XINJIANG ALTAY IMPROVED GRASSLAND MANAGEMENT PROJECT

国家林业和草原局
西北调查规划院

Document Prepared by National Forestry and Grassland Administration

Northwest Investigation and Planning Institute

Project Title	Xinjiang Altay Improved Grassland Management Project
Version	03
Date of Issue	09-February-2024
Project Location	Altay City, Altay Prefecture, Xinjiang Uygur Autonomous Region, China
Project Proponent(s)	Xinjiang Altay City Zhujin Investment Co., Ltd. 2F, South Side, No. 3, Zhizhanchang Road, Altay City, Altay Prefecture, Xinjiang Uygur Autonomous Region, China Project Leader: Liu Xiaohong Email：hexinlulibin@outlook.com 745252000@qq.com Tel：+86 (0906)2105571
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Project Lifetime	18-June-2021 to 17-June-2061, 40-year lifetime
GHG Accounting Period	18-June-2021 to 17-June-2061, 40-year lifetime
History of CCB Status	N/A
Gold Level Criteria	N/A

Expected Verification Schedule	N/A

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Restored 266,655.29 ha of degraded grassland and improve grassland productivity and forage quality in the project zone, and prevented continued degradation of grassland, which could significantly improve the ecological aesthetics value of local touristic resources	2.1
2) Organized special community cultural activities for local residents, improved the interaction within the local Kazakh community, increased connection between local Kazakh herders and other community members and indirectly promote the diffusion of traditional culture.	4.2
3) Improve the habitat environment of wildlife and increase the biodiversity of the project area	5

1.2 Standardized Benefit Metrics

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	18,687,019 t CO_2e	3.2
	Net estimated emission reductions in the project area, measured against the without-project scenario	/	/
Forest[1] cover	For REDD[2] projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	Not applicable	/
	For ARR[3] projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	Not applicable	/
Improved land management	Number of hectares of existing production forest land in which IFM[4] practices are expected to occurred as a result of project activities, measured against the without-project scenario	Not applicable	/
	Number of hectares of non-forest land in which improved land management practices are expected to occurred as a result of project activities, measured against the without-project scenario	Not applicable	/
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	13,167[5]	2.3
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	5,660	2.3

[1] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)
[2] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)
[3] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)
[4] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)
[5] 1,975 permanent jobs and 11,192 temporary jobs

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Employment	Total number of people expected to be employed in project activities,[6] expressed as number of full-time employees[7]	1,317[8]	2.3
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	567	2.3
Livelihoods	Total number of people expected to have improved livelihoods[9] or income generated as a result of project activities	13,167	2.3
	Number of women expected to have improved livelihoods or income generated as a result of project activities	5,660	2.3
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	/
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	/

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

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

[8] During the implementation of the project, about 13,167 local herders will be directly involved in grass planting and fence construction, 43% of whom are women. According to the payment records, the annual working hours during the monitoring period were 2,634,000 hours, and the legal working hours under the Labor Law were 2,000 hours/year. Therefore, the total employment of the project expressed in the number of full-time employees is 1,317 (2,634,000/2,000=1,317).

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

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	Not applicable	/
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	Not applicable	/
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Not applicable	/
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Not applicable	/
Well-being	Total number of community members whose well-being[10] is expected to improve as a result of project activities	13,167	2.3
	Number of women whose well-being is expected to improve as a result of project activities	5,660	2.3
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation,[11] measured against the without-project scenario	1,150,000[12]	2.1
	Expected number of globally Critically Endangered or Endangered species [13] benefiting from reduced	3	5.2

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

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

[12] According to PRA Report, the total area of Altay City is 1,150,000 ha. Through the project, the degraded grassland can be restored, the local herders can be guided to rational grazing, the carrying capacity of the ecosystem can be improved, the habitat area of local wildlife can be increased, and the biodiversity can be improved

[13] Per IUCN's Red List of Threatened Species

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	threats as a result of project activities,[14] measured against the without-project scenario		

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

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

Xinjiang Altay Improved Grassland Management Project (hereafter as 'the project') is located in Altay City, Altay Prefecture, Xinjiang Uygur Autonomous Region, China. The project aims to restore the local degraded grassland ecosystem by Improved sustainable grassland management measures, such as rotating grazing and grazing prohibition in the project area by building fences, and improving the degraded grassland ecosystem by reseeding high-quality local grass seeds. After the implementation of the project, the grassland will be scientifically and rationally utilized according to the health status of the local grassland ecosystem. Achieve long-term sustainable management of degraded local grasslands. The implementation of the project has significantly improved the local climate benefits, community benefits and biodiversity benefits. The project sponsor is Xinjiang Altay City Zhujin Investment Co., LTD..

According to the Parameters for Degradation, Sandification and Salification of Rangelands[15] (National standard of China, GB19377-2003) and Project Design Report, moderately degraded areas refer to the total grass yield decreased by 21%-50% compared with that before degradation and the total grass yield decreased by 50% compared with that before degradation is regarded as severely degraded grasslands. According to the baseline survey, before the implementation of the project, the grassland in the project area was facing serious degradation and even desertification due to the impact of climate change and human activities, most of them were moderately degraded while some of them even severely degraded for years.

Totally, 266,655.29 ha (or 3999829.35 Mu[16]) of degraded grassland in Altay City have been managed sustainably including grazing prohibition, rotational grazing and reseeding of local high-quality forage. And that reduce net GHG emissions by increasing carbon stocks and/or reducing non-CO_2 GHG emissions. There are three main restoration measures as followed in the project:

Rotational grazing was implement in moderately degraded grasslands where grass yield is about 185.73 kg/Mu which decreased by 43.44% compared with the non-degraded grassland date in 2011[17]. It requires that the grazing time shall be halved by dividing grasslands into seasonal grazing land according to the livestock carrying capacity of the grassland by fence building. Then based on specified order, grazing cycle and zoning grazing time, the grassland is grazed area by area and used in turn. 229,060.82 ha of degraded grassland have been managed sustainable by the implementation of rotational grazing.

Reseeding grass was also implement in moderately degraded grasslands where grass seeds of local high-quality forage was sowed such as *Medicago sativa* (Lucerne), *Agropyron cristatum* (Ice grass), *Bromus inermis* (Awnless brome) and *Festuca arundinacea* (Tall fescue). The total area of high quality forage seeds sown in this project is 7,598.05 ha. After that, under the premise of not affecting the normal

[15] GB19377-2003 Parameters for degradation, sandification and salification of rangelands
[16] 1 ha = 15 Mu
[17] Yu Ting (2012) *ALeTaiShi Grassland Degradation Reasons and Administering Countermeasure*

growth of the improved grassland, the grassland should be used reasonably and sustainably according to the local approve livestock carrying capacity.

Grazing prohibition was implement in severely degraded grasslands where grass yield is about 156.67kg/ Mu which decreased by 52.29% compared with the non-degraded grassland data in 2011[18]. It calls for grasslands to be classified as no-grazing areas by fencing and for grazing to be banned for five years, and for 29,996.42 ha of degraded grassland to be sustainably managed by banning grazing.

Besides these main restoration measures, the project also alleviates soil desertification and restore grassland vegetation to improve soil carbon storage and local biodiversity through grassland management measures, such as daily management measures from other protect projects like rodent and pest control and grassland fire prevention to ensure the long-term sustainable management of the project area.

The project is estimated to generate GHG emission removals of 18,687,019 tCO_2e in 40 years, with an average annual GHG emission removal of 467,175.475 tCO_2e.

The objectives of the project including:

Climate: Restore the degraded grassland ecosystem, increase grassland coverage, increase grassland carbon sink function and reduce GHG emissions.

Community: Improve the livelihood of local herders, provide permanent and temporary job opportunities for them, increase their income. Provide technical skills and training in sustainable grassland management, increases interaction within the community and improve the well-being of local communities.

Biodiversity: Provide more suitable habitats for wild animals and increase local biodiversity.

[18] Yu Ting (2012) *ALeTaiShi Grassland Degradation Reasons and Administering Countermeasure*

Figure 2-1 The restored degraded grassland in the project area

2.1.2 Project Scale

Project Scale	
Project	
Large project	√

2.1.3 Project Proponent (G1.1)

Organization name	Xinjiang Altay City Zhujin Investment Co., Ltd.
Contact person	Liu Xiaohong
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The project prpponent Xinjiang Altay City Zhujin Investment Co., Ltd. is rich experience in sustainable grassland management in Altay City, including rodent control, grassland protection and management, techincal training, carbon measurement and monitoring and biodiversity assessment.

2.1.4 Other Entities Involved in the Project

Organization name	National Forestry and Grassland Administration Northwest Investigation and Planning Institute
Contact person	Li Bin
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Established in 1955, National Forestry and Grassland Administration Northwest Investigation and Planning Institute is a public welfare institution directly under The National Forestry and Grassland Administration, mainly responsible for the important tasks of investigating, monitoring, evaluating and planning of forest, grassland, wetland, desert ecosystems and nature reserves and wildlife resources in eight provincial units of the Northwest Monitoring Area, including Shanxi, Chongqing, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang and Xinjiang Production and Construction Corps. It has rich experience in forestry and grassland carbon sink measurement and monitoring, consultation and evaluation and research, and has a dedicated carbon sink department within.

2.1.5 Physical Parameters (G1.3)

The project is located in Altay City, Xinjiang Uygur Autonomous Region, China. Altay City is located at the southern foot of Altay Mountain and the northern edge of Junggar Basin, at 86°53′ ~ 88°37′ east longitude and 47°13′ ~ 48°38′north latitude. It borders Fuhai County in the southeast, Burqin County in the west, Jeminay County in the southwest and Mongolia People's Republic in the north. The border line is 96 km long. Altay city spans 130 km from east to west, and stretches for 156 km from north to south, with a total area of 11500 km^2.

According to CCB standard, Altay City is defined as the project zone, and the project implementation area in Altay City is defined as project area. The boundaries of project zone and project area are shown in Figure 2-2 and Figure 2-3, and the KML file has also been uploaded to Verra Registry.

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

Topography

Most of Altay city is located in the middle of Altay geosyncline fold system, and only the southwest corner crosses the northern edge of Junggar geosyncline fold system. The two fold systems are separated by the Erqis fault line. It has typical piedmont landform. From north to south, it shows obvious gradient vertical distribution, and from top to bottom, it can be divided into three natural geomorphic units: northern

mountainous area, southern hilly area and intermountain alluvial plain area. Altay mountain area in the north is an important livestock farm in the city; The middle part is a basin hilly area with an altitude of 700-1,000m. It is composed of low mountains, inter-hill basins and terraces. It is the main producing area of grain and oil in Altay and an important spring and autumn pasture in Altay. The Irtysh River alluvial plain in the south, with an altitude of 476-700m, is a valley plain and a piedmont plain. The valley plain is in the lower reaches of the Crane River and on both sides of the Irtysh River. There are first-class and second-class river terraces or terraces on both sides of the river in turn, which are flat and rich in water resources. It is a good winter pasture for animal husbandry in the city.

Soil

The distribution of soil in Altay City is clear, and the northern mountainous area is alpine meadow soil between 2,400-3,200m above sea level. The subalpine zone is between 1,800-2,400m above sea level, and the soil is subalpine meadow soil; The altitude of 1,200-1,800m is the Zhongshan belt, and the soil is mountain coniferous forest soil; Between 800-1,200m above sea level, it is a low mountain zone, and the soil is mostly mountain brown calcium soil and mountain chestnut soil. Most of the hilly areas in the central basin are brown calcium soil and meadow soil. The soils in the southern plain are brown calcium soil, meadow soil, swamp soil and aeolian sand soil.

The soil in Altay City is characterized by more gravel in the top soil, low nutrient content, lack of nitrogen and phosphorus, and more potassium. The texture is mainly sandy, the soil has poor water and fertilizer conservation ability, and the desertification is serious. There is an impermeable layer about 70 cm below the surface layer, and the underground runoff is not smooth, which is prone to secondary salinization. The average content of organic matter in topsoil is 16.20 g/kg, alkali-hydrolyzable nitrogen is 63.3 mg/kg, available phosphorus is 12.3 mg/kg and available potassium is 253.2 mg/kg. To sum up, among all kinds of nutrients in the city, available potassium is rich, organic matter content is acceptable, and other nutrients are low, especially available phosphorus.

Climate

Altay City belongs to the continental climate zone in the middle temperate zone, with hot and dry summer, large temperature difference between day and night, cold winter and windy winter and spring. The average temperature is 4.2 ˚C, the average precipitation can reach 182.4 mm, the average evaporation is 1,824.6 mm, and the frost-free period is close to 150 days a year.

The landform changes from north to south, and the three landforms and climates in the northern mountainous area, the hills in the central basin and the southern plain area have their own characteristics. Mountainous area in the north: The area above 3,200 m is a permanent snow belt, which belongs to a cold zone climate zone and is of little value for direct utilization of agriculture and animal husbandry. Below 3,000 m, it belongs to temperate climate zone, with abundant precipitation, low temperature, little wind, annual precipitation of 350-600 mm and less evaporation. Hilly area of the central basin: it has a cool climate in the middle temperate zone, with no obvious division of four seasons, less precipitation, large evaporation, long and cold winter, daily temperature range and large annual range. Average precipitation is 182.4 mm, evaporation is 1,812.2 mm, average temperature is 4.0 ˚C, and frost-free period is 148 days. Southern plain area: strong evaporation in summer, less precipitation and large temperature difference between day and night; Winter is cold and the snow depth is shallow. The average annual precipitation is about 100 mm, the evaporation is about 2,000 mm, the average temperature is 4.0 ˚C and the frost-free period is 155-160 days.

Hydrology

Altay City is located in the middle reaches of the Irtysh River, and is rich in surface water resources. There are three main rivers in the territory, namely Irtysh River, Crane River and Sumudayirike River, with a total length of 667 km and a wide basin. The Irtysh River originates in Fuyun County and flows through the south of the city from east to west. It is about 148.4 km in Altay City with an annual runoff of 3.091 billion m^3. The Crane River system includes the main stream of the Crane River, Khandgart River, Ercek River in Kiriko and Allahac River, with a drainage area of about 1,655 km^2 and an annual runoff of 615 million m^3. Sumudayirike River is one of the three major water systems in Altay City, with an annual runoff of 1.4 billion m^3. There are hundreds of large and small lakes in the territory, most of which are the cradles of existing rivers, belonging to glacial freshwater lakes, mostly along the border between China and Mongolia in the north, with clear lakes and many cold-water fish living. Because Altay City is located in the middle reaches of the Irtysh River, on the one hand, there is abundant precipitation, on the other hand, there is snow melting water in winter, which is beneficial to the production of agriculture and animal husbandry.

The groundwater recharge sources in Altay City are snowmelt and rainfall. It is mainly the fissure water in the northern mountainous area and the hilly area of the central basin, and it is the drinking water for people and livestock in the spring and autumn period of animal husbandry. There are hundreds of large and small lakes in Altay City, most of which are the cradles of existing rivers, belonging to glacial freshwater lakes, mostly along the border between China and Mongolia in the north. The lakes are clear and there are many cold-water fish, among which the large Tangba Lake, Banakanak Reservoir and Aweitan Lake have built artificial reservoirs.

Types of vegetation

Vegetation species in Altay City can be roughly divided into six categories, including forest vegetation, shrub vegetation, desert vegetation, grassland vegetation, meadow and swamp vegetation and artificial vegetation.

Altay City covers a total area of 1.15 million ha, including 711,400 ha of grassland. The Altai City steppe covers 672,200 ha of natural grassland, 1,867 ha of artificial grassland, and 37,300 ha of other grassland. Grassland types in Altay City show a vertical distribution sequence from south to north. From low to high: temperate desert grassland, temperate Sandy loam, temperate mountain grassland, temperate meadow grassland, temperate meadow, alpine meadow grassland, etc.

Altay City is an important forest area in Xinjiang Uygur Autonomous Region, which is divided into five forest areas according to different uses, namely: alpine coniferous forest water conservation timber forest area; Soil and water conservation irrigation jungle area in shallow hills; Poplar and willow farmland shelterbelt in hilly basin; Poplar, willow and Caragana protect grazing and farmland forest areas in valley plain; Pastoral protection forest area of poplar and willow secondary forest in valley plain.

2.1.6 Social Parameters (G1.3)

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

Main settlements

Altay City has jurisdiction over 4 streets, 5 towns, 6 townships, 2 pastures and 1 corps headquarters. It is a multi-ethnic border city with Han and Kazak as the main body. Altay has a total population of 196,200, including 99,900 Han people, accounting for 51.0% of the total population, 79,900 Kazakhs, accounting for 40.7%, and 16,400 other ethnic groups, accounting for 8.3%, of which: the urban population is 113,650, accounting for 57.67% of the total population; The rural population is 83,406, accounting for 42.33% of the total population, and the urbanization rate is 57.67%.

Land use and economic activities

The total land area of Altay City is 11,500 km^2. According to the communique issued by the Department of Natural Resources of Xinjiang Uygur Autonomous Region[19], the data of 8 major land types in Altay City were released, among which: There are 448,117.20 ha of arable land, 8,864,032.46 ha of grassland, 105,622.57 ha of wetland land, 58,199.85 ha of urban and rural land and industrial and mining land, 36,455.13 ha of transportation land, and 259,323.93 ha of water and water conservancy facilities land.

