the dispute still cannot be settled, an administrative lawsuit may be brought in accordance with the Administrative Procedure Law of the People's Republic of China, or directly to Huachi County people's court to file a lawsuit. The stakeholders strongly agreed with the implementation of the project. During the implementation of the project, the project was implemented in strict accordance with the requirements without any conflict with the stakeholders.

2.1.5 Public Comments

Comments received	Actions taken
N/A	N/A

This project is in the public comment period and no comments have been received.

2.2 Risks to Stakeholders and the Environment

Risks identified	Mitigation or preventative measure taken
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Risks to stakeholder participation	No risk identified	All the villagers related to the project plot agreed and signed a land transfer agreement.
Working conditions	Effects of forest clearing, land preparation and seedling planting on soil and water loss during afforestation.	All kinds of construction activities are strictly controlled in the construction area, as far as possible not to destroy the original surface vegetation and soil, to retain the dead leaves and forest ground cover, not to cut the planted trees. Vehicles and construction machinery should drive on the demarcated road, and it is strictly prohibited to roll the surface vegetation at will. Afforestation has a positive impact on the environment.
Safety of women and girls	No risk identified	The afforestation activities of this project will strictly comply with the relevant provisions and requirements of the Environmental Protection Law of the People's Republic of China, the Implementation Regulations of the Law of the People's Republic of China on Soil and Water Conservation and the Technical Regulations of Afforestation.
Safety of minority and marginalized groups, including children	No risk identified	The afforestation activities of this project will strictly comply with the relevant provisions and requirements of the Environmental Protection Law of the People's Republic of China, the Implementation Regulations of the Law of the People's Republic of China on Soil and Water Conservation and the Technical Regulations of Afforestation.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	Exhaust and noise from construction vehicles	The exhaust gas and noise of construction vehicles are short-term and local impacts, which can be eliminated with the end of construction and will not cause pollution to the environment.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

Discrimination and sexual harassment	The project proponent treated the local population with great respect and there was no discrimination or sexual harassment has occurred during the implementation of the project.
Management experience	Before the implementation of the project, the project proponent have signed a green project contract with a professionally qualified construction party through open bidding. ¹³
Gender equity in labor and work	In order to promote equality between men and women, and to ensure that women enjoy equal rights with men in all aspects, China government promulgated the Law of the People's Republic of China on the Protection of Women's Rights and Interests, which came into force on 1 October, 1992 ¹⁴ . Project participants have always complied with national laws and regulations, and the equal opportunities have been provided in the context of gender equity and pay for labor and work.
Human trafficking, forced labor, and child labor	In order to protect the legitimate rights and interests of workers, the Chinese government promulgated the Labor Law of the People's Republic of China, which came into effect on January 1995, stipulating that forced labor and the employment of minors are not allowed ¹⁵ . According to the provisions of the Criminal Law of the People's Republic of China ¹⁶ , and according to the Action Plan against Human Trafficking (2021-2030) promulgated on April 9, 2021 ¹⁷ , China cracks down on human trafficking crimes in accordance with the law. The project proponent have signed a green project contract with a professionally qualified construction companies through open bidding. They have always complied with national laws and regulations. Thus, the project does not and will not use victims of human trafficking, forced labor, and child labor.

2.3.2 Human Rights

In the project design stage, the project selected a professional engineering company to compile the afforestation operation design document, and carried out detailed understanding and communication with the local residents, and selected the tree species suitable for the local environment and the local residents' favorite. During the implementation of the project, the project provides employment opportunities for local residents and increases their income, and improves the local ecological environment through afforestation activities.

¹³ <https://www.bidcenter.com.cn/news-222667281-4.html>

¹⁴ https://www.gov.cn/guoqing/2021-10/29/content_5647634.htm

¹⁵ <https://www.gqb.gov.cn/node2/node3/node5/node9/node108/userobject7ai1378.html>

¹⁶ http://www.yueyang.gov.cn/web/2570/2611/3940/content_1789434.html

¹⁷ https://www.gov.cn/gongbao/content/2021/content_5609081.htm

The project fully respects and promotes the protection of the rights of intellectual property owners, low-income persons and customary rights holders.

2.3.3 Indigenous Peoples and Cultural Heritage

There are no historical sites or cultural heritage in the project area according to the supporting documents issued by the Villagers Committee of Xinbao Village, Yule Town, Huachi County, as a result, not applicable.

2.3.4 Property Rights

Rights to territories and resources

Through consultation with the villagers, the village collective leased the land contracted by the villagers to the project proponent for afforestation project development.

In the absence of the Proposed Project, the sites of the project are all low-nutrient, low-supply land, and the terrain is steep, local villagers do not have the financial strength to carry out afforestation activities. The Project Proponent as a natural gas production enterprise with a sense of social responsibility, voluntarily implemented the project in order to protect the local ecological environment and mitigate climate change.

According to Article 10 of the Constitution of the People's Republic of China and the provisions of the Land Management Law of People's Republic of China, the land is owned by the state or collectives and the ownership is non-transferable, while the land use right can be transferred according to the law. The lands in the project area are owned by the collective and managed by the local villagers. The local villagers possessed land use right prior to the project implementation.

Prior to the project implementation, the Project Proponent and the local villagers agreed that the local villagers transfer the land use right to the Project Proponent by signing the Contract of land lease and transfer of management to improve local ecological environment considering the poor soil condition and local residents' planting capacity.

Considering the expected quantity and price of VCUs, the Project Proponent considered that the revenue of the VCU sales could not cover the project costs. Therefore, the Project Proponent and the villagers agreed that the land use right transfer fee has included the revenue of the VCU sales and paid to the villagers, and the financial benefits accrued from the sale of VCUs under the project will belong to the Project Proponent.

All the related rights to territories and resources include ownership of the lands, land use ownership, ownership of the forest, right to the VCU sales revenue. All the related rights have been agreed between the Project Proponent and the local villagers and supervised by the Collective according to the Contract of land lease and transfer of management between the Project Proponent and local villagers.

Respect for property rights	In the project design stage, the project selected a professional engineering company to compile the afforestation operation design document, and carried out detailed understanding and communication with the local residents, and selected the tree species suitable for the local environment and the local residents' favorite. During the implementation of the project, the project provides employment opportunities for local residents and increases their income, and improves the local ecological environment through afforestation activities.
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2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	Through consultation with the villagers, the Project Proponent and the local villagers agreed that the local villagers transfer the land use right to the Project Proponent. For afforestation project development, and signed the Contract of land lease and transfer of management. China is a civil law country. The rights to territories and resources are defined by the legal provisions. According to Article 10 of the Constitution of the People's Republic of China and the provisions of the Land Management Law of People's Republic of China, the land is owned by the state or collectives and the ownership is non-transferable, while the land use right can be transferred according to the law. The lands in the project area are owned by the collective and managed by the local villagers. All the related rights to territories and resources include ownership of the lands, land use ownership, ownership of the forest, and right to the VCU sales revenue. All the related rights have been agreed between the Project Proponent and the local villagers and supervised by the Collective according to the Contract of land lease and transfer of management between the Project Proponent and local villagers. There are no other customary right holders except for the local villagers. The Project Proponent and the local villagers reached a consensus agreement and signed the Contract of land lease and transfer of management, which is in compliance with the Civil Code of the People's Republic of China (Adopted at the Third Session of the Thirteenth National People's Congress on May 28, 2020).
Summary of the benefit sharing plan	The Project Proponent and the local villagers agreed that the local villagers transfer the land use right to the Project Proponent by signing the Contract of land lease and transfer of management. According to the Contract of land lease and transfer of management between the Project Proponent and local villagers. Considering the expected quantity and price of VCUs, the Project Proponent considered that the revenue of the VCU sales cannot cover the project costs. Therefore, the Project Proponent and the villagers agreed that emission reduction income has been included in the setting of the land use right transfer fee and paid to the villagers, and the financial benefits accrued from the sale of VCUs under the project will belong to the Project Proponent.
Approval and dissemination of	According to the signed agreement, the benefit-sharing agreement was agreed up on by the affected stakeholder groups, and that the agreement was shared in a culturally appropriate manner.

benefit sharing
plan

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure taken
Impacts on biodiversity and ecosystems	The implementation of the project is conducive to increasing biodiversity and thus improving ecosystem stability. The impact of the project on biodiversity and the ecological environment is positive.	The project implements scientific afforestation in accordance with afforestation design standards.
Soil degradation and soil erosion	In the early stage of afforestation, the soil will be bare and loose, resulting in a certain area of bare ground and damaging the soil stability structure. Overall, the project will play an important role in soil conservation, wind prevention and sand fixation.	During the construction period, the publicity and education of construction personnel should be strengthened, and the work of patrol and law enforcement should be strengthened. Various construction activities should be strictly controlled in the construction area, as far as possible not to damage the original surface vegetation and soil. After preparation, cover the surface with shrubs and herbs in time to avoid exposing the topsoil. Tending adopts local soil loosening to preserve the surface vegetation as much as possible, and the weeds cultivated down are kept in place to reduce soil erosion.
Water consumption and stress	The project contributes to increased water conservation capacity.	Select suitable tree species according to geographical location and climatic conditions. Intensive afforestation measures such as water retaining agent and base fertilization are used. Improve planting skills, shorten planting time, and reduce water consumption during afforestation.

Usage of fertilizers	The project will use a small amount of base fertilizer during the afforestation process, which will have a minimal impact on the environment.	Reasonable control of fertilizer use.
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2.4.1 Rare, Threatened, and Endangered species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

According to the supporting documents issued by the Villagers Committee of Xinbao Village, Yule Town, Huachi County, the project is not located in or adjacent to habitats for rare, threatened, or endangered species.

2.4.2 Introduction of species

N/A

2.4.3 Ecosystem conversion

In the absence of the Proposed Project, the sites of the project are all low-nutrient, low-supply land, and the terrain is steep, with few herbaceous plants growing. The project area was not cleared or drained of existing natural ecosystems during project implementation.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	AR-AMS0007	Afforestation and reforestation project activities implemented on lands other than wetlands	03.1
Tool ¹⁸	ar-am-tool-08-v4.0.0	Estimation of non-CO ₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity	04.0.0

¹⁸ CDM: Afforestation and reforestation project activities implemented on lands other than wetlands --- Version 3.1 (unfccc.int)

Tool	ar-am-tool-14-v4.2	Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities	04.2
Tool	AFOLU-Non-Permanence-Risk-Tool-v4.2	VCS AFOLU Non-Permanence Risk Tool (Version 4.2) Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities.	4.2

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
AR-AMS0007	This methodology is applicable to small-scale afforestation and reforestation (A/R) project activities	The project will reduce estimated GHG emission reductions by less than 60,000 per year which is belonged to small-scale afforestation and reforestation project activities.
AR-AMS0007	(a) The land subject to the project activity does not fall in wetland category	As per the IPCC GPG LULUCF 2003, wetlands are defined as lands that are covered or saturated by water for all or part of the year (e.g., peatland) and that does not fall into the forest land, crop land, grass land or settlements categories including reservoirs, natural rivers and lakes. The project site is sandy, barren and degraded land which designated barren land without its implementation. Thus, the land subject to the project does not fall in wetland category.
AR-AMS0007	(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 project area is barren land. Soil disturbance attributable to project area will always be less than 10% of the total surface. Soil disturbance attributable to the project activity is 8% ¹⁹ which does not cover more than 10 per cent of area of

¹⁹ The digging pits of size 0.80 m × 0.60 m (length × width) at a spacing of 2 m × 3 m is equal to a coverage of 8 per cent.

	(ii) Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in appendices 2 and 3 to this methodology.	land, according to Design Document of Afforestation Operation prepared, Details are available in Section 1.12. Meanwhile, the area of the project belongs to the semi-arid area, with mountainous terrain as the main terrain. The project activity land is not containing organic soils. The land on which the project activity has been established does not contain organic soils. The soils of the initial project activity instances and the grouped project area were classified according to the procedures of the Intergovernmental Panel on Climate Change (IPCC) utilizing soil maps. Any of the selected areas will undergo, under baseline conditions, land use or management practices described in appendices 2 and 3 of the selected methodology.
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Applicability of tools used:

Methodology ID	Applicability condition	Justification of compliance
ar-am-tool-08-v4.0.0 Estimation of non-CO₂ greenhouse gas (GHG) emissions resulting from burning of biomass attributable to an A/R CDM project activity	The tool is applicable to all occurrence of fire within the project boundary. Non-CO₂ GHG emissions resulting from any occurrence of fire within the project boundary shall be accounted for each incidence of fire which affects an area greater than the minimum threshold area reported by the host Party for the purpose of defining forest, provided that the accumulated area affected by such fires in a given year is ≥5% of the project area.	The tool will be applied for each fire incident that affects an area greater than 0.5ha, where the accumulated area of fires in any year is higher than ≥5% of the project area. No fires have occurred in the past.
ar-am-tool-14-v4.2	The tool is applicable for: (a) Estimation of carbon stock	This tool has no internal applicability conditions.

Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities	and change in carbon stock in living biomass of trees and shrubs in baseline; (b) Ex-ante estimation (projection) of carbon stock and change in carbon stock in living biomass of trees and shrubs in project; (c) Ex-post estimation of carbon stock and change in carbon stock in trees and shrubs for monitoring of project activities. This tool has no internal applicability conditions.	For this proposed project activity the carbon stocks in baseline trees can be considered to be 0 conservatively. Within the project area, approximately 55,000 saplings will be planted, covering an area of around 500 mu, the species selected for afforestation include Mongolian pine, Spruce, and Xinjiang poplar. Thus, ex-ante estimation (projection) of carbon stock and change in carbon stock in living biomass of trees in the project, and ex-post estimation of carbon stock and change in carbon stock in trees for monitoring of the project activities requires the use of this tool.
AFOLU-Non-Permanence-Risk-Tool-v4.1 VCS AFOLU Non-Permanence Risk Tool (Version 4.2)	This tool provides the procedures for analyzing non-permanence risk and determining buffer contributions for Agriculture Forestry and Other Land Use (AFOLU) projects.	Tool is applicable as the current project is an AFLOU project. It is mandatory to conduct non-permanence risk analysis. The tool sets out procedures to determine non-permanence risk rating. This determines number of buffer credits that shall be deposited into the AFOLU pooled buffer account.

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Above-ground biomass	CO ₂	No	Not accounted for in the baseline under the AR-AMS0007
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
		Other	N/A	N/A

Project	Below-ground biomass	CO ₂	No	Not accounted for in the baseline under the AR-AMS0007
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
		Other	N/A	N/A
	Dead wood Litter and Soil organic carbon	CO ₂	No	Carbon stock in this pool is expected to increase due to the implementation of the project activity, but this carbon pool is conservatively neglected.
		CH ₄	No	GHG emissions in the baseline can be conservatively ignored
		N ₂ O	No	GHG emissions in the baseline can be conservatively ignored
		Other	N/A	N/A
	Above-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	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
		Other	N/A	N/A
	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	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
		Other	N/A	N/A
	Dead wood Litter and Soil organic carbon	CO ₂	No	Carbon stock in this pool is expected to increase due to the implementation of the project activity, but this carbon pool is conservatively neglected.
		CH ₄	No	GHG emissions in the baseline can be conservatively ignored

		N ₂ O	No	<i>GHG emissions in the baseline can be conservatively ignored</i>
		Other	N/A	N/A

Emission sources and GHGs selected for accounting

Source	Gas	Included?	Justification/Explanation
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 the methodology.
	N ₂ O	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under the methodology.

The map of the locations of the project is shown in Figure 3-1. The KML files for boundary for project location are provided separately. As shown, the spatial boundaries of the project area where the project activity is implemented locates within Madengbian Residential Area, Xinbao Village, Yule Town, Huachi County, Qingyang City, Gansu Province, People's Republic of China with the geographical coordinate: Latitude 36°13'41" and 36°14'06" (North) & Longitude 107°55'02" and 107°55'51" (East). The project has a central geographical coordinates of the Latitude 36.2026 North and 107.9286 East.



Figure3-1. The spatial boundaries of the project area

3.4 Baseline Scenario

As stated in section 5.2 of the approved small-scale methodology AR-AMS0007 version 03.1, the baseline scenario for this project is continuation of the pre-project land use.

The continuation of the land uses about project activity area is a minimum period of 20 years and before the proposed project design, the land would be barren land. At present, the land is degraded sandy land with an extremely low forest coverage indicated in photo as following.

It shows that the proposed project is located in position which was barren land and desert before the proposed project is implemented.



Figure3-2. The degraded land before the proposed project

In the proposed project, the species selected for afforestation include Mongolian pine, Spruce, and Xinjiang poplar, due to the high survival rate, better ecological benefits, ability to withstand extreme weather disasters, strong resistance to pests and diseases, their acceptability by local people, and carbon sequestration potential. Meanwhile, the project will enhance the ability of the forest to conserve water, conserve water and soil, prevent wind and sand, fix carbon and release oxygen, improve soil and purify air.



Figure3-3. The project construction status

3.5 Additionality

3.5.1 Regulatory Surplus

Is the project located in an or Non-Annex 1 country?

- ☐ Annex 1 country ☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

- ☐ Yes ☒ No

If the project is located inside a Non-Annex 1 country and the project activities are mandated by a law, statute, or other regulatory framework, are such laws, statutes, or regulatory frameworks systematically enforced?

☐ Yes

☐ No

According to the Forestry Law of the People's Republic of China, people's governments at all levels encourage all walks of life and urban and rural residents to carry out afforestation activities²⁰, therefore the project activity is not mandated by any law, statute, and other regulatory framework.

3.5.2 Additionality Methods

The demonstration and assessment of additionality is done hereafter using the Appendix 1 of the AR-AMS0007 Small-scale Methodology: "Afforestation and reforestation project activities implemented on lands other than wetlands".

- **Investment barrier**

Madengbian Residential Area, where the proposed project is located, is a less developed area, where the local people are in economic difficulties and the local finance is tight, the budget available from the Government of the local government department was not adequate for the project to implement afforestation. These project lands were still left unplanted by the local government department and forest department due to time bound activities and unit-wise budget allocations, which are not sufficient to engage community from long duration to restore the project areas. The lower motivation in undertaking similar activities lies in the deep rooted barrier of budgetary provision and lower voluntary community participation.

The sites of the project are all low-nutrient, low-supply land with few herbaceous plants growing, and the terrain is steep. As a result the cost of afforesting these lands would be very high with regards to the likely benefits.

It is for this reason that these proposed lands were not taken up when afforestation activities were taken up in earnest all over Huachi County. The local communities and villagers showed no interest in taking up these lands for afforestation activities as they did not expect any significant benefits.

- **Barriers due to local ecological conditions**

The soil of the project site is poor, the vegetation coverage of forest trees is low, the soil erosion is serious. The terrain of the project site is steep, and which is on the sunny side. As a result, there are ecological conditions obstacles for afforestation.

²⁰ https://www.gov.cn/xinwen/2019-12/28/content_5464831.htm

Without the benefits flowing from the carbon credits expected under this project the above mentioned two barriers would have ensured that the afforestation work on these proposed project lands was never taken up. Therefore, the additionality of the proposed activity of afforestation on the project lands is established.

3.6 Methodology Deviations

No any methodology deviations applied to this project, as a result, not applicable.