In 2020, the regional GDP reached 10.138 billion yuan (calculated at 2015 comparable prices), up by 3.7% year-on-year. Among them, the added value of primary industry was 1.372 billion yuan, the added value of secondary industry was 1.611 billion yuan, and the added value of tertiary industry was 7.154 billion yuan. In 2020, the total output value of agriculture, forestry, animal husbandry and fishery in Altay City was 2,485,398,100 yuan. Among them, the output value of agriculture was 932.6636 million yuan, the output value of forestry was 29.1038 million yuan, the output value of animal husbandry was 1.3415407 million yuan, the output value of fishery was 44 million yuan, and the output value of agriculture, forestry, animal husbandry and fishery services was 138.09 million yuan.

The total planting area of crops increased, and the planting structure changed. The total sown area of crops is 718,600 Mu, including 152,100 Mu of grain, 259,900 Mu of cash crops and 306,600 Mu of other crops. The total grain output is 133,400 tons, the wheat output is 2,900 tons, the oil output is 15,600 tons, the bean output is 1,000 tons, the vegetable output is 10,900 tons, and the fruit melon output is 6,200 tons. By the end of 2020, it had produced 19,400 tons of meat and 80,100 tons of milk.

Relevant historic conditions

Altay means "golden mountain" in Turkic and Mongolian. Because Altay Mountain is rich in gold, Altay City is in the sunny side of Altay Mountain, so it got its name from the mountain. Altay City is a place where nomadic peoples in western China have been living and multiplying since ancient times. On November 17, 1984, with the approval of the State Council, Altay County was abolished and changed to Altay City, which was under the administrative office of Altay region. Altay is one of the most important pastoral areas in China due to its rich grassland resources and high-quality forage production, so there have been many nomadic peoples living there since ancient times, and it has a long history of nomadic culture.

Social-cultural information

Altay City is a multi-ethnic community, with 33 ethnic groups including Han, Kazak, Hui, Uygur and Mongolia. Altay City has a total population of 196,200, including 99,900 Han people, accounting for 51.0% of the total population, 79,900 Kazakhs, accounting for 40.7%, and 16,400 other ethnic groups, accounting for 8.3%, of which: the urban population is 113,650, accounting for 57.67% of the total population; The rural

[19] http://zrzyt.xinjiang.gov.cn/xjgtzy/dzdt/202204/e712719b35bf459396450eae20318ac8.shtml

population is 83,406, accounting for 42.33% of the total population, and the urbanization rate is 57.67%. The ratio of male to female in the total population is 99.82: 100. In 2020, the per capita disposable income of urban residents in the city was 34,507 yuan.

Altay City has 1 adult institution of higher learning, 1 vocational college, 4 secondary vocational schools, 2 ordinary middle schools, 2 junior middle schools, 3 nine-year compulsory schools, 19 primary schools and 1 special education school. The enrollment rate of junior high school graduates is 94.54%. There are 123 health institutions in the city, with 1,461 beds and 2,177 health technicians, including 783 professional doctors and 951 registered nurses.

The essence of nomadism is shifting grazing, which is moving grazing between pastures in different places in a relatively fixed area. The purpose is to find suitable pastures for livestock, provide enough forage resources, and avoid hot summer and cold winter. This seasonal transition nomadism is actually a very important economic form of animal husbandry. As a traditional nomadic people, Kazakhs carry out the transition activities according to the seasons all year round, which are generally divided into spring, summer and winter pastures. This traditional nomadic life has lasted for nearly 3,000 years.

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

The project is located in Altay City, Altay Prefecture, Xinjiang Uygur Autonomous Region of China. The geographical coordinates of the project are east longitude 86°53′14.45″～88°38′15.41″ and north latitude 47°14′5.21″～48°38′46.73″.

According to CCB standard, Altay City is defined as the project zone, and the implementation area is defined as project area, and the project activities in the project area will generate net climate benefits. And the location of communities the project impacted are showed in Figure 2-4. The boundaries of project zone and project area are shown in Figure 2-2 and Figure 2-3, and the KML file has also been uploaded to Verra Registry.

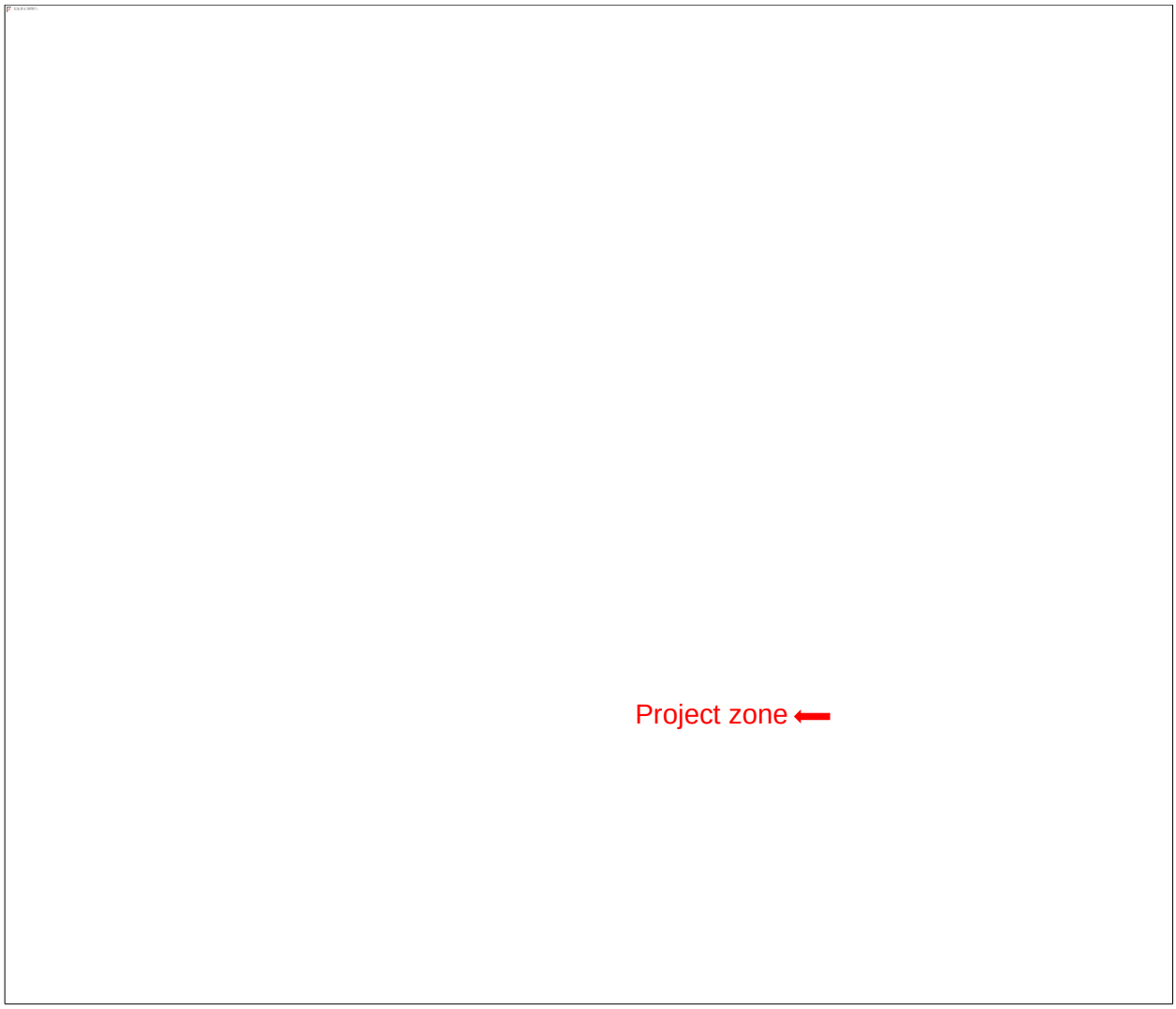


Figure2-2 The project location and project zone

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

As described in section 3.2.3, grazing frequency will be managed after the implementation of the project, and the County Forestry and Grassland Bureau measures the grass yield of the surrounding grasslands in the project area, and guides herders to graze in a reasonable area. So, there is leakage in the project zone due to grazing displacement activities. And the offsite climate impacts areas are defined as the project zone, which is outside of the project area, as shown in Figure 2-3.

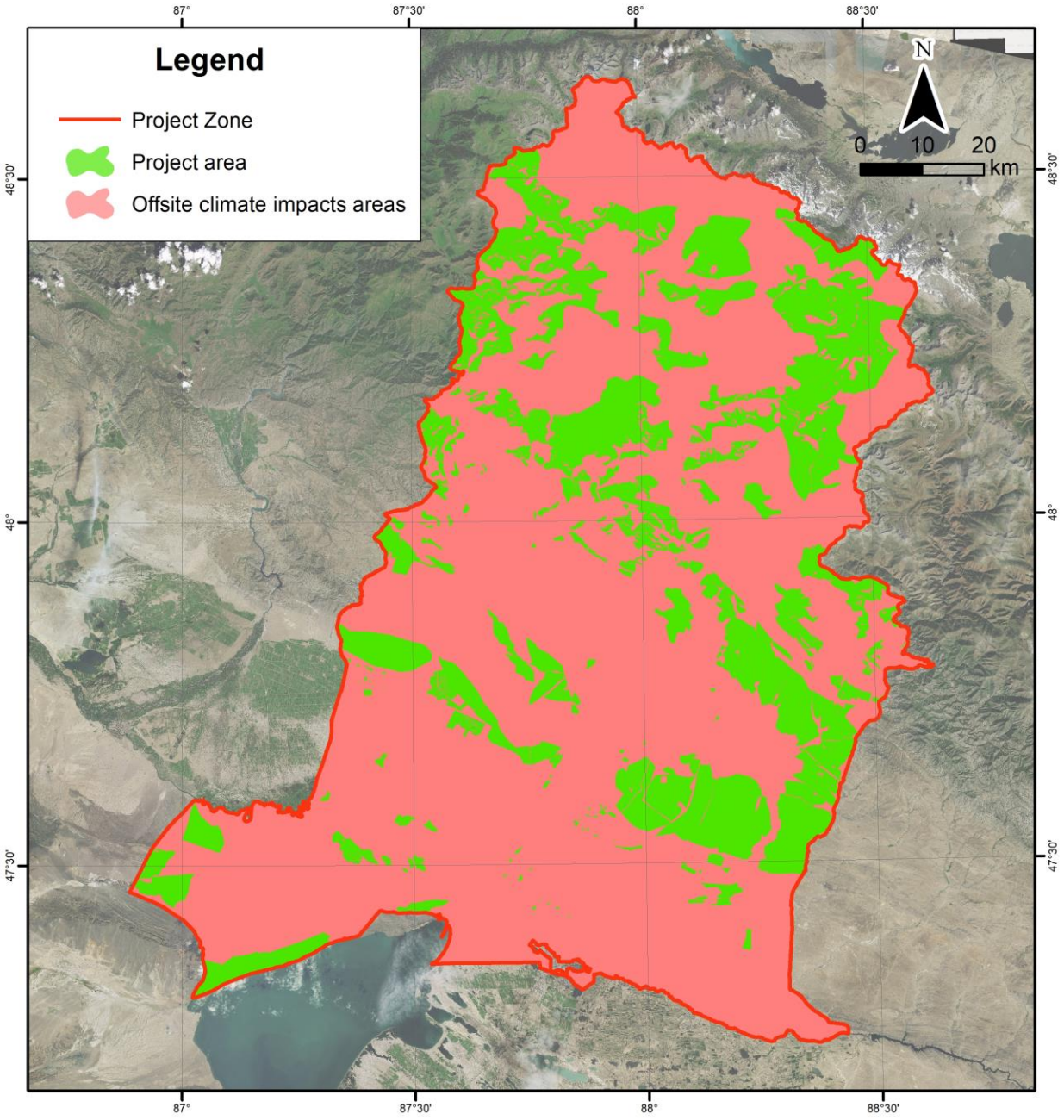


Figure 2-3 The project area and offsite climate impacts areas

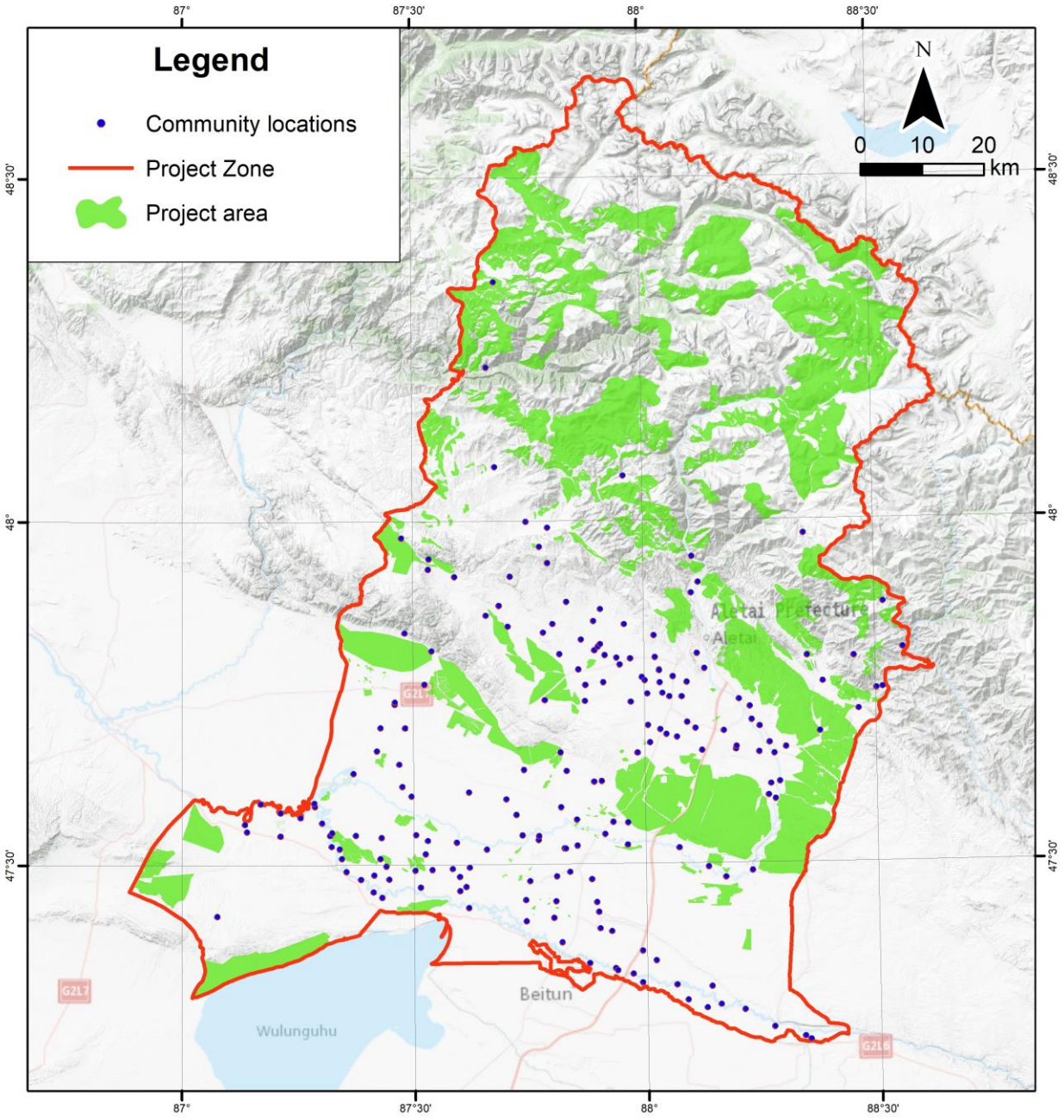


Figure 2-4 Community location of the project zone

2.1.8 Stakeholder Identification (G1.5)

The following proposed steps were adapted to identify stakeholders according to SBIA Manual:

Step 1: Brainstorm with key informants or focus groups to list and classify stakeholders

This brainstorm starts by listing all the people or groups who might have an influence over or be impacted by a project. The local village committees and village officials were considered to be the key informants and focus groups who know best about the local residents.

Altay City has been identified as the project zone. And it will be impacted directly by the project activities, hence all communities, community groups in Altay City should be identified as stakeholders. In addition, we have also identified other stakeholders who may be affected by the project activities. The most meaningful stakeholder categories are listed below.

1) Local residents around project area

The project provided short-term work such as fence building and grass seeding but also the long-term work such as the grassland guardians for local residents around project area, which will increase their household income. The project restored the degraded grassland and improved their living environment. These residents can be divided into the following categories：

Local residents

Local residents are the main labor resources during the project implementation, and some of them are employed as grassland guardians.

Local women

Women and men often have very different roles and interests in natural resource management and can contribute complementary skills and knowledge. There is also evidence that when women receive income, positive welfare outcomes are more likely. Therefore, women should be regard as the important stakeholders. In this project, about 43 percentage of the local residents directly involved in the project are women. The project provided them with skills training in fence building and sustainable grassland management, which is conducive to increasing family income and improving local ecological environment.

Local Kazakh

The Kazakh ethnic group of Altay City accounts for 40.7% of the total population and is one of the world's famous nomadic ethnic groups. The implementation area is located in the steppe and will affect the traditional way of life of the local Kazakh ethnic group, which should therefore be identified as a stakeholder.

Local herders

Local herders depend on their grazing for a living, and grassland ecosystems will have a major impact on their traditional livelihoods. Overgrazing is a major factor in the ongoing degradation of grassland ecosystems. The project will restore degraded grassland and guide its rational grazing.