4 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

In the absence of the Proposed Project, the sites of the project are all low-nutrient, low-supply land, and the terrain is steep, with few herbaceous plants growing. Without its implementation, all the sites will keep the same circumstances with no natural renewal and afforestation within the project area.

As described in sections above, the baseline scenario is continuation of the pre-project land use. Considering the conditions of applicability of the selected methodology, changes in selected carbon pools (above ground biomass and belowground biomass) can be assumed to be negligible for the baseline emission calculations.

$$\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} + \Delta C_{SHRUB_BSL,t} + \Delta C_{DW_BSL,t} + \Delta C_{LI_BSL,t} \quad \text{Equation (1)}$$

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

$\Delta C_{LI_BSL,t}$ = 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

The pools corresponding to shrub biomass, dead wood and litter will not be considered for the purposes of this project as explained above in Section above. The project area was barren land before afforestation, and there were no loose trees. Therefore, these carbon pools will be assumed as zero in the baseline. As outlined in section above, the carbon stock in the baseline trees and shrubs are going to increase (sinks) due to the conditions of the land under project area. Hence, the change in the amount of carbon stock is negative. However, changes in carbon stocks in trees in the baseline is accounted as zero in accordance to Methodological tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”, specific requirements are as follows.

- There are very few trees in the pre-project area and these trees are neither harvested, nor cleared, nor removed, throughout the crediting period of the project activity.
- The pre-project trees do not suffer mortality because of competition from trees planted in the project, or damage because of implementation of the project activity, at any time during the crediting period of the project activity.
- The pre-project trees are not inventoried along with the project trees in monitoring of carbon stocks but their continued existence, consistent with the baseline scenario, is monitored throughout the crediting period of the project activity.

Thus, changes in carbon stock in shrubs is also zero.

For simplicity, the baseline net GHG removals is considered to be carbon stock in baseline tree biomass within the project boundary.

$$\Delta C_{BSL,t} = 0$$

$$\Delta C_{TREE_BSL,t} = 0$$

$$\Delta C_{SHRUB_BSL,t} = 0$$

$$\Delta C_{DW_BSL,t} = 0$$

$$\Delta C_{LI_BSL,t} = 0$$

Therefore, baseline net GHG removals by sinks, $\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} = 0$.

4.2 Project Emissions

According to the applied methodology “AR-AMS0007 v03.1 developed the Clean Development Mechanism for small-scale Reforestation”.

The actual net GHG removals by sinks is calculated as follows:

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

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 calculated 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 applied methodology “AR-AMS0007 v03.1, 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.

As per §9 of the applied methodology, increase in non-CO₂ GHG emissions within the project boundary as a result of the implementation of the project activity is calculated as per the tool “Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity” (version 4.0.0). The pre and post project activities does not involve in the burning of biomass or forest fires, or usage of fire for site preparation or usage of fire to clear land of harvest residue prior to replanting of land. The area affected by fire is estimated to be 0% or extremely negligible. Hence, as per the “Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity (Version 4.0.0)” the area affected burning of biomass is less than 5% and so the emissions resulting from the same is estimated as zero.

The project proponent does not produce additional GHG emissions as part of project activities. Therefore, $GHG_{E,t}$ is zero, $\Delta C_{ACTUAL,t} = \Delta C_{P,t}$.

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

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

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 biomass 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 biomass 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 , as estimated in the tool “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities”; t CO₂-e

The project does not include shrub planting, thus, $\Delta C_{SHRUB_PROJ,t} = 0$

For simplicity, the carbon stocks in dead wood, litter and soil organic carbon have been excluded from the calculation. It is expected that these carbon pools will not change significantly.

$$\begin{aligned} \Delta C_{DW_PROJ,t} &= 0 \\ \Delta C_{LI_PROJ,t} &= 0 \\ \Delta SOC_{AL,t} &= 0 \end{aligned}$$

Therefore, change in the carbon stocks in project, $\Delta C_{P,t} = \Delta C_{TREE_PROJ,t}$.

For the proposed project, carbon stock in pre-project tree biomass is estimated in three type of trees, and detailed equation is following.

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

Equation (4)

$$= \Delta C_{Mongolian\ pine_PROJ,t} + \Delta C_{Spruce_PROJ,t} + \Delta C_{Xinjiang\ poplar_PROJ,t}$$

According to the applied methodological tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”(Version 04.2), the change in carbon stock in trees and the associated uncertainty are estimated as follows:

$$\Delta C_{TREE_PROJ,t} = C_{TREE_PROJ,t2} - C_{TREE_PROJ,t1}$$

Equation (5)

Thus,

$$\begin{aligned} \Delta C_{TREE_PROJ,t} = & (C_{Mongolian\ pine_PROJ,t2} - C_{Mongolian\ pine_PROJ,t1}) \\ & + (C_{Spruce_PROJ,t2} - C_{Spruce_PROJ,t1}) \\ & + (C_{Xinjiang\ poplar_PROJ,t2} - C_{Xinjiang\ poplar_PROJ,t1}) \end{aligned}$$

Equation (6)

Where:

$\Delta C_{TREE_PROJ,t}$ = Change in carbon stock in tree biomass in the project in year t ; tCO₂-e

$C_{TREE_PROJ,t1}$ = Carbon stock in trees as estimated at time t_1 ; t CO₂e

$C_{TREE_PROJ,t2}$ = Carbon stock in trees as estimated at time t_2 ; t CO₂e

The requirements for stratification according to the applied methodology “AR-AMS0007 v03.1” are as follows:

If biomass distribution over the project area is not homogeneous, stratification should be carried out to improve the precision of biomass estimation. Different stratifications may be appropriate for the baseline and project scenarios in order to achieve optimal precision of estimation of net GHG removals by sinks. In particular:

(a) For baseline net GHG removals by sinks, it is usually sufficient to stratify the area according to major vegetation types and their crown cover and/or land use types;

For the project, baseline net GHG removals by sinks is zero, thus, stratification under baseline scenarios is not involved.

(b) For actual net GHG removals by sinks the stratification for ex ante estimations is based on the project planting/management plan and the stratification for ex post estimations

is based on the actual implementation of the project planting/management plan. If natural or anthropogenic impacts (e.g. local fires) or other factors (e.g. soil type) significantly alter the pattern of biomass distribution in the project area, then the ex post stratification is revised accordingly.

Based on the actual situation that the terrain, climate, soil and other site conditions of the forested land in the project area are basically the same, and the afforestation time, initial planting density and operation and management measures are the same, the planting area is stratified into one strata.