Grassland guardians

About 1,975 local herders have been employed as grassland guardians, each earning an annual salary of 22,176 RMB (about 3,019.61 USD[20]). They will protect and manage grasslands under the guidance of project sponsors and local forestry and grassland authorities.

2) Village collectives

According to Grassland Law of People's Republic of China, the ownership of grassland belongs to the state and the collectives. Therefore, village collectives that own the grassland should be identified as stakeholders.

3) Altay Forestry and Grassland Bureau

Altay Forestry and Grassland Bureau is the government department responsible for implementing national forestry and grassland regulations, formulating development strategies, and managing local forest and grassland resources. Altay Forestry and Grassland Bureau actively assisted and participated in the daily management of the project implementation phase. Therefore, the Altay Forestry and Grassland Bureau should also be identified as a stakeholder.

4) Local government

The government agency Altay Finance Bureau provided the initial funds for the implementation of the project. The government also supervises the environmental and social impacts of the project, such as the restoration of the grassland ecosystem and employment issues.

5) Other stakeholders

Scientific research institutions

Grassland is of great significance in purifying water source and improving ecological environment. Research institutions have carried out research on grassland types, grassland degradation mechanisms and grassland restoration, which is the key to promoting sustainable grassland development. The project aims to restore degraded grasslands facing desertification, which is a hot topic in scientific research on grassland ecological protection.

Tourism companies

The grassland ecosystem in the project zone is seriously degraded, which is not conducive to the sustainable development of tourism. After the successful implementation of the project, the restored grassland is beneficial to rebuild local pleasant and beautiful ecological system which has higher ecological aesthetic value of tour and sightseeing. Therefore, the project will generate a certain degree of impact for all tourism companies within or outside the project zone.

Step 2: Well-being ranking of local or community stakeholders

[20] RMB is a legal tender issued by the People's Bank of China, and according to local time, the exchange rate of the US dollar to the RMB was 7.3440 on September 11, 2023

Reference to procedures: The 'Who Counts First?' matrix evolved as part of the 'Criteria and Indicators' for sustainable forest management process of Center for International Forestry Research (CIFOR), we also involve ranking stakeholder groups according to seven dimensions of well-being or importance:

- D1: Proximity to the grassland
- D2: Pre-existing rights
- D3: Dependency on the grassland
- D4: Poverty level
- D5: Local or indigenous knowledge
- D6: Grassland/culture integration (i.e., the cultural importance of the grassland)
- D7: Power deficit of stakeholder group compared to other stakeholders

Each stakeholder group is scored, according to the extent that each dimension applies to them, with the following simple scoring system:

- 1 = high
- 2 = medium
- 3 = low

The result of this step is shown in Table 2-1 in which the following notations for the stakeholder groups are adopted:

- LR: Local residents
- LW: Local women
- LK: Local Kazakh
- LH: Local herders
- GG: Grassland guardians
- VC: Village collectives
- AFGB: Altay Forestry and Grassland Bureau
- LG: Local government
- SRI: Scientific research institutions
- TC: Tourism companies

Table 2-1 Importance of stakeholder groups analysis

Stakeholder	LR	LW	LK	LH	GG	VC	AFGB	LG	SRI	TC
D1	1	1	1	1	1	1	2	2	3	3
D2	2	1	1	1	2	2	1	1	3	3
D3	1	1	1	1	1	2	1	1	3	3
D4	1	1	1	1	1	2	3	3	3	3
D5	1	1	1	1	1	1	1	2	3	3
D6	2	2	2	2	2	1	2	2	3	3
D7	1	1	1	1	1	1	1	2	3	3
Average score	1.29	1.14	1.14	1.14	1.29	1.43	1.57	1.86	3.00	3.00

An average over the seven dimensions is estimated as stakeholder groups scores. In the case study applications of this method, stakeholder groups scores with less than 2 are regarded as important stakeholders from an equity perspective, while those scoring 2 or more are regarded as less critical.

Step 3: Analyse each stakeholder group in terms of their interests, motivation to participate and relationships with other stakeholders

The result of this step is summarized in Table 2-2.

Table 2-2 Stakeholder analysis

Stakeholder or stakeholder sub-group	Interests in the project	Effect of project on their interests	Capacity and motivation to participate	Relationship with other stakeholders
Local residents	Job opportunity	Create job opportunity, provide work training	Higher income	Partnership
Local women	Job opportunity	Create job opportunity, provide work training	Higher income	Partnership
local Kazakh	Job opportunity	Create job opportunity, provide work training	Higher income	Partnership
Local herders	Job opportunity	Create job opportunity, provide work training and extra subsides from government	Higher income	Partnership
Grassland guardians	Job opportunity	Create job opportunity, provide work training and extra subsides from government	Higher income	Partnership
Village collectives	Restoration of degraded grassland and drive the development of tourism	Increase the coverage and ecological value of grassland; provide sustainable grassland management training	Achievement	Partnership
Altay Forestry and Grassland Bureau	Sustainable grassland management	Organize project implementation and protect grasslands as the achievement	Achievement and duty	Partnership
Local government	Financial support, Local social and environmental	Enhance local social and environmental management.	Achievement	Partnership

Stakeholder or stakeholder sub-group	Interests in the project	Effect of project on their interests	Capacity and motivation to participate	Relationship with other stakeholders
	management, employment and welfare of city	Increased employment and improved welfare of county		
Scientific research institutions	Provide experimental evidence for theoretical research	Apply research results to specific projects	Achievement	Partnership
Tourism companies	Obtain tourism income	Attract more people to travel and increase income	Higher income	Partnership

The descriptions of each community group have been stated in the following section 2.1.9.

Step 4: Analysis of the level of influence and importance of each potential stakeholder group

Influence refers to the extent to which a stakeholder or stakeholder group has power over the project, and can therefore facilitate or hinder project interventions, and importance refers to how much the achievement of project goals depends upon the involvement of a given stakeholder. The levels of influence and importance are classified into low, moderate, significant and critical.

In the project, according to the step 1 and step 3, the relevant analysis is summarized as below.

- Local residents

Some local residents around the project area participated in the implementation of the project, such as fences building and seeding grassland. However, the absence of local residents around the project area will not hinder the implementation of the project. Therefore, the importance of local residents around the project area is assessed as ‘Significant’ and its influence is ‘Critical’.

- Local women

About 43% of the local residents directly involved in the project are women, which will contribute to empower women and build community capacity in gender and sustainable grassland management. However, the absence of female workers will not hinder the implementation of the project. Therefore, the importance of female workers is assessed as ‘Critical’ and its influence is ‘Moderate’.

- Local Kazakh

The Kazakh ethnic group of Altay City accounts for 40.7% of the total population and is one of the world's famous nomadic ethnic groups. The implementation area is located in grasslands and will impact the traditional lifestyle of local Kazakh, therefore they should be identified as stakeholders.

- Local herders

Local herders live by grazing, and overgrazing is the main factor leading to the continued degradation of the grassland ecosystem. The project restored degraded grassland and guided them to graze reasonably. Therefore, herders' grazing activities have a significant impact on the achievement of the project goals.

However, the absence of local herders will not hinder the implementation of the project. Therefore, the importance of local herders is assessed as 'Critical' and its influence is 'Moderate'.

- Grassland guardians

Approximately 1,975 local herders will be employed as grassland guardians, and they will protect and manage the grassland under the guidance of the project proponent and the Altay Forestry and Grassland Bureau. However, the absence of local herders will not hinder the implementation of the project. Therefore, the importance of local herders is assessed as 'Critical' and its influence is 'Moderate'.

- Village collectives

According to Grassland Law of People's Republic of China, the ownership of grassland belongs to the state and the collectives. Therefore, without the support of the village collectives, the project cannot be successfully carried out. Therefore, the importance and influence of village collectives are assessed as 'Significant'.

- Altay Forestry and Grassland Bureau

Altay Forestry and Grassland Bureau is responsible for the implementation and sustainable management of the project. In addition, Altay Forestry and Grassland Bureau also provides training to the project implementation personnel on rodent control, grass planting, rational grazing and other aspects, which is conducive to the realization of the project objectives. Therefore, the importance and influence of Altay Forestry and Grassland Bureau are assessed as 'critical'.

- Local government

Altay City Government approved the request of the Forestry and Grass Bureau to carry out the grassland carbon sink project. But local government did not participate in the management and implementation of the project, therefore, the importance of local government is assessed as 'low' and its influence is 'Significant'.

- Scientific research institutions

Research institutions have carried out research on grass species, grassland degradation mechanisms, and grassland restoration, which are the key to promoting sustainable grassland development. However, the scientific research institutions have low influence to hinder the implementation of the project. Therefore, the importance of scientific research institutions is assessed as 'moderate' and its influence is 'Low'.

- Tourism companies

The relationship of tourism companies and the project is reciprocal in long term. The success of the project may bring abundant of tourism resources, in turn, the tour and sightseeing may play a role of dissemination and facilitate development of similar project. And the tourism companies have low influence to hinder the implementation of the project. Therefore, the importance and influence of tourism companies are assessed as 'Low'.

Table 2-3 Influence and Importance of stakeholder to project achievement

Influence of Stakeholder	Importance of stakeholder to project achievement			
	Low	Moderate	Significant	Critical
Low	TC	SRI		
Moderate				LW, LK, LH, GG
Significant		LG	VC	LR, AFGB
Critical				

According to the above scoring and analysis, the local residents around the project area and Altay Forestry and Grassland Bureau are the most important stakeholders in this project.

Step 5: Publish the results of identified stakeholders

According to the step 4, the influence and importance rank of stakeholders is as follow: LR, AFGB > LW, LK, LH, GG > VC > LG > SRI > TC. The final stakeholders are identified and listed as below. The final stakeholders are identified the top three of the total rank and they have been stated in the following section 2.1.9.

Table 2-4 Final Stakeholders

Category Code	Stakeholders Group	Rank
LR	Local residents	1
LK	Local Kazakh	
AFGB	Altay Forestry and Grassland Bureau	
LW	Local women	2
LH	Local herders	
GG	Grassland guardians	
VC	Village collectives	3
LG	Local government	

The results of identified stakeholders will be publicly announced on CCB and VCS website as part of the draft PD which can be accessed by everyone, in case there is any other person who may consider themselves as one of the project's stakeholders, they can directly contact the project owner for consultation.

Step 6: Final continuous input / grievance mechanism

According to the step 5, there are different response mechanisms with different rank level of stakeholders group, are summarized as below.

After the approval of the project, it will be implemented by Altay Forestry and Grassland Bureau in cooperation with local residents' organizations, and the project will be supervised and managed by the project owner and Altay Forestry and Grassland Bureau during the entire credit period.

Firstly, once there are any complaints or grievances, project proponent shall contact and discuss with relevant community or other stakeholders within 3 days; secondly, the specific staff of project proponent should propose a solution and mediation which is performed by relevant government agency within a week

based on all collected information; Thirdly, the project proponent will address their complaints or grievances by relevant legal method such as arbitration and courts if necessary. Finally, the entire complaints or grievances redress process shall be dealt within 30 days.

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

As described above, Altay City is defined as the project zone, so the identified stakeholders can summarize below:

Table 2-5 Stakeholder descriptions

Stakeholder	Rights, Interest and Overall Relevance to the Project
Local residents	Rights: • To be provided with an environment and working conditions that ensure the minimum conditions of well-being. • To be trained on issues related to the development of project activities. • To express opinions on the direct and indirect impact of the project on the interests of the community. • To express opinions on the direct and indirect impact of the project on climate and biodiversity. Interest: • To have more and better job opportunities for both men and women. • To receive training. Relevance: • Direct beneficiaries of projects economic outcome, as well as impacts on climate, communities, and biodiversity.
Local Kazakh	Rights: • To be trained with sustainable and scientific grazing skills. • To have more opportunities to organize and participate in traditional culture activities. Interest:

Stakeholder	Rights, Interest and Overall Relevance to the Project
	• To improve grazing productivity. • To promote traditional livelihood. Relevance: • About 40.7% the local residents are Kazakh whose traditional livelihood is herding and grazing which would be impacted by the implementation of the project.
Altay Forestry and Grassland Bureau	Rights: • To regulate land use in the Project Area. • Responsible for approval of project implementation. Interest: • To ensure compliance with current regulations on land use. • To ensure the sustainable development of their jurisdiction by verifying compliance with existing environmental regulations for the different project activities. Relevance: • Altay Forestry and Grassland Bureau is a government department responsible for the supervision and management of the grassland and ecological construction.
Local women	Rights: • To be provided with an environment and working conditions that ensure the minimum conditions of well-being. • To be trained on issues related to the development of project activities. • To express opinions on the direct and indirect impact of the project on the interests of the community. • To express opinions on the direct and indirect impact of the project on climate and biodiversity.

Stakeholder	Rights, Interest and Overall Relevance to the Project
	Interest: • To have more and better job opportunities. • To have increased economic support. • To receive training. Relevance: Female rural workers are the main labor resources during the project implementation, and some of them are employed as grassland guardians. Women accounted for about 43% of the local residents involved in the project.
Local herders	Rights: • To be provided with an environment and working conditions that ensure the minimum conditions of well-being. • To be trained on issues related to the development of project activities. • To express opinions on the direct and indirect impact of the project on the interests of the community. • To express opinions on the direct and indirect impact of the project on climate and biodiversity. Interest: • To have more and better job opportunities or both men and women. • To have increased economic support. • To receive training. Relevance: • Direct beneficiaries of projects economic outcome, as well as impacts on climate, communities, and biodiversity.

Stakeholder	Rights, Interest and Overall Relevance to the Project
	• Some herders participated in the planting and fence construction of the project. Local herders depend on their grazing for a living, and grassland ecosystems will have a major impact on their traditional livelihoods.
Grassland guardians	Rights: • To be trained on issues related to the development of project activities. • To express opinions on the direct and indirect impact of the project on climate and biodiversity. Interest: • To receive training. • Relevance: • Some local herders were employed as grassland guardians to manage and protect the grassland under the guidance of the project proponent and the local forestry and grassland bureau through and beyond the project lifetime.
Village collectives	Rights: • Village collectives own some land ownership of the project. • To have an environment that ensures the minimum conditions of well-being and security. • To have equal rights to participate and apply for employment opportunities in their locality. Interest: • To support the social and organizational development of the community. • To promote and develop work capacity of the community. Relevance:

Stakeholder	Rights, Interest and Overall Relevance to the Project
	• The village collective owns the land ownership of the project, and the village collective can transfer the land use right to the project owner before the project starts. • Direct beneficiaries of projects economic outcome, as well as impacts on climate, communities, and biodiversity.
Local government	Rights: • Compliance with municipal regulations related to the Project. • Provide recommendations on project activities. Interest: • Development of indirect economic activities that stimulate community development. Relevance: • The government provided the initial fund, approved and supervised the environmental and social impacts of the project, such as the restoration of the grassland ecosystem and employment issues.

2.1.10 Sectoral Scope and Project Type

According to Appendix 1 (Eligible AFOLU Project Categories) of VCS Standard version 4.5, eligible ALM activities are those that reduce net GHG emissions on croplands and grasslands by increasing carbon stocks in soils and woody biomass and/or decreasing CO_2, N_2O and/or CH_4 emissions from soils; eligible ALM activities include Improved Cropland Management (ICM), Improved Grassland Management (IGM) and Cropland and Grassland Land-use Conversions (CGLC).

The project restores degraded grassland by adopting a variety of measures including Rotational grazing, Reseeding grass and Grazing prohibition, hence increasing soil carbon stocks. The sectoral scope applicable to the project is VCS scope 14 “Agriculture, Forestry and Other Land Use (AFOLU)”; its AFOLU project category is Agricultural Land Management, and its activity type is Improved Grassland Management.

The project is not a grouped project.

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

The project adopts the following measures to achieve GHG emission reductions or removals on degraded grassland:

Totally, 266,655.29 ha (or 3999829.35 Mu) of degraded grassland in Altay City have been managed sustainably including grazing prohibition, rotational grazing and reseeding of local high-quality forage. And that reduce net GHG emissions by increasing carbon stocks and/or reducing non-CO_2 GHG emissions. There are three main restoration measures as followed in the project:

Rotational grazing was implement in moderately degraded grasslands where grass yield is about 185.73 kg/Mu which decreased by 43.44% compared with the non-degraded grassland date in 2011. It requires that the grazing time shall be halved by dividing grasslands into seasonal grazing land according to the livestock carrying capacity of the grassland by fence building. Then based on specified order, grazing cycle and zoning grazing time, the grassland is grazed area by area and used in turn. 229,060.82 ha of degraded grassland have been managed sustainable by the implementation of rotational grazing.

Reseeding grass was also implement in moderately degraded grasslands where grass seeds of local high-quality forage was sowed such as *Medicago sativa* (Lucerne), *Agropyron cristatum* (Ice grass), *Bromus inermis* (Awnless brome) and *Festuca arundinacea* (Tall fescue). The total area of high quality forage seeds sown in this project is 7,598.05 ha. After that, under the premise of not affecting the normal growth of the improved grassland, the grassland should be used reasonably and sustainably according to the local approve livestock carrying capacity.

Grazing prohibition was implement in severely degraded grasslands where grass yield is about 156.67kg/ Mu which decreased by 52.29% compared with the non-degraded grassland data in 2011. It calls for grasslands to be classified as no-grazing areas by fencing and for grazing to be banned for five years, and for 29,996.42 ha of degraded grassland to be sustainably managed by banning grazing.

Through scientific and sustainable management of grazing, relevant training about technical skills, scientific and effective management plan, alleviate soil desertification and restore grassland vegetation to improve soil carbon storage and local biodiversity, and enhance the capabilities of local communities and residents.

The project is not located within a jurisdiction covered by a jurisdictional REDD+ program; in fact, there are no REDD+ activities for now in China according to UNFCCC[21].

The project is estimated to generate GHG emission removals of 18,687,019 tCO_2e, with average annual GHG emission removals of 496,785 tCO_2e.

[21] https://redd.unfccc.int/info-hub.html

Figure 2-5 The restored degraded grassland in the project area

Theory of Change

As described in the following section, there are three key issues that can be addressed in the no-project scenario:

1) The grassland of Altay City is one of the most important ecosystem types in the region and it is very sensitive to climate change. Due to long-term climate change and overgrazing, grassland ecosystems will continue to degrade, causing serious damage to the local environment and sustainable development.

2) If this project is not implemented, the continued degradation of grassland ecosystems will worsen the living environment of local herders and affect their livelihoods.

3) The continued degradation of grassland ecosystems poses a long-term threat to local climatic conditions and biodiversity.

The main objective of the project is to address these issues by restoring degraded grassland ecosystems through rotational grazing, reseeding of high-quality grass species and the implementation of grazing bans.

Focal issues of grassland ecosystem degradation: In the absence of a project, the project area will continue to degrade and the surrounding communities will be threatened by the continued degradation of the grassland ecosystem. After the implementation of the project, the grassland coverage has increased, the grazing practices have improved, the soil and water have been preserved, which is beneficial to the local environment, and the healthy grassland ecosystem is an attractive landscape that can significantly bring benefits to local tourism resources and promote local economic development.

Focal issues of local herders' livelihood: In the absence of a project, the project area will remain degraded grassland, the area available for grazing will gradually decrease, and the income of the herders will decrease in the long term. The project will provide a number of short - and long-term employment opportunities for local residents, thereby increasing family income. Restoration of degraded grasslands and sustainable grazing will increase the grazing productivity of local pastoralists. The project provides equal employment opportunities for local women and men and can build community capacity in gender equality by empowering women. In addition, the project is located in Altay City, a traditional Kazakh region, and the local residents employed in the project are mostly Kazakh. The project will organize unique community

cultural activities for local residents, providing more opportunities for Kazakhs to inherit traditional culture and enhance social ties. All of this will significantly improve the well-being of local communities.

Focal issues of threats to biodiversity: In the absence of the project, the project area will continue degradation with much threat to local climate and biodiversity condition. There are 1 endangered species (*Oxyura leucocephala)* and 2 critically endangered species (*Emberiza aureola, Saiga tatarica*) are listed in the IUCN Red List (please refer to Section 5.1 for details of the endangered species) at the project site for its unique grassland habitat. The implementation of the project can preserve the natural habitats of wild animals by increase vegetation cover and avoid soil desertification in the project area. Therefore, the population of the endangered animals could be maintained and enhanced due to the better environment of the habitat which could increase the long-term biodiversity of local ecosystem.

Table 2-6 Project Activities and Theory of Change Table

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Construct fences in degraded grassland to carry out rotational grazing, ban grazing and reseeding high-quality grass seed	Limiting the number of grazing livestock in the project area, improving grassland coverage and preventing continuous grassland retreat	Increase habitat area for wild lives; Generate GHG emission removals; Improve the knowledge or skills of local herders	Maintain and enhance the natural grassland ecosystem in project area; Increase the population of the endangered animals within the project zone; Improve local touristic development and promote the local economy.	Climate benefits, Biodiversity benefits, Community benefits
Provide permanent and temporary employment opportunities for local pastoralists, including women	Create 13,167 job opportunities (1,975 permanent jobs and 11,192 temporary jobs), which is equally offered to local women and men; Increase household incomes of local residents	Empower women, build community capacity for gender equality, and improve the living standards of local residents.	When other employees are involved in community activities, women may get more happiness than just doing housework, so their happiness increases significantly.	Community benefits
Provide technical skills and training in sustainable grazing methods	Increase grazing productivity and prevent further degradation of grassland ecosystems	It increases the capacity of local herders, increases household income and provides better habitat for wildlife	Improve the well-being of local residents and increase local biodiversity	Biodiversity benefits, Community benefits
Organize special community cultural activities for Local residents, since 40.7% of the local	Increase social connection of Local residents and improve the	The project is located in Altay City which is a traditional Kazakh region, the project provides more	Improving the well-being of the local population, contacts between local Kazakh herders and other	Community benefits

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
residents employed by the project are Kazakhs, and all the other community members are also invited	interaction within the community	opportunities for Kazakhs to inherit their traditional cultural in a positive way	community members can indirectly promote the spread of traditional culture	

During the project life cycle, Altay Forestry and Grassland Bureau is responsible for the implementation and management of the project. Technicians from the local Forestry and Grassland Bureau will regularly measure the amount of grass produced in the project area and guide pastoralists to graze in a sustainable manner. In addition, 1,975 local pastoralists have been employed as grassland guardians to manage and protect grasslands during and after the project life cycle, under the guidance of the project sponsors and the local Forestry and Grassland Bureau.

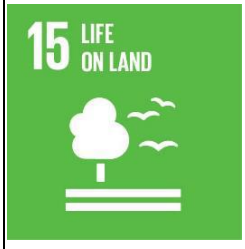
The improvement of herdsmen's living standards will accelerate the transition from traditional overgrazing to sustainable grazing, which is conducive to the maintenance and protection of local grassland ecosystems. In addition, the implementation of the project has provided permanent and temporary employment opportunities for local pastoralists, including women, empowered women, built community capacity on gender equality and improved the living standards of the local population. A healthy grassland ecosystem is an attractive landscape that can significantly benefit local tourism resources and contribute to local economic development, thereby enhancing long-term benefits after the project life cycle.

All of this can guarantee long-term climate, community and biodiversity benefits.

2.1.12 Sustainable Development

The project provided many benefits that will help to achieving China's Sustainable Development Goals as following:

Table 2-7 Sustainable Development goals that the project achieved

	The project provides employment opportunities for local residents, and all residents who meet the work requirements have an equal opportunity to participate in the project. Women and vulnerable groups from the poorest local families were not only given equal opportunities, but also consciously ensured that they could be part of the project. All employees involved in grass planting and fence construction are paid 80 yuan (10.89 USD) a day. The annual salary of the grassland guardian is about 22,176 RMB / year (3,019.61 USD / year).
	The project proponent has referenced Labor Law of the People's Republic of China and adapted them to meet the local conditions to ensure workers' health and safety. The workers' health and safety policy, including items covering the health insurance scheme for workplace accidents and evacuation plans is made available for workers and implemented by Altay Forestry and Grassland Bureau.
	During the implementation of the project, about 13,167 local herders participated in the project, of whom 5,660 were women. This will help empower women and build community capacity in gender and sustainable grassland management. By being trained in sustainable grassland management skills and participating in community activities with other employees, women may gain more happiness than if they just did housework, and thus be more likely to bring positive welfare outcomes to local families.
	The aim of the project is to restore degraded grassland ecosystems, manage grazing through the construction of fences for rotational grazing and grazing prohibition, as well as reseeding high-quality grass species, generate greenhouse gas emissions by increasing soil organic matter or avoiding soil degradation, and mitigate the impact of climate change on the local ecological environment.
	Through the implementation of this project, we will improve the quality and quantity of grassland vegetation, provide more habitats for wildlife and enhance biodiversity protection.

2.1.13 Implementation Schedule (G1.9)

Table 2-8 Timeline of the project

Date	Milestone(s) in the project's development and implementation
1-September-2020	The Project Design Report was completed
9-October-2020	The Project Design was approved by Altay Region Development and Reform Commission[22]
3-November-2020	The Participatory Rural Appraisal (PRA) Report was completed
15-April-2021	The baseline biodiversity survey report was completed
9-May-2021	Baseline Survey Report was completed
18-June-2021 to 10-July-2021	On 4,681.94 ha of degraded grassland, high-quality grass seed has been artificially replanted, and 2,922.92 ha of degraded grassland has been fenced and banned from grazing
12-September-2021 to 17-June-2022	Fences were built and managed by rotation grazing in 229,060.82 ha of degraded grassland, and fences were built and managed by forbidding grazing in 24,087.12 ha of degraded grassland
21-December-2021 to 20-March-2022	Fences have been built on 2986.38 ha of degraded grassland and grazing bans have been implemented, and high-quality grasses have been replanted on 2916.11 ha of degraded grassland
15-September-2023	The draft Project Description and the Project Description summary were finished.

[22] The Altay Regional Development and Reform Commission is a government department in Altay Prefecture, Xinjiang Uygur Autonomous Region, responsible for approving projects related to ecological environment protection and people's well-being within its jurisdiction.

2.1.14 Project Start Date

According to VCS Standard version 4.5, an AFOLU project is the date on which activities that led to the generation of GHG emission reductions or removals are implemented (e.g., preparing land for seeding, planting, changing agricultural or forestry practices, rewetting, restoring hydrological functions, or implementing management or protection plans).

The project starts on June 18, 2021, when grass planting and fencing will begin.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

The project crediting period is from 18-June-2021 to 17-June-2061 with a lifetime of 40 years which is the same as the CCB benefits assessment period.

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

The GHG emissions accounting, climate adaptive capacity and resilience, community, and/or biodiversity assessment and periods are all the same.

2.1.17 Estimated GHG Emission Reductions or Removals

Table 2-9 Estimated GHG removals of the project

Year	Estimated GHG emission removals (tCO_2e)
2021	462,925
2022	467,188
2023	467,287
2024	467,287
2025	467,287
2026	467,287
2027	467,287
2028	467,287
2029	467,287
2030	467,287
2031	467,287
2032	467,287
2033	467,287
2034	467,287
2035	467,287
2036	467,287
2037	467,287
2038	467,287
2039	467,287
2040	467,287
2041	467,287
2042	467,287
2043	467,287

Year	Estimated GHG emission removals (tCO_2e)
2044	467,287
2045	467,287
2046	467,287
2047	467,287
2048	467,287
2049	467,287
2050	467,287
2051	467,287
2052	467,287
2053	467,287
2054	467,287
2055	467,287
2056	467,287
2057	467,287
2058	467,287
2059	467,287
2060	467,287
Total estimated ERs	18,687,019
Total number of crediting years	40
Average annual ERs	467,175.475

2.1.18 Risks to the Project (G1.10)

Table 2-10 Risk analysis of the project

Identify Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Fire	The project area is degraded grassland with low coverage. Therefore, the risk of fire is quite low in the early stages of the project. As the grassland coverage increases, the risk of fire may increase and the project owner will take necessary fire prevention measures.	According to the Chinese Grassland Law and the Regulations on Grassland Fire Prevention, the local government should carry out the construction of grassland fire prevention facilities, strengthen the observation of grassland fire in the hay period, and strictly prevent grassland fire. Once a fire breaks out, the local government should immediately take charge of relevant rescue.
Rodents and pests	There may be rodents and pests on the grassland that cause damage to the grassland, but they should be prevented through daily supervision.	Use biological methods to control rodents, such as building eagle nests. The use of chemical pesticides is permitted only when severe infestations occur in the

Identify Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
		project area and is in accordance with the national pesticide policy. The project sponsor is experienced in local natural risk control and has established a grassland monitoring technical manual for the project, which includes specific guidance on rodent pest control.
Overgrazing	Overgrazing is the main factor leading to grassland degradation. It is possible that a few pastoralists do not comply with sustainable management, leading to overgrazing	The local government guides herders to carry out sustainable grazing, which can slow down the degradation of grassland. At the same time, the local forestry and grassland bureau has vigorously promoted the grassland protection work, provided relevant training to herdsmen, and improved their awareness of grassland protection.
Freeze injury	The project area is located in one of the most north-western regions of China, close to the Siberian region. Winter weather is cold, and extreme natural weather such as ice and snow disasters often occur, but the barrier of the Altay Mountains in the north can moderate this effect.	The grass species planted in the project are widely distributed in the local area, which are fully adapted to the local climate and can still maintain healthy growth in cold weather.

The AFOLU Non-permanence Risk tool was used to describe and analyse the issue of non-permanence risk, and the results showed that 10% of net change in the project's carbon stocks should be deposited in the AFOLU Pooled Buffer Account. Please refer to Non-Permanence Risk Tool calculation for the detail.

2.1.19 Benefit Permanence (G1.11)

In order to maintain and improve climate, community and biodiversity benefits, the project achieves rotational grazing and grazing prohibition by constructing grassland fences, and achieves sustainable grassland management by reseeding high-quality grass species. The main quality grass species in this project are *Medicago sativa* (Lucerne), *Agropyron cristatum* (Ice grass), *Bromus inermis* (Awnless brome) and *Festuca arundinacea* (Tall fescue). After the project is completed, the Regulations on Fire Prevention of Grasslands under the Grassland Law and the Interim Regulations of the Xinjiang Uygur Autonomous Region on Grassland Management will be strictly implemented, and the basic protection system of grasslands and the system for balancing grass and livestock will be formulated.

At the same time, the Regulations of the Xinjiang Uygur Autonomous Region on the Balanced Management of Grass and Livestock will be strictly implemented, the responsibility for the management and protection

of degraded grassland and its fence facilities to townships, villages and households will be further implemented, and management and protection responsibility documents at all levels will be signed to clarify responsibilities and obligations. Supervisory departments of grasslands shall strengthen law enforcement of grasslands and promptly stop, investigate and punish illegal acts such as grazing without authorization, damaging grassland vegetation and fence facilities during the rest period.

According to the Grassland Law of the People's Republic of China, the ownership of grasslands belongs to the state and the collective. After the implementation of the project, the sustainable management of grassland will be carried out by Altay Forestry and Grassland Bureau. In order to ensure the smooth implementation of project-related carbon credits, with the support of Altay Forestry and Grassland Bureau in the early stage, the local township collectives, village collectives and herders who own the project land agree to authorize the land and grassland management right within the project boundary to Xinjiang Altay City Zhujin Investment Co., Ltd. during the project credit period. Subsequently, Altay Forestry and Grassland Bureau also confirmed this authorization.

Therefore, as the initiator of the project, Xinjiang Altay City Zhujin Investment Co., Ltd. has the right of control and operation of the project during the credit granting period. The carbon revenue will be used to pay the salaries of the grassland keepers, which is conducive to the sustainable development of the project.

Altay Forestry and Grassland Bureau is responsible for the implementation and management of the project during the whole life of the project. After the expiration of the project, Altay Forestry and Grassland Bureau will regularly organize technical personnel to measure the yield of herbage in the project area and guide the herders to stock reasonably. In addition, under the guidance of the project builder and the local forestry and Grassland bureau, about 1,317 local herdsmen were hired to serve as grassland guardians to manage and protect the grassland until the end of the project.

All of these could guarantee the long-term climate, community, and biodiversity benefits.

2.1.20 Financial Sustainability (G1.12)

The construction cost of this project is 39.894 million RMB, and the follow-up management and protection cost of the whole life cycle is expected to be 43.798 million RMB/year. Over such a long period of time, it is difficult to raise sufficient funds and effectively sustain the implementation of the project. The Altay Forestry and Grassland Bureau managed the early implementation of the project, carried out baseline surveys and raised the initial funds for planting grass and building fences. The initial funds came from the finance department of Altay City. However, the initial funding is not sufficient for continuous grassland maintenance, which is crucial for sustainable management and restoration of grassland ecosystems; therefore, after the implementation of the project, the Forestry and Grassland Bureau of Altay City is responsible for sustainable grassland management. In order to ensure the smooth development of project-related carbon credits, Altay Forestry and Grassland Bureau authorized Xinjiang Altay City Zhujin Investment Co., Ltd. as the initiator of the project to control and operate the project during the whole project credit period.

The Altay Forestry and Grassland Bureau signed a consulting agency contract with Xinjiang Altay City Zhujin Investment Co., Ltd. which was responsible for the development of carbon credits and sales in the international carbon market. The project has no benefits other than carbon benefits. As described in Section 2.1, the project is expected to eliminate GHG emissions of 18,687,019 tCO_2e and reduce GHG emissions of 467,175.475 tCO_2e per year on average. Based on an estimate of 30 RMB (4.1 USD)/tCO_2e, the annual carbon revenue is about 14.9 million RMB (2.03 million USD). The carbon revenue generated by the project

will be used to sustain the implementation and management of the project over its life. Therefore, carbon benefits can help alleviate the shortage of funds and ensure the sustainable management of grassland.

2.1.21 Grouped Projects

No applicable.

2.2 Without-project Land Use Scenario and Additionality

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

According to the land cover data of Altay City in 2010 (Figure 2-7) released by the National Center for Basic Geographic Information, satellite images (Figure 2-6, Figure 2-8, and Figure 2-9), and photos of the project area taken in 2020 (Figure 2-10), the project area is determined to be grassland. Comparing the satellite images in 2010 and 2020, there was no change in land use in the project area.