According to the applied methodological tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”, mean carbon stock in trees within the tree biomass estimation strata and the associated uncertainty are estimated as follows (all time-dependent quantities relate to the time of measurement):

$$C_{TREE_PROJ} = \frac{44}{12} \times CF_{TREE_PROJ} \times B_{TREE_PROJ} \quad \text{Equation (7)}$$

$$B_{TREE_PROJ} = A \times b_{TREE_PROJ} \quad \text{Equation (8)}$$

$$b_{TREE_PROJ} = \sum_{i=1}^M w_i \times b_{TREE_PROJ,i} \quad \text{Equation (9)}$$

$$u_c = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^M w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}} \quad \text{Equation (10)}$$

Where:

C_{TREE_PROJ} = Carbon stock in tree biomass in the project; tCO₂-e

CF_{TREE_PROJ} = Carbon fraction of tree biomass; t C (t d.m.)⁻¹

B_{TREE_PROJ} = Tree biomass within the biomass estimation strata; t d.m.

A = Sum of areas of the biomass estimation strata; ha

b_{TREE_PROJ} = Mean tree biomass per hectare within the biomass estimation strata; t d.m. ha⁻¹

w_i = Mean tree biomass per hectare within the biomass estimation strata; t d.m. ha⁻¹

$b_{TREE,i}$	=	Mean tree biomass per hectare in stratum i ; t d.m. ha ⁻¹
u_c	=	Uncertainty in C_{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_i^2	=	Variance of tree biomass per hectare across all sample plots in stratum i ; (t d.m. ha ⁻¹) ²
n_i	=	Number of sample plots in stratum i .

For Mongolian pine,

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

$$B_{TREE_PROJ,i,j} = f_j(x_{1,l}, x_{2,l}, x_{3,l} \dots) \times (1 + R_j) \quad \text{Equation (11)}$$

Where:

$B_{TREE_PROJ,i,j}$	=	Biomass of tree l of species j in sample plot p of stratum i ; t d.m.
$f_j(x_{1,l}, x_{2,l}, x_{3,l} \dots)$	=	Above-ground biomass of the tree returned by the allometric equation for species j relating the measurements of tree l to the above-ground biomass of the tree; t d.m. The specific equation is, Aboveground biomass per plant is equal to $0.306D^{1.886}$ (" DBH " represents the diameter at breast height of the tree species j , cm) ²¹
R_j	=	Root-shoot ratio for tree species j ; dimensionless

For Spruce,

Estimation by modelling of tree growth and stand development

$$B_{TREE_PROJ,i,j} = (0.152 \times DBH)^2 \times H^{0.768} \quad \text{Equation (12)}$$

²¹ 石永磊. 基于光学遥感数据的稀疏乔灌木地上生物量反演方法研究[D].河南理工大学,2022.DOI:10.27116/d.cnki.gjzgc.2022.000486.

Where:

DBH = Diameter at breast height of species j in sample plot p of stratum i ; cm

H = Height of tree of species j in sample plot p of stratum i ; m ²²

For Xinjiang poplar,

Estimation by modelling of tree growth and stand development

$$B_{TREE_PROJ,i,j} = (0.032927DBH)^{1.999595} \times H^{0.850952} \quad \text{Equation (13)}$$

Where:

DBH = Diameter at breast height of tree of species j in sample plot p of stratum i ; cm

H = Height of tree of species j in sample plot p of stratum i ; m ²³

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.

4.3 Leakage Emissions

As per Paragraph 21 of the methodology, leakage emission is calculated as follows:

$$LK_t = LK_{AGRIC,t} \quad \text{Equation (14)}$$

Where:

LK_t = GHG emissions due to leakage, in year t ; t CO₂-e

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t , as calculated in the tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”; t CO₂-e

In the absence of the Proposed Project, the sites of the project are all low-nutrient, low-supply land, and the terrain is steep, and unsuitable for farming. So there is no agricultural activities and no yield and profit in the project area, and then there is no agricultural transfers,

²² 刘建峰. 我国常见树种通用生物量相对生长方程建模研究[D].浙江师范大学,2022.DOI:10.27464/d.cnki.gzsfu.2021.000492.

²³ 陈章水,方奇.新疆杨元素含量与生物量研究[J].林业科学研究,1988(05):535-540.

and no pastoral transfers in the project area.²⁴ Therefore, there is no risks on food security, land loss, loss of yields, and no negative impacts on livelihoods for local stakeholders to participate in the project.

There is no displacement of the agriculture activities for this project hence the leakage is accounted as zero.

4.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

The net anthropogenic GHG removals by sinks is calculated as follows:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad \text{Equation (15)}$$

Where:

$\Delta C_{AR-CDM,t}$	=	Net anthropogenic GHG removals by sinks, in year t ; t CO ₂ -e
$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year t ; t CO ₂ -e
$\Delta C_{BSL,t}$	=	Baseline net GHG removals by sinks, in year t ; t CO ₂ -e
LK_t	=	GHG emissions due to leakage, in year t ; t CO ₂ -e

Since baseline removals and emissions due to leaks were considered zero, net anthropogenic removals are expressed according to the formula:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} \quad \text{Equation (16)}$$

Vintage period	Estimated baseline emissions (tCO ₂ e)	Estimated project emissions (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated reduction VCU (tCO ₂ e)	Estimated removal VCU (tCO ₂ e)	Estimated total VCUs (tCO ₂ e)
26-February-2023 to 25-February-2024	0	0	0	0.00	0	0
26-February-2024 to 25-February-2025	0	0	0	0.03	0	0
26-February -	0	6	0	0.85	0	5

²⁴ According to the Xinbao village committee issued a certificate stating that the project boundary does not involve agricultural activities conversion, clearance, depletion and degradation. Pre-forestation photos, and KML file.