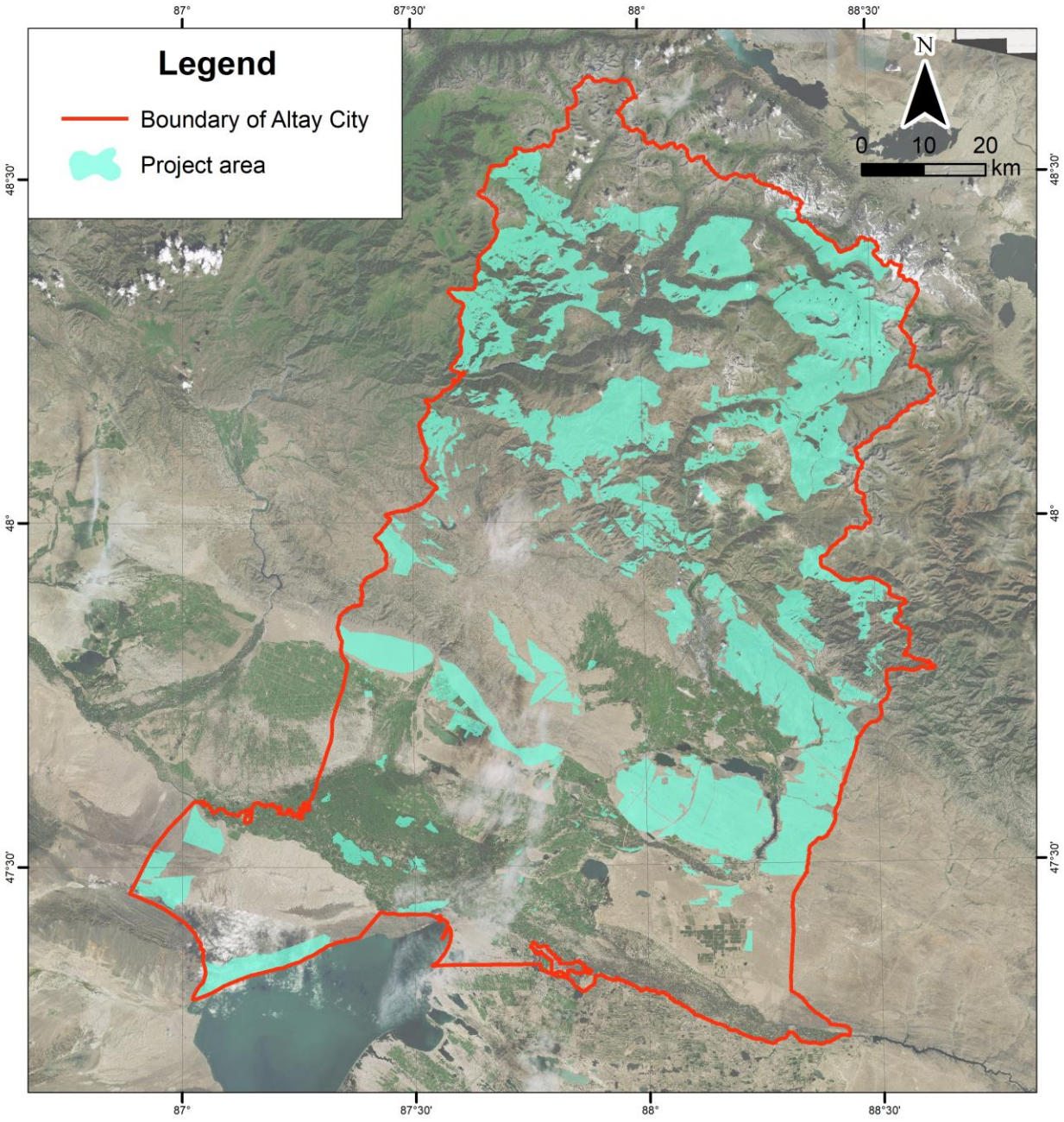
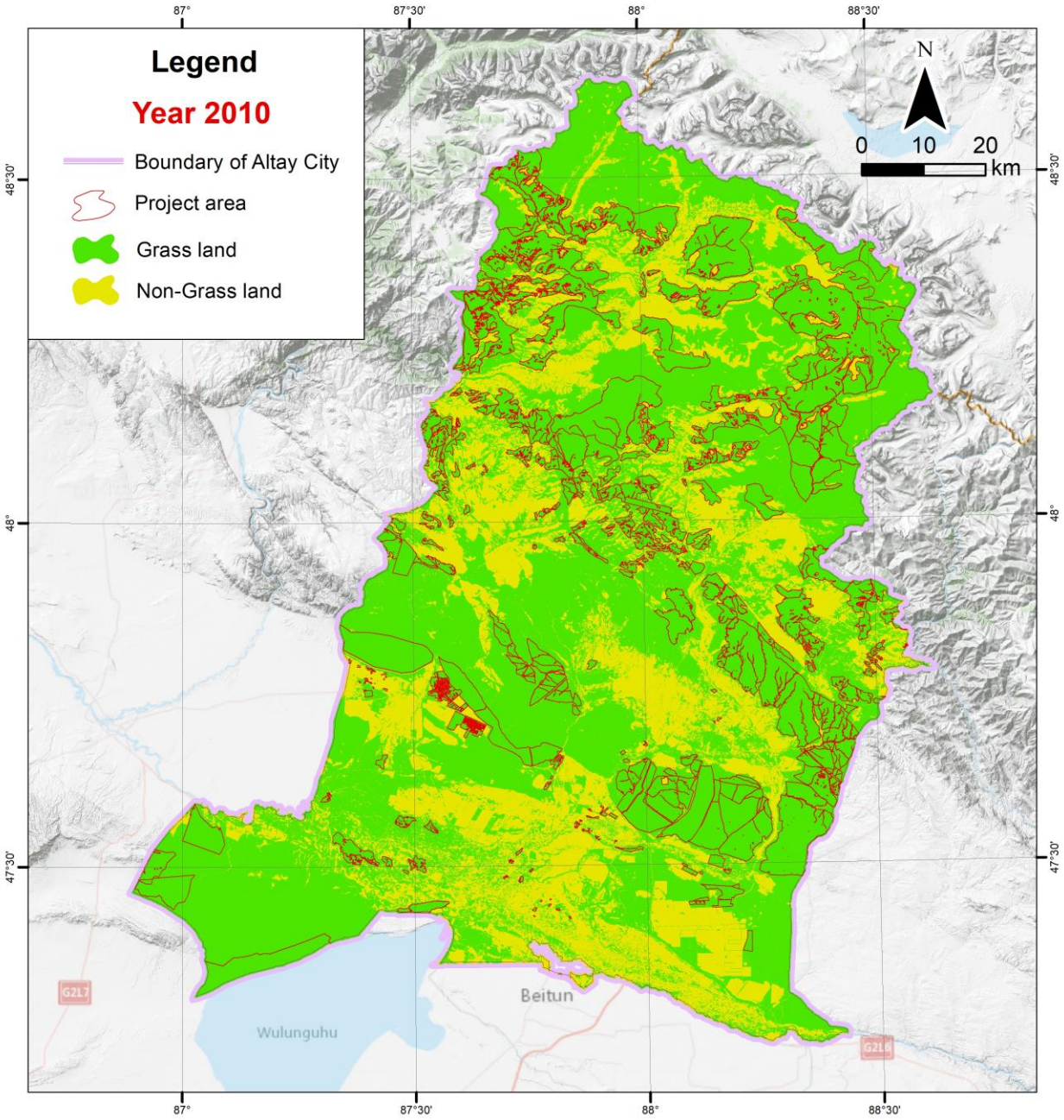


Figure 2-6 Satellite images of the project area


Legend
Year 2010
Boundary of Altay City
Project area
Grass land
Non-Grass land
N
0 10 20
km
87°
87°30'
88°
88°30'
48°30'
48°
47°30'
Beitun
Wulunguhu
G217
G216

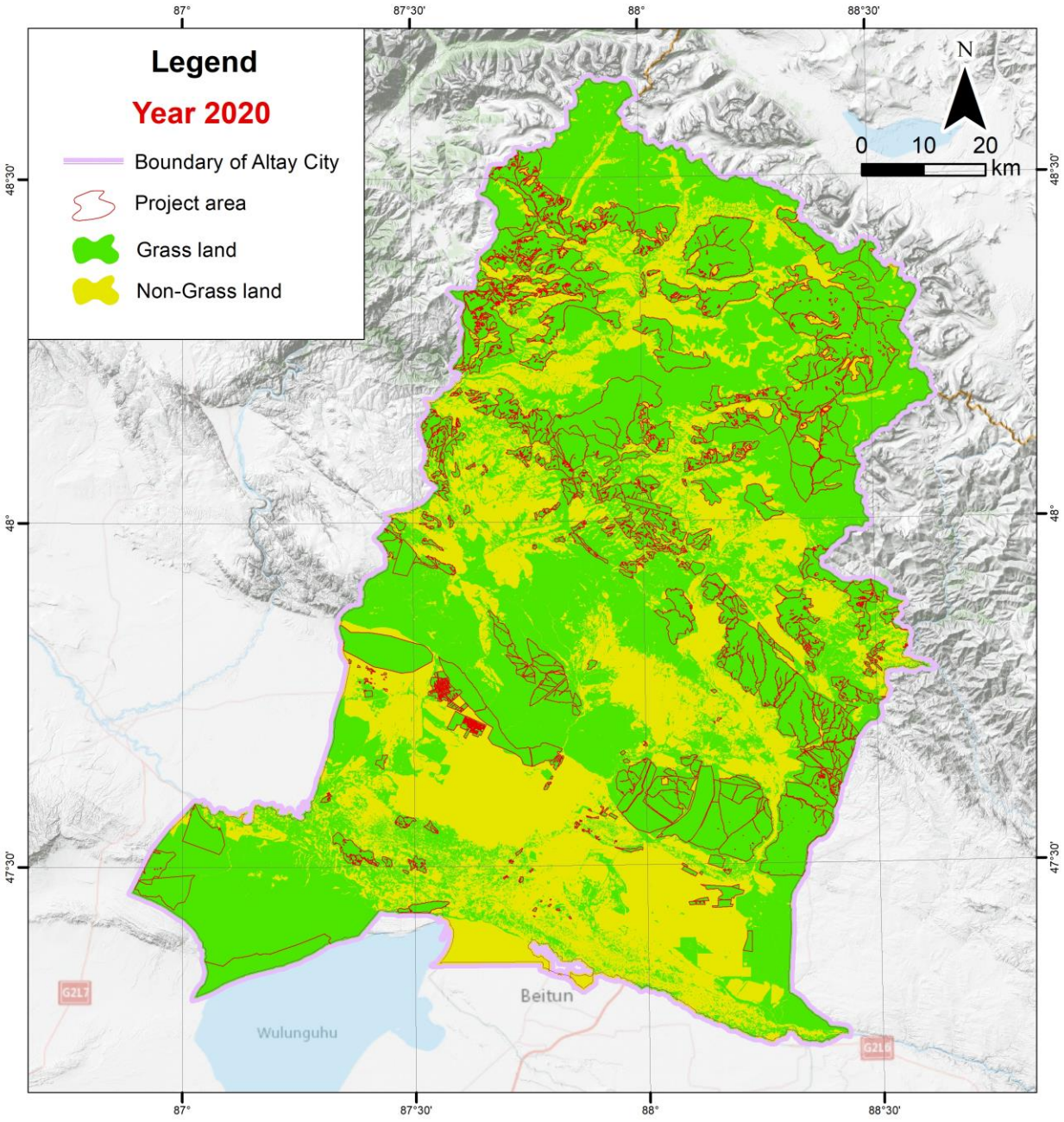


Figure 2-7 The land use scenarios of the project zone in 2010 and 2020

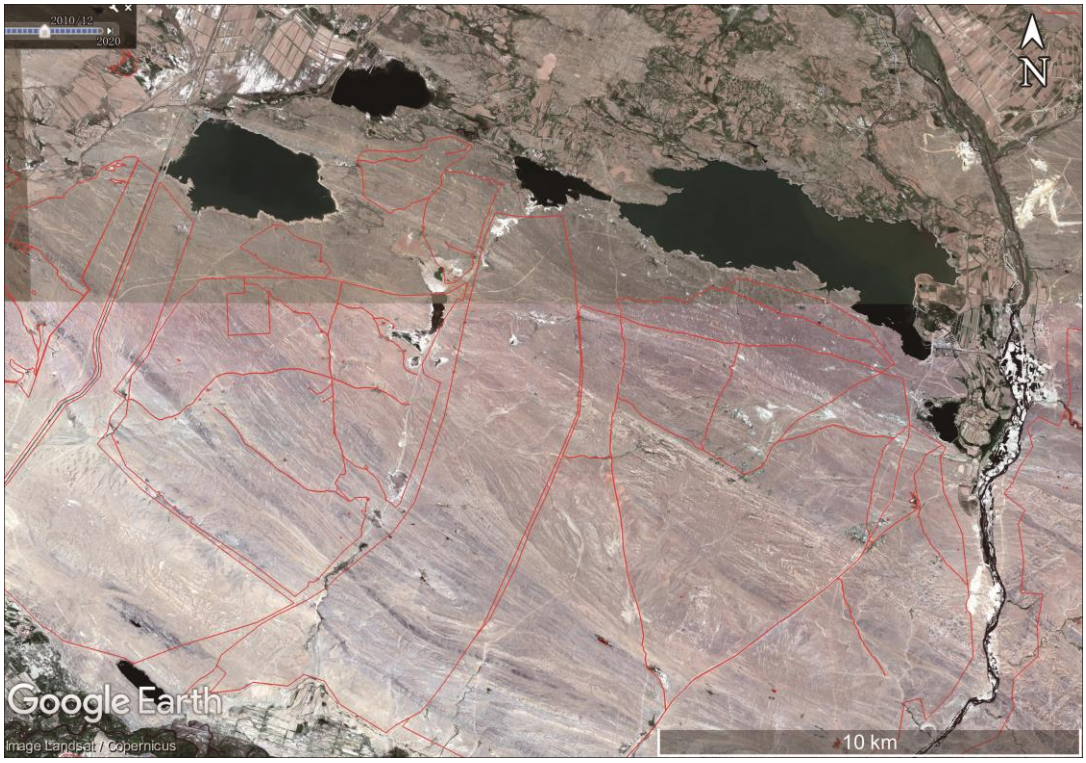


Figure 2-8 Satellite images of the project area in December 2010

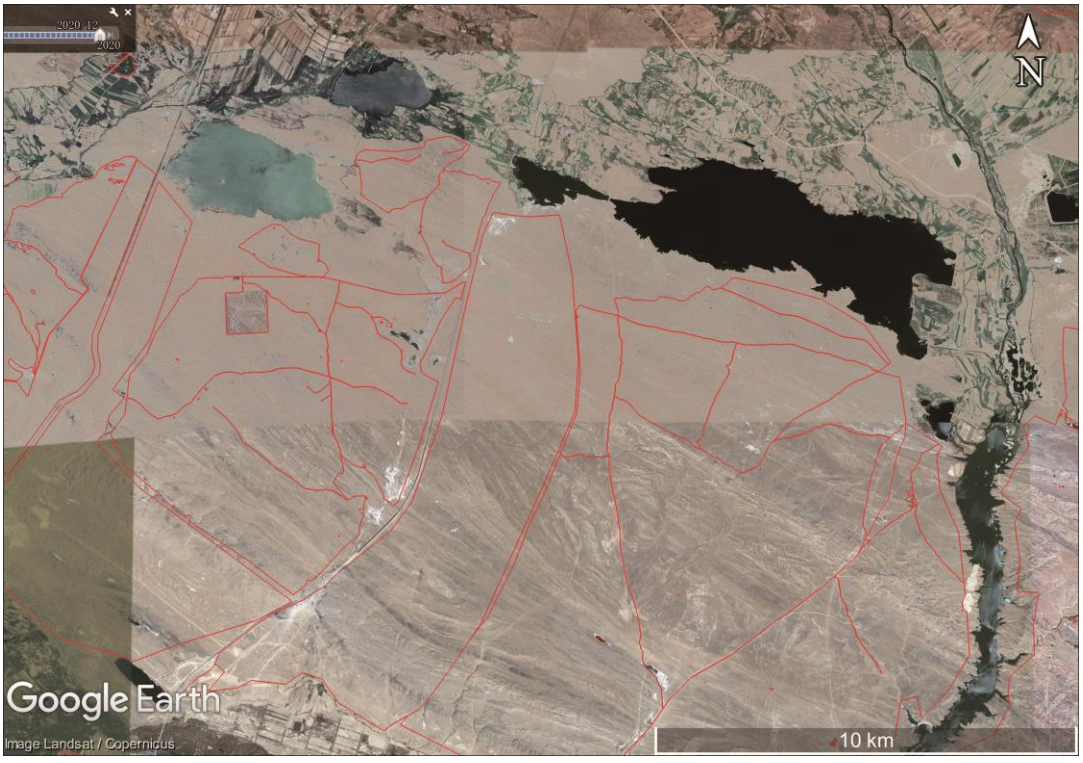


Figure 2-9 Satellite images of the project area in December 2020

Figure 2-10 Degraded grassland in the project area at the start of the project

2.2.2 Most-Likely Scenario Justification (G2.1)

The most-likely scenario is the same as baseline scenario, which is the lands would continue degradation without the project, please refer to section 3.1.4 for detailed information.