2025 to 25- February- 2026						
26- February - 2026 to 25- February- 2027	0	19	0	2.80	0	16
26- February - 2027 to 25- February- 2028	0	58	0	8.72	0	49
26- February - 2028 to 25- February- 2029	0	120	0	17.97	0	102
26- February - 2029 to 25- February- 2030	0	241	0	36.18	0	205
26- February - 2030 to 25- February- 2031	0	298	0	44.65	0	253
26- February- 2031 to 25- February- 2032	0	390	0	58.49	0	331
26- February- 2032 to 25- February- 2033	0	401	0	60.19	0	341
26- February- 2033 to 25- February- 2034	0	432	0	64.78	0	367

26-February-2034 to 25-February-2035	0	448	0	67.16	0	381
26-February-2035 to 25-February-2036	0	515	0	77.28	0	438
26-February-2036 to 25-February-2037	0	664	0	99.62	0	564
26-February-2037 to 25-February-2038	0	732	0	109.73	0	622
26-February-2038 to 25-February-2039	0	856	0	128.45	0	728
26-February-2039 to 25-February-2040	0	950	0	142.55	0	808
26-February-2040 to 25-February-2041	0	1099	0	164.84	0	934
26-February-2041 to 25-February-2042	0	1297	0	194.49	0	1102
26-February-2042 to 25-	0	1408	0	211.17	0	1197

February-2043						
Total	0	9933	0	1489.95	0	8443

For projects required to assess permanence risk:

i) Provide the requested information using the table below:

State the non-permanence risk rating (%)	15
Has the non-permanence risk report been attached as either an appendix or a separate document?	☒ Yes ☐ No
For ARR and IFM projects with harvesting, state, in tCO ₂ e, the Long-term Average (LTA).	/
Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☒ No If no, provide justification. The harvesting is not part of the project activities. Under the project for crediting period, the project proponent promised not to harvest the trees.
State, in tCO ₂ e, the expected total GHG benefit to date.	8,542 tCO ₂ e
Is the number of GHG credits issued below the LTA?	☐ Yes ☒ No If no, provide justification. The harvesting is not part of the project activities. Under the project for crediting period, the project proponent promised not to harvest the trees.

The non-permanence risk rating (%) as follows:

Risk Category	Rating
Internal Risk	14
External Risk	0
Natural Risk	1
Overall Risk Rating (a + b + c)	15

ii) Complete the table below for the project crediting period.

Vintage period	Estimated baseline emissions (tCO ₂ e)	Estimated project emissions (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated buffer pool allocation (tCO ₂ e)	Estimated reduction VCU (tCO ₂ e)	Estimated removal VCU (tCO ₂ e)	Estimated total VCU issuance (tCO ₂ e)
26-February y-2023 to 25-February y-2024	0	0	0	0.00	0	0	0
26-February y-2024 to 25-February y-2025	0	0	0	0.03	0	0	0
26-February y-2025 to 25-February y-2026	0	6	0	0.85	0	5	5
26-February y-2026 to 25-February y-2027	0	19	0	2.80	0	16	16
26-February y-2027 to 25-February y-2028	0	58	0	8.72	0	49	49
26-February y-2028 to 25-February y-2029	0	120	0	17.97	0	102	102
26-February y-2029 to 25-February y-2030	0	241	0	36.18	0	205	205
26-February y-2030 to 25-	0	298	0	44.65	0	253	253

Februar y-2031							
26- Februar y-2031 to 25- Februar y-2032	0	390	0	58.49	0	331	331
26- Februar y-2032 to 25- Februar y-2033	0	401	0	60.19	0	341	341
26- Februar y-2033 to 25- Februar y-2034	0	432	0	64.78	0	367	367
26- Februar y-2034 to 25- Februar y-2035	0	448	0	67.16	0	381	381
26- Februar y-2035 to 25- Februar y-2036	0	515	0	77.28	0	438	438
26- Februar y-2036 to 25- Februar y-2037	0	664	0	99.62	0	564	564
26- Februar y-2037 to 25- Februar y-2038	0	732	0	109.73	0	622	622
26- Februar y-2038 to 25- Februar y-2039	0	856	0	128.45	0	728	728
26- Februar	0	950	0	142.55	0	808	808

y-2039 to 25-Februar y-2040							
26-Februar y-2040 to 25-Februar y-2041	0	1099	0	164.84	0	934	934
26-Februar y-2041 to 25-Februar y-2042	0	1297	0	194.49	0	1102	1102
26-Februar y-2042 to 25-Februar y-2043	0	1408	0	211.17	0	1197	1197
Total	0	9933	0	1489.95	0	8443	8443

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	CF_{TREE}	
Data unit	t C (t d.m.) ⁻¹	
Description	Carbon fraction of tree biomass	
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013	
Value applied	Tree species	$CF_{TREE,j}$
	Mongolian pine	0.522
	Spruce	0.521
	Xinjiang poplar	0.496
Justification of choice of data or description of measurement methods and procedures 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	

Purpose of data	Calculation of project emissions
Comments	N/A

Data / Parameter	R_{TREE}	
Data unit	dimensionless	
Description	Root-shoot ratio for trees.	
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013	
Value applied	Tree species	$R_{TREE,j}$
	Mongolian pine	0.241
	Spruce	0.224
	Xinjiang poplar	0.227
Justification of choice of data or description of measurement methods and procedures 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	
Purpose of data	Calculation of project emissions	
Comments	N/A	

Data / Parameter	t_{VAL}	
Data unit	dimensionless	
Description	Two-sided Students t-value, at infinite degrees of freedom for the required confidence level	
Source of data	Students t-distribution table in the tool "Calculation of the number of sample plots for measurements within A/R CDM project activities" (Version 02.1.0)	
Value applied	1.645	
Justification of choice of data or description of measurement methods and procedures applied	Use the 90% confidence level for determination of biomass stock in A/R CDM project activities	
Purpose of data	The parameter is used to calculate number of sample plots for Measurements	

Comments	N/A
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5.2 Data and Parameters Monitored

Data / Parameter	$A_{PLOT,i}$, A_i
Data unit	ha
Description	Area of a sample plot; area of a 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 the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Frequency of monitoring/recording	At every verification
Value applied	Actual value will be applied in verification
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 the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	n_i
Data unit	Dimensionless
Description	Number of sample plots in stratum i
Source of data	Calculated
Description of measurement methods and procedures to be applied	$n = \frac{N \times t_{VAL}^2 \times (\sum_i w_i \times s_i)^2}{N \times E^2 + t_{VAL}^2 \times \sum_i w_i \times s_i^2}$
Frequency of monitoring/recording	At every verification

Value applied	<i>Actual value will be applied in verification</i>
Monitoring equipment	<i>N/A</i>
QA/QC procedures to be applied	<i>N/A</i>
Purpose of data	• <i>Calculation of project emissions</i>
Calculation method	<i>The calculation method is described in the tool “Calculation of the number of sample plots for measurements within A/R CDM project activities” (version 02.1.0)</i>
Comments	<i>N/A</i>