2.2.3 Community and Biodiversity Additionality (G2.2)

China has promulgated and revised a series of laws and administrative regulations related to grasslands, including the Grassland Law of the People's Republic of China[23], the Regulations of the People's Republic of China on the Protection of Wild Plants [24], the Regulations of the People's Republic of China on Nature Reserves[25], the Regulations on Fire Prevention of Grasslands[26], and the Regulations on the Prevention and Control of Forest Pests and Diseases[27]. There are no laws or regulations governing the restoration of degraded grassland.

[23] http://yjgl.xinjiang.gov.cn/xjyjgl/zcfg/201901/82417e8173904e21b40215e8cc737725.shtml
[24] https://www.gov.cn/gongbao/content/2019/content_5468858.htm
[25] http://www.forestry.gov.cn/main/3950/20170314/459882.html
[26] https://www.gov.cn/zhengce/zhengceku/2008-12/05/content_2756.htm
[27] http://www.forestry.gov.cn/c/www/gkxzfg/300054.jhtml

Due to the dual effects of natural and human factors, the grassland in Altay city has been degraded to different degrees. With the degradation of grassland, the grass yield per unit area of grassland decreased. The project is located in a poor area of China with economic difficulties and local financial constraints. Moreover, investments in the restoration of degraded grasslands have had no economic return for decades and are therefore not commercially attractive. However, with the general development of the national economy, the local grassland ecosystem will continue to degrade as herders continue to intensify their grazing in order to improve their income.

Meanwhile, in the absence of the project, due to the lack of reasonable grazing methods provided by the local forestry and grass bureau, such as rotation grazing, no-grazing and re-seeding of high-quality pasture technology, local herders will continue to use traditional grazing methods. Grasslands will face continued degradation due to technical barriers faced by herders.

The project restored the degraded grassland through sustainable grassland management such as rotation grazing, grazing prohibition and reseeding of high-quality grass seeds. The total investment of the project was 39.894 million RMB, which was provided by the local financial bureau. Sustainable grassland management requires continuous financial support, such as the employment of 1,317 local herders as grassland guardians, each with an annual salary of 22,176 RMB. The carbon revenue generated by the project can be used to pay guardian salaries, which can reduce funding difficulties.

Through the above analysis, if the project is implemented without registration as a VCS project, the financial and technical barriers would lead to the failure of the project. Therefore, the community and biodiversity project benefits would not occur in the absence of the project.

The detailed additionality assessment was demonstrated by using the Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (VT0001), please refer to Section 3.1.5 for details.

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

Not applicable.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The project documentation (PD, PD Summary) will be published on VCS and CCB website for public comments, and the local communities and other stakeholders can easily download from the website. The project owner will notice local stakeholders every milestone by publishing the summary project documents in the public notice boards in each village of the project development, including listing, registered, issuance, etc.

2.3.2 Dissemination of Summary Project Documents (G3.1)

Along with the project implementation, the project documentation will be published on VCS and CCB website for all stakeholders to obtain the detailed project information and development progress. Also, the summary of project description in local language and Chinese version have been distributed among local communities during the community monitoring activity and the website address to download all the

summary project documents has been provided to communities which will be published in the public notice boards in each village. In addition, a contact person with phone numbers will be published through villager assembly in case any stakeholders want to directly contact the project proponent and raise opinions.

2.3.3 Informational Meetings with Stakeholders (G3.1)

To ensure the continued effectiveness of the participation mechanism, the team conducted Participatory Rural Appraisal (PRA) in the project towns before the project was launched to obtain basic information, data and information on the socio-economic situation in and around the project area, and to understand the main socio-economic and environmental issues raised by stakeholders. Their willingness to participate in the proposed project activities was collected and, using the needs of the proposed project activities, the potential socio-economic and environmental impacts of the proposed project activities were analysed.

The project owner also held stakeholder meetings several times to collect direct feedback and suggestions throughout the project life cycle. The notice of the meeting was published on the village collective bulletin board, and representatives of the village collective, Altay Forestry and Grassland Bureau, Altay Finance Bureau and local government were invited to the meeting by telephone. During the meeting, questionnaires were distributed to participants to collect their feedback. In addition, the content of the meeting is announced on the village collective bulletin board. See Section 2.3.7 for details.

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

During the PRA survey and stakeholder meeting on 3 November 2020, project owner explained the potential costs, risks and benefits to relevant communities and stakeholders by using the Theory of Change and invited them to give their feedback. The analysis based on results chain is quite clear and understandable using a form as followed. According to the analysis, the community benefits of the project include income improvement, job creation, training opportunities, capability establishment and higher ecological aesthetic value, and all the relevant communities are aware of the design concept of the project and have willingness to participate in the project.

Local herders make a living from grazing, and traditional grazing methods are not sustainable, such as overgrazing. The project will change the traditional grazing method of some local herders, and promote the growth of pasture by guiding herders to sustainable grazing and pasture seeding.

Benefits	Costs and Risks	Mitigations
income improvement, job creation, training opportunities, capability establishment, higher ecological aesthetic value	Through the construction of grassland fence for rotational grazing and grazing prohibition. Under the premise of not affecting the normal growth of the improved grassland, the grassland should be used reasonably and sustainably according to the local approved livestock and poultry carrying capacity.	In the project area, the local government will provide subsidies to the herders who rotate grazing or are prohibited from grazing. Altay Forestry and Grassland Bureau measured the yield of herbage in the surrounding grasslands of the project area to guide herders to graze in reasonable areas. In addition, the project provides employment opportunities for local pastoralists, which will increase their income in the long run

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

The villager assembly is held once a year, all community group leaders participate in the village assembly, and the contents of the assembly will be conveyed to all community members by the leaders. Therefore, the villager assembly is considered as the most appropriate means for sharing information with local communities. A contact person with phone numbers was published through villager assembly in case any stakeholders wish to participate in any activities related to the project.

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

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

The local stakeholders will be informed timely regarding the project process, especially when the auditor would take the site visit. And a week prior to the visit, the project staff will inform relevant stakeholders in advance about the details of the audit process and arranged a half day for the auditor's interview with stakeholders so that the stakeholders have sufficient time to communicate with the auditor.

2.3.7 Stakeholder Consultations (G3.4)

As mentioned above, the stakeholder consultation includes PRA survey and meetings.

During the PRA survey from November 2020, the survey team from Altay Forestry and Grassland Bureau went to the villages where the project located and took the interview with head of the villages to collect the basic information of the villagers and characteristics of local communities. Then they conducted the household interviews with local villagers and collected the questionnaires from them. There are totally 6,001 households involved in the project, a randomly sampling method was applied to distribute the survey questionnaires. According to Guideline of Sampling and Surveys for CDM project Activities and Programmes of Activities (Ver 04.0), the total sampling size was calculated as 68 (see the following equations for details), and the final number has been adjusted into 70 to make sure the household interview could represent the different community group, such as local Kazak nationality, herders and grassland guardians.

$$n \geq \frac{1.645^2 \times N \times P \times (1-P)}{(n-1) \times 0.1^2 \times P^2 + 1.645^2 \times P \times (1-P)} \quad (1)$$

Where:

n	=	Sample size
N	=	Total number of households
P	=	Expected proportion, which is defined as 0.8 based on the empirical value provided by Xinjiang Altay City Zhujin Investment Co., Ltd.
1.645	=	Represents the 90% confidence required
0.1	=	Represents the 10% relative precision

As N is 6,001 as determined of total number of households, P is determined as 80% based on the empirical value provided by Xinjiang Altay City Zhujin Investment Co., Ltd, and taking 90% level of confidence, n is therefore calculated as 1.6452*6,001*0.8*(1-0.8)/{(6,001-1)*0.12*0.82+1.6452*0.8*(1-0.8)} ≈ 68.

In the PRA survey, 70 questionnaires were distributed to stakeholder representatives from the local government and surrounding villages, and 70 valid answers were collected. These representatives cover different ages, different occupations, and different levels of education, and Table 2-10 summarize the data. The respondents were representative in terms of gender, age, and education. Therefore, it can be considered that the responses to the survey already give a comprehensive picture of the attitudes towards the project of the stakeholders who may be affected by the project.

The quality of monitoring results is determined by the quality of data collection and processing. In order to ensure true and effective monitoring results, the project owner arranges for data collection and analysis supervisors to constantly check the data collection and processing throughout the PRA monitoring process

to ensure that the questionnaires are completed, the survey records are reviewed and the data processing form is filled in clearly and accurately.

Quantitative data can be analyzed by direct calculation methods such as summation, averaging, and proportion. By comparing and analyzing these values, the similarities and differences between the monitored objects can be discussed, and the relationships between the values can also be summarized. Quantitative data can be counted directly by hand or analyzed with the help of computers and statistical software such as Excel, OriginPro, and SigmaPlot.

The summary of qualitative data is complex. The following are the basic steps of qualitative data analysis:

1) Briefly summarize the main points of each person's answer to the question.

2) Check these answers carefully. Make a note of the most important points. Then review all the responses and count the total number of respondents with the same major opinion. Alternatively, count the number of people who hold or disagree with a particular opinion and rank their opinions. If the number and proportion of opinion-holders cannot be calculated accurately, then at least some trend must be pointed out, that is, whether “All”, “The vast majority”, or “Minority” of respondents had a point of view.

3) Ask others to check these conclusions to ensure that the answers are accurately interpreted.

After data analysis and processing, the results were summarized as follows:

Table 2-11 The representatives’ information

Question	number:70	
Gender	Male	58%
	Female	42%
Age	20-30	21%
	30-50	48%
	above 50	31%
Education	Junior high school and below	62%
	senior middle school	28%
	junior college education and above	10%

Table 2-12 The survey results

Question	Result	
1. Do you know this project will bring carbon revenue?	Yes	72%
	No	28%
2. Do you willing to participate in this project?	Yes	100%
	No	0
3. Do you want to get economic profit by participating in the project?	Yes	86%
	No	14%
4. Do you think this project can bring economic benefits to the local area and promote local sustainable development?	Yes	91%
	No	9%
5. How do you want to participate in the project?	Participate in sustainable management work such as fence construction, planting high-quality pasture, grassland management and protection and inspection	
6. How will the project affect local herders engaged in grazing around the project area?	The number of grazing animals is controlled according to the approved capacity of the grassland in the rotation grazing and grass planting areas, and grazing is strictly prohibited for 5 years in the no-grazing areas, and then grazing is controlled to achieve sustainable management of the grassland. In addition, the project provides employment opportunities and reasonable grazing training for local herders	
7. What do you think are the main benefits of the project?	Increase employment, improve economic efficiency, improve ecological environment, enhance grazing skills, and improve local biodiversity	

Question	Result	
8. Do you support the project?	Yes	100%
	No	0

According to the results of the questionnaire, all local residents want to participate in the implementation of the project, because they believe that the project can protect the local ecological environment and improve the living standards of local residents.

According to the survey results, 9% of the representatives believe that the project does not bring economic benefits to the area and promote local sustainable development; Fourteen percent expressed no intention to benefit financially from participating in the project.

In order to help stakeholders better understand the project, the project initiator, Xinjiang Altay City Zhujin Investment Co., Ltd. also held a stakeholder physical meeting in the conference room of the Altay Forestry and Grassland Bureau on September 29, 2020. Representatives of villagers and other stakeholders were invited, including officials from local government agencies and researchers from the National Forestry and Grassland Administration Northwest Investigation and Planning Institute (with extensive experience in grassland conservation). About 25 people attended the stakeholder meeting.

At the meeting, the project sponsor presented the implementation plan of the project, explained the potential costs, risks and benefits of the project to the relevant communities and stakeholders, and discussed all the issues raised by the delegates, such as rotation and prohibition subsidies, potential new employment opportunities, etc.

Participants were asked to give their opinions on the design of the project, as well as their willingness to participate in the subsequent implementation. All of them had no opinion on the project design and were willing to participate in the implementation and maintenance of the project. But some of them have some concerns about the financial benefits of participating in the project, because they work outside the home all the time, and they don't want to give up those jobs for the project. The project sponsor explained that the project can restore its degraded grassland. If they agree to restore the degraded grassland and implement rotational grazing, grazing prohibition and grass planting, they can also receive corresponding subsidies, and they are free to go out to work or accept employment opportunities provided by the project, even if they choose not to participate in the implementation and management of the grassland. The subsidy range from 2.5 RMB/Mu to 6.0 RMB/Mu. All stakeholders were satisfied with this arrangement and happy to introduce restoration projects on their degraded grassland.

Some residents also expressed concern that the project could affect their grazing hours and that their income from selling livestock products could be reduced. In this respect, the project construction party said that it will measure the amount of pasture grass produced in the surrounding grasslands of the project area. Although grazing is strictly prohibited in some areas, the Altay Forestry and Grassland Bureau will guide the herders to graze within an acceptable range to ensure that the project does not reduce the grazing

productivity of herders, does not affect the grazing time of herders, and does not reduce the grazing income of herders.

After in-depth communication, it was finally agreed that the project initiator and the Altay Forestry and Grassland Bureau would jointly restore the degraded grassland. So, the project design report does not change.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

The project was designed by Xinjiang Ruixiang Agricultural and Animal Husbandry Engineering Consulting and Design Institute Co., Ltd., Xinjiang Forest Wood Forestry Science and Technology Development Co., Ltd., and professional research Institute. Before the implementation of the project, consultation was conducted with all stakeholders, and all parties agreed and supported the project. Through consultation, most of the stakeholders were willing to participate in the construction of fences, grass planting, sustainable grassland management and fire prevention. Therefore, the project provides all employment opportunities for the local community, including temporary jobs (fence building, reseed planting) and permanent jobs (grassland guardian).

Throughout the lifetime of the project, the staff of project owner will visit village collectives, Altay Forestry and Grassland Bureau, Atlay Finance Bureau and local government once a year, and communicate the progress and problems of the project with them. This will establish a commitment to communication and consultation to keep stakeholders informed of project activities including restoration, maintenance, monitoring and the CCB validation and verification process. In addition, the project staff in the field will maintain communications with local residents around project area including local women, local herders and grassland guardians through in-person talking. And the project will actively listen to recommendations made by any identified community members, or other stakeholder groups, and adapt and improve methods as necessary.

The project has an adaptive management plan to effectively evolve as the project progresses, and systematically develop existing practices through project monitoring and evaluation. The project will periodically review plans, methods, goals and objectives, to incorporate new lessons learned, available technology, and scientific knowledge. These strategies will be in accordance with project’s Standard Operating Procedures (SOPs) and monitoring plans.

2.3.9 Stakeholder Consultation Channels (G3.5)

As described in Section 2.3.3, the project team conducted a Participatory Rural Assessment (PRA) in the project township prior to the launch of the project. During the PRA survey, the project team also held stakeholder meetings to collect direct feedback and suggestions. The most convenient way to invite local residents directly affected by the project to the stakeholder meeting is through the villagers' meeting, and the contact number is issued through the villagers' meeting to facilitate the participation of any stakeholders in the project related activities. Local policy makers and grassland experts were also invited by phone. All stakeholders have been informed either directly or through their representatives.

Summaries of project descriptions in local languages were distributed among local communities during community monitoring activities, and a website to download all project profiles was provided to communities during meetings, which was also posted on bulletin boards in each village. All these measures provide a sufficient degree of information sharing.

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

In the project planning phase, stakeholders were fully involved in the land selection, grass species selection, etc., through villagers meeting and PRA methods. As mentioned above in Section 2.3.7, before the project started, local residents around project area including local women, local herders and grassland guardians were asked to raise their opinions during the PRA survey, and village collectives, Altay Finance Bureau and local government were asked to raise their opinions during the stakeholder meeting. Also, 70 valid questionnaires have been collected from the representatives of the local stakeholders of local government and surrounding villages. Stakeholders from different age, gender and culture background has been prudently taken into account during the distribution of the questionnaires, and the feedbacks reflected in the interview and questionnaire has been seriously addressed immediately. Based on stakeholder consultation, all of the representatives of the stakeholders support the implementation of the project.

To enable the effective participation of all communities in a culturally appropriate and gender sensitive manner, the project proponent particularly encouraged the participation of women by maintaining the regular communications with women's Federation of local towns. During the project implementation, about 13,167 local herders (5,660 are women) participated in grass seeding and fences building, of which 1,975 local herders (845 are women) were employed as guardians. Among the 13,167 jobs opportunities, 11,192 are temporary jobs, which lasted from 2021 to 2022 and 1,975 are permanent jobs, which lasted through the entire project crediting period. All the employees will be provided related skill training periodically. Local residents who involved in reseed planting were compensated 80 RMB (10.89 USD)/day and Grassland Guardian were paid around 22,176 RMB (about 3,019.61 USD) /year. During the project implementation, the local communities will play as the direct implementers of the project, and the project proponent will play as coordinator who is in-charge of the overall management. All the critical information regarding decision-making will be published to local stakeholders, and the decision should be revised according to further discussion in case there is any feedback from stakeholders.

In the monitoring period, the project proponent will invite some of the local residents to help conduct the field work with payment, such as soil sample collection and questionnaire survey collection. And a contact person with phone numbers was published through villager assembly in case any stakeholders wish to participate in the following monitoring or other activities related to the project.

2.3.11 Anti-Discrimination Assurance (G3.7)

According to Labor Law of the People's Republic of China, it is illegal to discriminate on grounds of race, nation, sex or religion. The project owner will obey the Labor Law of the People's Republic of China and have established the anti-discrimination rules in the implementation of the project, including:

1) Managers must treat all employees equally and without any discrimination in the recruitment or implement process.

2) Women and men receive equal pay for equal work. Women who meet the recruitment requirements enjoy equal employment rights.