Data / Parameter	<i>DBH_i</i>
Data unit	<i>cm</i>
Description	<i>Diameter at breast height of trees of species <i>i</i> in sample plot</i>
Source of data	<i>Field measurement</i>
Description of measurement methods and procedures to be applied	<i>Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, are applied</i>
Frequency of monitoring/recording	<i>At every verification</i>
Value applied	<i>Actual value will be applied in verification</i>
Monitoring equipment	<i>N/A</i>
QA/QC procedures to be applied	<i>Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, are applied</i>
Purpose of data	• <i>Calculation of project emissions</i>
Calculation method	<i>For the ex-post calculation during the following verification, the allometric equations will be used to calculate the tree biomass.</i>
Comments	<i>N/A</i>

Data / Parameter	<i>H_i</i>
Data unit	<i>m</i>

Description	Height of trees of species <i>i</i> in sample plot
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 the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Frequency of monitoring/recording	At every verification
Value applied	Actual value will be applied in verification
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 the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Purpose of data	Calculation of project emissions
Calculation method	For the ex-post calculation during the following verification, the allometric equations will be used to calculate the tree biomass.
Comments	N/A

Data / Parameter	$N_{i,j}$
Data unit	tree/ha
Description	Number of the tree species <i>j</i> of strata <i>i</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 the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Frequency of monitoring/recording	At every verification
Value applied	Actual value will be applied in verification
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 the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, are applied

Purpose of data	Calculation of project emissions
Calculation method	For the ex-post calculation during the following verification, the allometric equations will be used to calculate the tree biomass.
Comments	N/A

5.3 Monitoring Plan

According to the applied methodological tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities” (Version 04.2), sample plots are installed in one or more strata.

To monitor the applicability conditions, the following steps will be taken:

Method for estimation of the change in carbon stock

As stated in section 4.2, the actual net GHG removals by sinks are calculated by the equation (4):

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

Where:

$$\begin{aligned} \Delta C_{P,t} &= \text{Change in the carbon stocks in project, occurring in the selected carbon pools, in year } t; \text{ t CO}_2\text{-e} \\ \Delta C_{TREE_PROJ,t} &= \text{Change in carbon stock in tree biomass in project in year } t, \text{ as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”}; \text{ t CO}_2\text{-e} \end{aligned}$$

According to the applied methodological tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities” (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:

$$C_{TREE_PROJ} = \frac{44}{12} \times CF_{TREE_PROJ} \times B_{TREE_PROJ}$$

$$B_{TREE_PROJ} = A \times b_{TREE_PROJ}$$

$$b_{TREE_PROJ} = \sum_{i=1}^M w_i \times b_{TREE_PROJ,i}$$

$$u_c = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^M w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}}$$

Where:

C_{TREE_PROJ}	= Carbon stock in tree biomass in the project; tCO ₂ -e
CF_{TREE_PROJ}	= Carbon fraction of tree biomass; t C (t d.m.) ⁻¹
B_{TREE_PROJ}	= Tree biomass within the biomass estimation strata; t d.m.
A	= Sum of areas of the biomass estimation strata; ha
b_{TREE_PROJ}	= Mean tree biomass per hectare within the biomass estimation strata; t d.m. ha ⁻¹
w_i	= Mean tree biomass per hectare within the biomass estimation strata; t d.m. ha ⁻¹
$b_{TREE,i}$	= Mean tree biomass per hectare in stratum i ; t d.m. ha ⁻¹
u_c	= Uncertainty in C_{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_i^2	= Variance of tree biomass per hectare across all sample plots in stratum i ; (t d.m. ha ⁻¹) ²
n_i	= Number of sample plots in stratum i .

According to the Appendix 2 of the tool (Uncertainty of the mean tree biomass per hectare within the project boundary was estimated as (Equation (15) in methodological tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities” (Version 04.2): the uncertainty in the estimated mean value of a parameter is more than 10 per cent, the estimated mean value is either increased or decreased by a percentage of the uncertainty. The table below provides the uncertainty discount factors to be applied for different ranges of uncertainty.

Uncertainty discount factors :

Uncertainty (refers to as “U”)	Discount (% of U)
$U \leq 10\%$	0
$10 < U \leq 15$	25%
$15 < U \leq 20$	50%
$20 < U \leq 30$	75%
$U > 30$	100%

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 plants in a sample plot above a minimum dimension are measured and the biomass of each tree is estimated. The biomass of the individual plants 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 center of the plot) is estimated as follows (all time-dependent variables relate to the time of measurement):

$$b_{TREE,p,i} = \frac{B_{TREE,p,i}}{A_{PLOT,i}} \quad \text{Equation (17)}$$

$$B_{TREE,p,i} = \sum_j B_{TREE,j,p,i} \quad \text{Equation (18)}$$

$$B_{TREE,j,p,i} = \sum_l B_{TREE,l,j,p,i} \quad \text{Equation (19)}$$

Where:

$b_{TREE,p,i}$ = Tree biomass per hectare in sample plot p of stratum i ; t d.m. ha⁻¹

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

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

$$B_{TREE_PROJ,i,j} = f_j(x_{1,l}, x_{2,l}, x_{3,l} \dots) \times (1 + R_j) \quad \text{Equation (20)}$$

Where:

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

$$f_j(x_{1,l}, x_{2,l}, x_{3,l} \dots) = \text{Above-ground biomass of the tree returned by the allometric equation for species } j \text{ relating the measurements of tree } l \text{ to the above-ground biomass of the tree; t d.m.}$$

The specific equation is, Aboveground biomass per plant is equal to $0.306D^{1.886}$ ("DBH" represents the diameter at breast height of the tree species j , cm) ²⁵

$$R_j = \text{Root-shoot ratio for tree species } j; \text{ dimensionless}$$

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

Estimation by modelling of tree growth and stand development

$$B_{TREE_PROJ,i,j} = (0.152 \times DBH)^2 \times H^{0.768} \quad \text{Equation (21)}$$

Where:

$$DBH = \text{Diameter at breast height of species } j \text{ in sample plot } p \text{ of stratum } i; \text{ cm}$$

$$H = \text{Height of tree of species } j \text{ in sample plot } p \text{ of stratum } i; \text{ m} \quad ^{26}$$

²⁵ 石永磊. 基于光学遥感数据的稀疏乔灌木地上生物量反演方法研究[D].河南理工大学,2022.DOI:10.27116/d.cnki.gjzgc.2022.000486.

²⁶ 刘建峰. 我国常见树种通用生物量相对生长方程建模研究[D].浙江师范大学,2022.DOI:10.27464/d.cnki.gzsfu.2021.000492.

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

Estimation by modelling of tree growth and stand development

$$B_{TREE_PROJ,i,j} = (0.032927DBH)^{1.999595} \times H^{0.850952} \quad \text{Equation (22)}$$

Where:

DBH = Diameter at breast height of tree of species j in sample plot p of stratum i ; cm

H = Height of tree of species j in sample plot p of stratum i ; m ²⁷

Sampling plan and stratification

Sampling design:

The sampling design for the monitoring the changes in carbon stocks of above ground biomass and below ground biomass is adopted from the Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities; (Version 04.2) and further referred with Calculation of the number of sample plots for measurements within AR CDM project activities (Version 02.1.0).

Sampling Frame:

To measure and monitor the changes in carbon stocks of above around biomass and below ground biomass, the project adopts the method of stratified random sampling to design the sample land. The plots will be located with the help of GPS and are to be treated as in other lands within the project boundary, e.g., during site and soil preparation, weeding, fertilization, harvesting, etc., and will be prevented from deforestation over the crediting period. All of the plots will be duly numbered and geo-referenced within the project area.

Sample Size:

The number of plots to be established depending on the number of species, number of strata identified, monitoring precision and confidence interval, with the appropriate associated cost-effectiveness criteria. The sample size (n) is estimated with fixed levels of precision (10% of mean biomass of a specific strata), and t value at 90% of the confidence interval with the assumption of no cost differences exist between strata and sub-strata, as described by the tool "Calculation of the number of sample plots for measurements within A/R CDM project activities" (Version 02.1.0) in methodology used for calculating sample size.

²⁷ 陈章水,方奇.新疆杨元素含量与生物量研究[J].林业科学研究,1988(05):535-540.

With the fundamentals from the project and the biomass stock estimates, the calculation is made using equation 1 from the tool.

$$n = \frac{N \times t_{VAL}^2 \times (\sum_i w_i \times s_i)^2}{N \times E^2 + t_{VAL}^2 \times \sum_i w_i \times s_i^2} \quad \text{Equation (23)}$$

Where:

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

For the project,

Total area = 33.35ha

Sample plot area = 0.06ha

$N = 33.35/0.06=555.83$

At the 90% reliability level, the T-value of the T-distribution bilateral T-quantile table is checked when the degree of freedom is infinite (∞), as described by the tool "Calculation of the number of sample plots for measurements within A/R CDM project activities" (Version02.1.0):

$t = 1.645$

The standard deviation of biomass stock for each stratum (S_i) was determined as 30% as per the forestry survey professional experience. This was determined based on the 90% confidence level. A default value equal to 10% of the mean biomass stock was used as the

acceptable margin of error. The mean biomass stock is the expected biomass at the time of monitoring.

After calculation, Number of sample plots allocated is listed in the following table:

Parameter	Data
<i>Strata</i>	1
<i>N</i>	555.83
<i>W_i</i>	1
<i>S_i</i>	13.688
<i>t_{VAL}</i>	1.645
<i>E</i>	4.563
<i>n</i>	23
<i>No. of Sample plots</i>	23

Setting sample plots:

The monitoring team needs to adopt the method of stratified random sampling to set the sample plots due to measuring requirements at regular intervals. Plot size is set to be a square area with 30m×20m. The plot needs to determine the location at the four locations' coordinates of the plot. The location, administrative positions, number of carbon stratum and carbon sub-stratum of each plot should be documented to ensure that the distribution of the sample plots is uniform.

Determine the sample location:

The samples are rectangle areas with 30m×20m. When selecting the samples on the slope, it is necessary to monitor the gradient and convert the horizontal long to the oblique long. The management methodology (irrigation, fertilization, etc.) within the samples must be the same as those outside the samples. If a fire breaks out, another sample could be selected near the original sample.

Monitoring is required to measuring, recording, storing, aggregating, collating and reporting on monitored data, about the proposed project.

- The methods for monitoring

The monitoring plan addresses the monitoring of project implementation, the monitoring of actual carbon stock changes from project activity set out in Section 5.2 (data and parameters monitored).

- Organizational structure and responsibilities

The operational and management structure that will be implemented by the Project Proponent in order to the monitoring of actual carbon stock changes and any leakage generated by the project activity is described in the following figure:

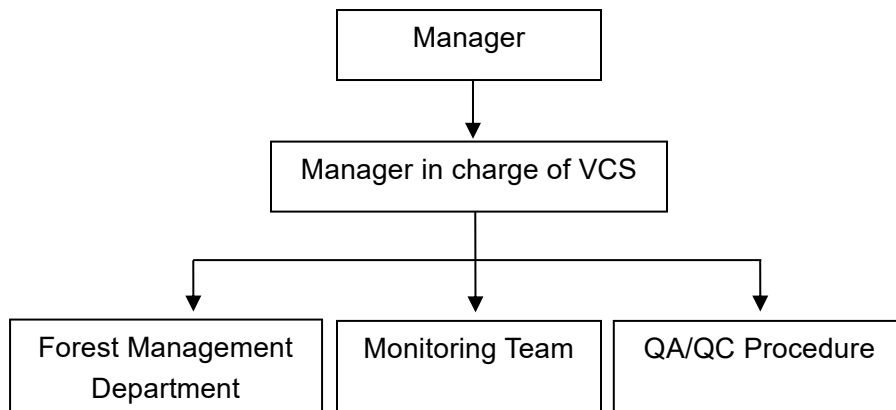


Figure 5-1 Monitoring Organization Chart

Composition	Function
Manager	Formalizing the procedure to establish monitoring as an official process
Manager in charge of VCS	Shall verify the relevance of the procedure and the declaration of GHG reductions and removals in the project areas. Supervision and providing orientation to the monitoring team on procedures and quality assurances.
Forest Management Department	Identify and evaluate possible discrepancies between the proposed procedures and implement corrective measures, if needed. Assure correct measurements and quality of the monitoring system.
Monitoring Team	Perform measurements, and process data at set times and within reasonable statistical thresholds.
QA/QC Procedure	Implement procedures for internal auditing and QA/QC plans

- The procedures for internal auditing and QA/QC

The monitoring program will include strict quality assurance and quality control procedures (QA/QC) incorporating Standard Operating Procedures for all phases of the monitoring process. The QA/QC procedures will be abided to ensure the following:

- Reliability of data collected from field measurement,
- Verification of the techniques used to obtain field data,
- Verification of data entry and analysis methods,
- Verification of data maintenance and archiving, and

v. Upgrading of electronic data with technological changes.

Internal data audits will be performed on a regular basis to ensure accuracy. The technical field team will visit the plots measured by the monitoring team to determine measurement data accuracy.

The 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.

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

Section	Information	Justification
/	/	/

No commercially sensitive information has been excluded from the public version of the project description.