3) Employees shall not be discriminated against or restricted in employment, compensation, training and promotion on the basis of their race, sex, pregnancy, age, religion, belief, disability, nationality, etc.

4) Under no circumstances should managers be allowed to engage in coercive, threatening, abusive, exploitative or psychologically abusive or sexually harassing acts against their staff, including postures, language and physical contact.

5) In case of discrimination, the employee may report the complaint according to the "Feedback and Grievance Redress Procedure" of this project. Any person has the right to report it directly or anonymously.

6) The project owner shall not interfere with the religious, sexual orientation, appearance, political, personal interests and other rights of all employees.

All the rules have been emphasized during staff training sessions. And there is a grievance and redress procedure which has been described in section 2.3.12 and 2.3.13 of the PD, in case of any discrimination occurred, anyone could report to the project proponent follow the relevant procedure.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

In case of any conflicts and grievances, stakeholders can either appeal through village representatives or directly to the local forestry and grass bureau, which is the most effective ways to solve the problems. They are familiar with the phone numbers of the project staff or the related focal point, or during community meetings. Moreover, the planting and management work will avail community labour which will allow the community villagers to participate in project implementation themselves and find out or seek for solutions to the conflicts and grievances in the projects.

The project owner nominated a specific staff in charge of recording and collecting conflicts and grievances of local communities and individual herders. All of the grassland guardians are coming from local communities whose name and contact number were published through villager assembly. Grassland guardians in each project site will play an important role of treating with ordinary conflicts and grievances, and report to Altay Forestry and Grassland Bureau.

Once a grievance case reported to the specific staff, the staff will contact the relevant stakeholders directly and discuss with them for an acceptable solution within one week; if the stakeholder's demand cannot be satisfied in a short time, the specific staff will contact with the head of the village where the stakeholders come from, who will play as a mediation to discuss with both sides together and seek for a further solution, which should be no more than 30 days; for more complicated case which cannot be settled by mediation, the project proponent shall report to local government, and follow the relevant legal procedure of arbitration or courts.

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

The feedback and grievance redress procedure has been decided and published and made accessible to communities and other stakeholders. The grievance mechanism has also been explained to local communities orally through the workshop and engagement sessions. Local communities are aware that if they have any complaints, they are able to raise concerns and/or complaints with the field collaborator or field facilitators via phone call or email. All grievances that are raised during the project lifetime will be recorded and made publicly available. Project owner will also be updated on the outcomes of grievances, in person, through community meetings. To ensure accessibility to grievance mechanism, the project has established the following:

1) Suggestion boxes

2) Email

3) Telephone access

All the feedback and grievance received, and the relevant solution shall be recorded and summarized in the project monitoring report in the next verification, and all the project documents has been published on Verra website and the website address to download all the summary project documents has been provided to communities through the public notice boards in each village.

2.3.14 Worker Training (G3.9)

Each employee has a grassland monitoring technical manual, including technical guidance for work, and all employees receive technical training immediately upon employment. These skills and knowledge are useful for grassland management, such as fence installation, fire prevention techniques, and reseeding of quality grass seed techniques. These technical manuals were distributed to every household in the local villages, including villagers who were not involved in the project. Members of the local community are equally trained as long as they live near the project area and are willing to participate in the training process, so that local competencies are not lost due to staff turnover.

Besides the training on technical skills of grass planting, local workers were trained on relevant skills for their future livelihood, such as sustainable grassland management. These skills will benefit the long-term development of the local communities who participate in the project

During the implementation of the project, regular training sessions were arranged in June 2020, September 2020 and May 2021 to provide workers with skills and experience in installing fences and reseeding grass.

In October 2020, Altay Forestry and Grassland Bureau organized the training of grassland nurses, including grassland fire investigation, grassland fire prevention and control technology, rodent and insect pest control technology and other relevant law enforcement and specific implementation of protection measures.

In March 2021, the Northwest Investigation and Planning Institute of the National Forestry and Grassland Administration gave a systematic and detailed lecture on the field investigation and application system of grassland monitoring and evaluation, grassland patch partitioning method, toxic grass identification technology, Shouwanglincao App application method, and grassland monitoring and evaluation technical details.

2.3.15 Community Employment Opportunities (G3.10)

The project will mobilize entire communities, including women and the poorest. All people from the community will have an equal chance to fill a job position if they meet the job requirements. Women and vulnerable groups from the poorest local families will not only be given equal opportunities, but conscious efforts will also be made to ensure that they can be part of the project.

During the implementation of the project, some 13,167 local herdsmen (5,560 women) participated in reseeding and building fences, of whom 1,975 herdsmen (845 women) acted as guardians. Of the 13,167 jobs, 11,192 were temporary jobs that continued from 2020 to 2021, and 1,975 were permanent jobs that

continued from the entire project accounting period. All employees will receive regular training in relevant skills. Local residents who participate in planting grass are compensated 80 RMB (10.89 USD) per day, and grassland Guardian earn about 22,176 RMB (3019.61 USD) per year.

The current cost of the employment came from Altay Finance Bureau. However, the initial fund is not sufficient for the continued maintenance of the grassland, so the project is seeking for the subsidy of carbon credits which could help to mitigate the funding shortage and ensure sustainable management and restoration of the grassland ecosystem.

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

Local people will be protected by the Labor Law of the People's Republic of China[28], forced labor will not be allowed, and local people will be free to establish and join any labor organization according to their own wishes. Regular pre-job training for workers, clear workers' rights and appeal mechanisms, workers' rights are protected in the labor contract.

2.3.17 Occupational Safety Assessment (G3.12)

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

The potential risks of the project mainly include risks such as fire, driving, and unexpected situations in the wild.

To minimize potential risks, all workers received new employee training before starting work. The training includes all necessary risk control measures during the work, as well as the aforementioned health and safety policy.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

In order to ensure the development and implementation of the project, the project owner has established a project work group and the expert group. Xinjiang Altay City Zhujin Investment Co., Ltd. is responsible for the project's overall implementation and decision-making and has established a project working group (covering aspects of carbon sink, ecology, grassland, community, geographic information, etc.). The Altay Forestry and Grassland Bureau is responsible for organizing the implementation of the project. Altay Finance Bureau provided the initial fund of the project. National Forestry and Grassland Administration Northwest Investigation and Planning Institute is responsible for technical support for the project development and implementation; the responsibility of local residents and communities is daily supervision and data management during the project implementation.

[28] https://www.gqb.gov.cn/node2/node3/node5/node9/node108/userobject7ai1378.html

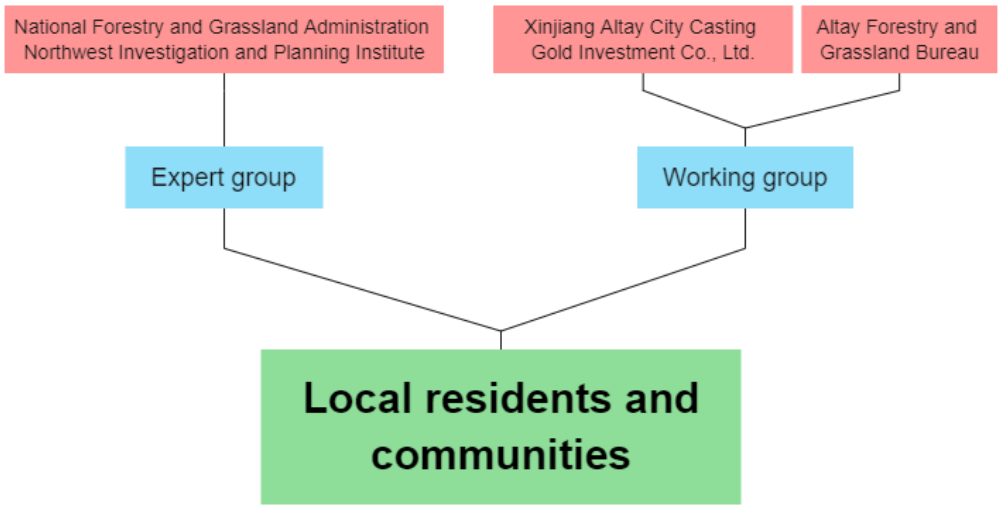


Figure 2-11 The project governance structure

2.4.2 Required Technical Skills (G4.2)

The project requires community involvement, biodiversity assessment, and technical skills in carbon measurement and monitoring in order to implement project activities. The table below Outlines the skills required for each project activity.

Table 2-13 Important skills needed to implement project activities

Project Activity	Specific measures	Important skill Requirements
Grass reseeding and fence building	Project community division, grass seed and sowing method selection, fence design	Construction capacity, assisted seeding technology, Geographic Information System (GIS) site selection
Carbon stock measurements and monitoring	Soil carbon monitoring, land cover mapping, grazing monitoring, climate monitoring, biodiversity monitoring, community monitoring, and fire monitoring	Soil organic carbon, bulk density and sand content testing, GIS/ remote sensing, grazing records, fuel consumption records, deratization and fire management
Community engagement and development	Stakeholder consultation, livelihood development, and education program	Community organizing, conflict resolution, business management, adult education, livelihoods and social science surveys
Biodiversity assessment and monitoring	Sustainable grassland management, biodiversity monitoring, endangered animals monitoring	Building fences, reseeding grass, rotating grazing, forbidding grazing, biodiversity investigation, field investigation, infrared camera technology, global positioning system tracking technology

2.4.3 Management Team Experience (G4.2)

The project proponent Xinjiang Altay City Zhujin Investment Co., Ltd. is a legally registered company, who is in rich experience in sustainable grassland management, including grassland protection and management, technical training, carbon measurement and monitoring and biodiversity assessment.

Altay Forestry and Grassland Bureau is a local government agency who is in rich experience in community engagement, including holding stakeholders' meeting, mediation with local communities and provide guidance for local herders in related to rational grazing. Altay Forestry and Grassland Bureau is also good at sustainable grassland management, including grass planting, fence building and technical training.

Established in 1955, National Forestry and Grassland Administration Northwest Investigation and Planning Institute is a public welfare institution directly under The National Forestry and Grassland Administration, mainly responsible for the important tasks of investigating, monitoring, evaluating and planning of forest, grassland, wetland, desert ecosystems and nature reserves and wildlife resources in eight provincial units of the Northwest Monitoring Area, including Shanxi, Chongqing, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang and Xinjiang Production and Construction Corps. It has rich experience in forestry and grassland carbon sink measurement and monitoring, consultation and evaluation and research, and has a dedicated carbon sink department within. In addition, the National Forestry and Grassland Administration Northwest Investigation and Planning Institute has rich experience in VCS+CCB and CCER projects, providing planning and research services in carbon neutrality and carbon peak for many local government departments.

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

As listed in Table 2-13 in Section 2.4.2, the key skills required by the project include community engagement, biodiversity assessment and carbon measurement and monitoring skills.

As described in Section 2.4.3 the project proponent and other stakeholders are experienced in sustainable grassland management and VCS+CCB projects development.

Therefore, the project management team has sufficient experience and skills required by the project.

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

The Altay Forestry and Grassland Bureau and the Altay Finance Bureau are government agencies, and the National Forestry and Grassland Administration Northwest Investigation and Planning Institute is a subordinate institution of the National Forestry and Grassland Bureau, which is funded by the local government to ensure the financial health of the project throughout its life. In addition, the Xinjiang Altay City Zhujin Investment Co., Ltd. is a state-owned enterprise legally registered in China. According to the public information listed in National Enterprise Credit Information Publicity System*29*, the Xinjiang Altay City Zhujin Investment Co., Ltd. has not participated in or colluded in any form of corruption, such as bribery, embezzlement, fraud, favoritism, cronyism, cronyism, extortion, and collusion.

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

As legally registered companies, the project sponsor and other participants are obliged to comply with relevant regulations, including anti-corruption laws. Annual audits by the government ensure that its operations are in full compliance with Chinese laws and regulations.

2.4.7 Commercially Sensitive Information (*Rules* 3.5.13 – 3.5.14)

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

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

According to the Land Management Law of China30, there are three legal categories of land in China based on their using purpose: agricultural land, construction land and unused land. The term "agricultural land" refers to the land used for agricultural production, including cultivated land, forest land, grassland, land for farmland water conservancy, water surface for breeding, barren lands, etc.; The term "construction land" refers to the land for buildings and structures, including land for urban and rural housing and public facilities, land for Industry and mining, land for transportation water conservancy facilities, land for tourism, land for military facilities, etc.; The term "unused land" refers to land other than agricultural land and land for

[29] https://www.creditchina.gov.cn/xinyongxinxi/index.html?index=0&scenes=defaultScenario&tableName=credit_xyzx_tyshxydm&searchState=2&entityType=1,2,4,5,6,7,8&keyword=%E6%96%B0%E7%96%86%E9%98%BF%E5%8B%92%E6%B3%B0%E5%B8%82%E9%93%B8%E9%87%91%E6%8A%95%E8%B5%84%E6%9C%89%E9%99%90%E5%85%AC%E5%8F%B8

[30] http://www.npc.gov.cn/npc/c2/c30834/201909/t20190905_300663.html

construction. All the land must be used in accordance with their legal categories defined in General Land Utilization Plan approved by government. It is strictly forbidden for any individuals or entities to change the using purpose of any land.

According to the Article 10 of the Constitution of the People's Republic of China*31* and the provisions of the Land Management Law of China, the land ownership belongs to state or village collective, which is a non-transferable right while the land usage right can be transferred by law.

The state-owned land shall be managed through the State Council and the collective-owned land shall be centrally managed by the respective village committees. The "agricultural land" which belongs to village collective could be used by villagers in the form of household contract with the rural collective economic organization. The barren hills, ditches, hills and beaches that are not suitable for household contract may be contracted in the form of bidding, auction, public consultation, etc., for the use purpose of planting industry forestry, animal husbandry and fishery production. The "agricultural land" which belongs to state but managed by village collectives could also be used by individuals or entities by signing contracts with the rural collective economic organization. Both parties should contract the right and obligations and should protect and make rational use of the land in accordance with the purposes stipulated in the contract.

The people's government at the county level (or higher if necessary) shall register, issue certificates and confirm the ownership, any disputes regarding ownership or usage right of the land shall be arbitrated by the people's government at or above the county level.

According to Participatory Rural Appraisal (PRA) Report, Altay City covers a total area of 1.15 million ha, including 711,400 ha of grassland. The Altai City steppe covers 672,200 ha of natural grassland, 1,867 ha of artificial grassland, and 37,300 ha of other grassland. According to Grassland Law of People's Republic of China, prior to the project initiation, the ownership of 266,655.29 ha grassland of the project belongs to the state and collectives.

2.5.2 Recognition of Property Rights (G5.1)

Before the project was launched, the project area was owned by local township collectives, village collectives and herders. Given the relatively dispersed distribution of the project land, it is difficult for anyone landowner to raise enough funds and effectively maintain the implementation of the project over such a long period of time. Therefore, after seriously considering carbon income and believing that carbon income can help alleviate investment barriers, under the authorization of Altai Forestry and Grassland Bureau, the Xinjiang Altay City Zhujin Investment Co., Ltd. organized and managed the early implementation of the project, including baseline survey and signing carbon credit development consultant agreement with Northwest Surveying and Planning Institute of National Forestry and Grassland Bureau. In the first two years, the Municipal Finance Bureau of Altay raised preliminary funds for reseeding fees and fence construction fees.

According to the Grassland Law of the People's Republic of China, the ownership of grasslands belongs to the state and the collective. After the implementation of the project, the sustainable management of grassland will be carried out by Altay Forestry and Grassland Bureau. In order to ensure the smooth implementation of project-related carbon credits, with the support of Altay Forestry and Grassland Bureau in the early stage, the local township collectives, village collectives and herders who own the project land

[31] https://www.gov.cn/guoqing/2018-03/22/content_5276318.htm

agree to authorize the land and grassland management right within the project boundary to Xinjiang Altay City Zhujin Investment Co., Ltd. during the project credit period. Subsequently, Altay Forestry and Grassland Bureau also confirmed this authorization. the Project Proponent will also be responsible for development of the carbon credits and the carbon revenue will be used for sustainable development and management of the project activities.

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

As described above, Xinjiang Altay City Zhujin Investment Co., Ltd. has been authorized the rights of grassland management within the project boundary during the project crediting period, so the project will not encroach uninvited on private property, community property or government property.

To make all project stakeholders aware of the potential impact of the project on their lives, the project team completed a Participatory Rural Appraisal (PRA) on November 2020 to obtain basic information, data and information on the socio-economic situation of the surrounding area of the project to understand the main socio-economic and environmental issues faced by the stakeholders. Their willingness to participate in the proposed project activities was collected and, using the needs of the proposed project activities, the potential socio-economic and environmental impacts of the proposed project activities were analyzed.

Also, a stakeholder meeting was held during the PRA survey and questionnaires were distributed to attendees to collect their feedback. During the meeting, the project owner publicized the draft Project Design Report and informed stakeholders of the project's impact.

The project will not change the ownership of the project land, but some herders are affect by the project, due to grazing was strictly forbidden in the first five years, and then controlled grazing will be allowed depending on the growth situation of the forage. To mitigate the impact of project implementation, the project proponent and Altay Forestry and Grassland Bureau will measure the grass yield of the surrounding grasslands in the project area in July and August every year, calculate the reasonable grazing quantity according to the carrying capacity standard of Xinjiang Uygur Autonomous Region, and guide herders to graze within the acceptable area to make sure their grazing productivity could be maintained. So, the project will not reduce the grazing time and quantity, instead of which, the sustainable grazing could improve the grazing productivity in a long term. And the leakage emissions due to grazing displacement are calculated in section 3.2.3.

Through conference interviews and questionnaires, all stakeholders learned about the impact of the project and believed that the implementation of the project could restore degraded grassland and increase grazing area in the long term. The project also provided employment opportunities and increased the income of local herders.

In conclusion, the project has received free, prior, and informed consent from relevant property rights holders prior to commencing with project activities.

2.5.4 Property Rights Protection (G5.3)

Prior to the project implementation, the project area is mostly degraded grassland with no residents, and Altay Forestry and Grassland Bureau has confirmed the right of grassland management to the project proponent during the project crediting period. The project will not change the ownership of the project land, but some herders are affected by the project, due to grazing was strictly forbidden in the first five years,

and then controlled grazing will be allowed depending on the growth situation of the forage. Altay Forestry and Grassland Bureau measures the grass yield of the surrounding grasslands in the project area, and guides herders to graze in a reasonable area. Also, the project provides job opportunities for local herders, which will increase their income in long term. In addition, due to the prohibition of grazing, herders in the project area can receive corresponding.

Therefore, the project will not change the ownership of the project land, lead to involuntary removal or relocation of property rights holders from their lands or territories and does no force rights holder to relocate activities important to their culture or livelihood.

2.5.5 Illegal Activity Identification (G5.4)

Currently all project lands are defined as grassland by local government. According to Chinese grassland law[32], activities that destroy the grassland like mining and construction without pre-approval by local authority are strictly prohibited. Prior to the implementation of the project, the project area was degraded due to long-term overgrazing but no mining or construction or other destroying activities exist on the grassland, thus no illegal activities occurred around the project area. Although a series of laws and administrative regulations in China prohibit destruction of grassland, none of them mandate the restoration of degraded grassland like the project activities, See the Section 3.1.4 for details.

Therefore, the project's climate, community and biodiversity impacts will not be affected by the illegal activities.

2.5.6 Ongoing Disputes (G5.5)

The project area was owned by township collectives, village collectives and pastoralists before the project was launched, and there were no unresolved conflicts or disputes over rights to land, territory and resources, nor have there been any resolved disputes in the last two decades. At the beginning of the project, the local population made a living from herding cattle, there were not many other job opportunities, and most local women had no income.

This project will not change the ownership of the project land, but some herders will be affected by this project. Some areas (about 29,996.42 ha) will be strictly prohibited from grazing within 5 years after the installation of fences, and then grazing will be controlled according to the growth of pasture. Altay Forestry and Grassland Bureau will measure the yield of herbage in the surrounding grasslands of the project area to guide herders to graze in reasonable areas. In addition, the project provides employment opportunities for local pastoralists, which will increase their income in the long run. In addition, herders in the project area can receive corresponding subsidies due to rotational grazing and grazing prohibition.

The healthy grassland ecosystem is an attractive landscape which could significantly benefit local touristic resources and promote the local economy. After the implementation of the project, local residents have more opportunities to work together, which will give them the motivation to organize more social activities and hence increase the interaction within the community. So, there is no ongoing or unresolved conflicts or disputes over rights to lands, territories and resources exist.

[32] http://www.forestry.gov.cn/main/3949/20180918/1141201277620 82.html

2.5.7 National and Local Laws (G5.6)

This project complies with various regulations in the grassland field, as follows:

1) PRC Constitution, PRC Grassland Law, PRC Wildlife Protection Law, Grassland Fire Prevention Regulations, Insect Control Regulation, PRC Production Safety Law, PRC Labour Law;

2) GB19377-2003 Parameters for Degradation, Sandification and Salification of Rangelands[33];

3) NY/T 1176-2006 Technical guidelines for seasonal banning and long-term grazing prohibition[34];

4) NY/T 1342-2007 Technical Rules for Establishing Cultivated Grassland[35];

5) According to Article 51 of the PRC Grassland Law, the planting of forage grass or fodder crops on grasslands shall comply with the plans for the protection, construction and utilization of grasslands；The grass seeding and fencing construction of the project in strict accordance with the requirements of GB/T 27514-2011 Technical Regulation of Reseeding on Sandy Grassland[36] and NY/T 1237-2006 Technical Rule for Fences Construction of Rangeland[37];

6) According to Article of the PRC Grassland Law and the Grassland Fire Prevention Regulations, a responsibility system for grassland fire prevention should be established, the grassland fire prevention period should be stipulated, the grassland fire prevention and suppression plan should be formulated, and the prevention and suppression of grassland fires should be effectively done.

7) The project proponent is experienced in local natural risk control and has established a Grassland Management Manual for the project which includes specific instruction in fire prevention.

8) As mentioned in Section 2.3.17, negative well-being impacts on community groups, including fire, emergency situations and dangerous driving, can be mitigated by technical and awareness training of local pastoralists/communities, enhanced patrolling and monitoring. The project sponsor and the Altay Forestry and Grassland Bureau have trained local herders in relevant skills and strengthened their safety awareness. The local forestry and grassland bureau is equipped with fire fighting facilities, such as fire suits, fire trucks, fire water guns, etc. In addition, local herdsmen patrol the grassland every day, which can prevent the occurrence of grassland fires. In addition, the Prairie Patrol vehicle has a first aid kit in case of an emergency.

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

2.5.8 Approvals (G5.7)

The Project Design was approved by Altay Region Development and Reform Commission on 9-October-2020. The Altay Regional Development and Reform Commission is a government department in Altay

[33] http://c.gb688.cn/bzgk/gb/showGb?type=online&hcno=5F1960D0692A36C09136E04E6DE60B4E
[34] https://www.sdtdata.com/fx/fmrule/tsLibCard.doView
[35] https://www.sdtdata.com/fx/fmrule/tsLibCard.doView
[36] http://c.gb688.cn/bzgk/gb/showGb?type=online&hcno=7055D7EE6F71252F87CBCA16537DA2C1
[37] https://www.sdtdata.com/fx/fmrule/tsLibCard.doView

Prefecture, Xinjiang Uygur Autonomous Region, responsible for approving projects related to ecological environment protection and people's well-being within its jurisdiction.

2.5.9 Project Ownership (G5.8)

As mentioned in Section 2.5.2, before the implementation of the project, township collective, village collective and herdsmen owned the project area. Due to the relatively scattered distribution of project land, it is difficult for anyone landowner to raise enough funds and effectively maintain the implementation of the project over such a long period of time. Therefore, considering that carbon benefits can help alleviate investment barriers, the project owner agreed to authorize the land and grassland management rights within the project boundary to Xinjiang Altay Zhujin Investment Co., Ltd. during the project accounting period, which was confirmed by Altay Forestry and Grassland Bureau.

So, Xinjiang Altay Zhujin Investment Co., Ltd. have the rights to control and operate the project as Project Proponent during the whole project crediting period. The Project Proponent should be responsible for the maintenance and overall management of the grassland during the whole crediting period. In addition, the Project Proponent will also be responsible for development of the carbon credits and the carbon revenue will be used for sustainable development and management of the project activities.

Therefore, the Project Proponent of the project has the unconditional, undisputed and unencumbered ability to claim that the project will generate the project's climate, community and biodiversity benefits.

2.5.10 Management of Double Counting Risk (G5.9)

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

2.5.11 Emissions Trading Programs and Other Binding Limits

The project will not seek to generate or has received any form of environmental credits, and the GHG emission removals generated by the project will not be used for compliance under such programs or mechanisms.

2.5.12 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

2.5.13 Participation under Other GHG Programs

The project has not been participated under any other GHG programs.

2.5.14 Projects Rejected by Other GHG Programs

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

2.5.15 Double Counting (G5.9)

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

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

1) VM0026 Sustainable Grassland Management, v1.1

2) Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, v3.0

3) Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM AR Project Activities, v1.0

4) Guidelines for sampling and surveys for CDM project activities and programmes of activities, v 4.0

5) VMD0033 Estimation of emissions from Market leakage, v1.0

6) VMD0040 Leakage from displacement of grazing activities, v1.0

3.1.2 Applicability of Methodology

This methodology applies to Agricultural Land Management (ALM) project activities that introduce sustainable grassland management practices such as improving the rotation of grazing animals between grassland areas, limiting the number of grazing animals on degraded grassland, and restoring severely degraded grasslands by replanting with grasses and ensuring appropriate management over the long-term into a grassland landscape.

VM0026/Version 1.1 “Sustainable Grassland Management” are applicable under the following conditions:

Applicability conditions	Justification / Explanation
1. The project area is grassland at the start of the project.	According to the land cover data of Altay City in year 2010, which released by the National Basic Geographic Information Center (Figure 2-7), combined with project area location (Figure 2-2), and the satellite image (Figure 2-8, Figure 2-9), the project area is identified as grassland at the start of the project.
2. The project area is land that is degraded at the start of the project and degradation will continue in the baseline scenario on the basis that degradation drivers or pressures are still present in the baseline scenario. The procedures outlined the latest version of the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities must be used to determine both that the land is degraded at the start of the project and that in the baseline scenario the land will continue to degrade. The procedures outlined the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities (Version 1.0) is described below. (a) Provide documented evidence that the area has been classified as "degraded" under verifiable local, regional, national or international land classification system or peer-review study, participatory rural appraisal, satellite imagery and/or photographic evidence in the last 10 years. If the documented evidence of degradation is older than ten years then: (i) Provide evidence that the natural or anthropogenic degradation drivers and pressures that led to the land becoming "degraded" are still present and/or that there are no	As stated in the Project Design Report, the project is all degraded grassland. The aim of the project is to increase carbon sequestration and promote sustainable local development through rotational grazing, grazing bans, reseeding of quality pasture on degraded grasslands, and implementation of sustainable grassland management. According to the Parameters for degradation, sandification and salification of rangelands (GB19377-2003)[38], the total grass yield decreased by more than 21% compared with that before degeneration was defined as degraded grassland. Before the start of the project, the local Forestry and Grassland Bureau monitored the grass yield in the project area. The data showed that the total grass yield in the project area has decreased by 43.44% (moderately degraded grasslands) and 52.29% (seriously degraded grasslands.) compared with the total

[38] GB19377-2003 is a national standard document of the people's Republic of China which issued by The Ministry of Agriculture and Rural Affairs to assess the level of degradation, desertification and salinization of natural grassland. The original website of the standard is http://c.gb688.cn/bzgk/gb/showGb?type=online&hcno=5F1960D0692A36C09136E04E6DE60B4E

Applicability conditions	Justification / Explanation
insufficient land management interventions to reverse degradation. (b) Demonstrate through a comparative study that the candidate lands in the proposed project area have similar or equivalent conditions (e.g. vegetation, soil, climate, topography, altitude, soil class and land use) and socio-economic pressures and drivers of degradation to reference degraded lands elsewhere, verifiably classified and documented as degraded lands. The proof of similarity of lands should be made through verifiable documentation and/or visual field assessment and data sets: (c) Demonstrate through direct evidence based on selected indicators of land degradation that the area is "degraded" and/or "degrading" through conducting either a visual assessment of the state and condition of the indicators or a verifiable participatory rural appraisal (PRA). The indicators of degradation should be locally relevant and verifiable. Candidate lands shall be declared as "degraded" and/or "degrading" if they show at least one of the following: (i) The severity and extent of soil compaction and soil erosion, as determined by the presence of: reductions in topsoil depth (as shown by root exposure, presence of pedestals; exposed sub-soil horizons or armour layers); gully, sheet or rill erosion, landslides, or other forms of mass-movement erosion; (ii) Decline in organic matter content and/or recession of vegetation cover as shown by reduction in plant cover or productivity due to overgrazing or other land management practices, thinning of topsoil organic layer, scarcity of topsoil litter and debris (GPS and photo evidence should be provided); (iii) Presence of plant species locally known to be related to the condition of degradation of the land or field/lab tests showing nutrient depletion (e.g. reduced growth, leaf loss, dessication, leaf chlorosis), salinity or alkalinity, toxic compounds and heavy metals;	yield of non-degraded grassland[39] at the start of the project, which met the requirements of item (iv) of (c) in Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities (Version 1.0). According to the PRA Report, the grassland in the project area has been degraded for more than ten years due to climate change and overgrazing, under the baseline scenario, herders still graze on degraded grassland, while no restoration activities are carried out. So, there were a reduction in plant productivity due to overgrazing. The land in the project area is degraded at the start of the project and that in the baseline scenario the land will continue to degrade.

[39] According to the national standard GB19377-2003, the data of grassland before degradation is based on the grassland survey data of China in the 1980s. The data quoted here is ALeTaiShi Grassland Degradation Reasons and Administering Countermeasure *by* Yu Ting in 2012

Applicability conditions	Justification / Explanation
(iv) A reduction in plant cover or productivity due to overgrazing or other land management practices.	
3. The project area is subject to livestock grazing, burning, and/or nitrogen fertilization in the baseline scenario.	According to the Baseline Survey Report, in the baseline scenario the project area was subject to livestock grazing, but no burning and nitrogen fertilization.
4. In the baseline scenario, more than 95 percent of animal dung from grazing animals deposited on grassland is allowed to lie as is, and is not managed, and in the project scenario no more than 5 percent of the animal dung from grazing animals within the project area is managed with alternative manure management systems.	In the baseline scenario, there were no restrictions or regulations on the accumulation of animal waste in the project area, and all animal waste accumulated on grazing animals in the grassland was piled as is and not managed. In the no-grazing area, grazing is prohibited for the first five years, and then grazing is controlled according to the growth of pasture. No alternative manure management system is used to manage animal manure in rotation and reseeding areas, although the number of grazing animals and days are limited.
5. The project area must not have been cleared of native ecosystems within the 10 years period prior to the project start date.	According to the Project Design Report and related satellite pictures of the project area, the project area is natural grassland, which is continuously degraded due to overgrazing, and have not been cleared of native ecosystems within the 10 year period prior to the project start date.
6. The project area is located in a region where precipitation is less than evapotranspiration for most of the year and leaching is unlikely to occur.	According to described in Project Design Report, the annual evapotranspiration is greater than annual precipitation in Altay generally. In addition, according to relevant statistical data, the average annual

Applicability conditions	Justification / Explanation
	precipitation in Altay is 139.3 ~ 268.4mm, and the annual evaporation is 1397.3 ~ 2140.4mm[40]. Therefore, the annual evaporation in Altay is far greater than the precipitation.
7. If a biogeochemical model is selected for estimation of change in soil carbon stocks, the following conditions must be met: The model must comply with the requirements for models as set out in the VCS rules. The model must be appropriate for the region within which the project is situated. There must be studies by appropriately qualified experts (e.g. scientific journals, university theses, local research studies or work carried out by the project proponent) that demonstrate that the use of the selected biogeochemical model is appropriate for the IPCC climatic regions (see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 3), or the agroecological zone (AEZ) in which the project is situated (see Section 9.3.2).	No biogeochemical model is selected In the project the change of soil carbon stock is calculated based on the content of soil organic carbon which is directly monitored from soil samples.
8. Project activities must not include land use change	Activities such as installing fences and reseeding high-quality grass on degraded grasslands do not change land use patterns.
9. Project activities must not lead to an increase in the use of fossil fuels and fuel wood from non-renewable sources for cooking and heating.	Herders graze around the project area under the guidance of the local forestry and Grass bureau, using cow dung or solar energy as the main energy source for daily life, and the project activities do not involve the use of fossil fuels and fuel wood.
10. Project activities must not occur on wetlands or peatlands.	According to the Project Design Report and related satellite pictures of the project area, the project area is the

[40] https://www.tianqiyubao.com/qihou/12597.html

Applicability conditions	Justification / Explanation
	grassland, not involving wetlands and peatlands.

Therefore, VM0026/Version 1.1 is applicable for the proposed project.

Tool for the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities (Version 3.0) is applicable under the following conditions:

1) AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced;

The restoration of degraded grassland is encouraged in China, and there is no legal prohibition for the project, therefore the proposed project activity on the land within the project boundary does not lead to violation of any applicable law.

2) The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity.

The baseline scenario is identified using the methodology “Sustainable Grassland Management” (Version 1.1), which provides for a stepwise approach justifying the determination of the most plausible baseline scenario no new baseline methodologies involved. Please refer to Section 3.1.4 for details.

Therefore, tool for the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities (Version 3.0) is applicable for the proposed project.

Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM AR Project Activities (version 1.0) provides a procedure for the identification of degraded or degrading lands for the purpose of application of A/R CDM methodologies. There is no mandatory applicability requirement.

According to Appendix of 1 Eligible AFOLU Project Categories of the VCS Standard (version 4.5), eligible ALM activities are those that reduce net GHG emissions on croplands and grasslands by increasing carbon stocks in soils and woody biomass and/or decreasing CO2, N_2O and/or CH_4 emissions from soils. The project area shall not be cleared of native ecosystems within the 10-year period prior to the project start date. Eligible ALM activities include:

1) Improved Cropland Management (ICM): This category includes practices that demonstrably reduce net GHG emissions of cropland systems by increasing soil carbon stocks, reducing soil N_2O emissions, and/or reducing CH_4 emissions.

2) Improved Grassland Management (IGM): This category includes practices that demonstrably reduce net GHG emissions of grassland ecosystems by increasing soil carbon stocks, reducing N_2O emissions and/or reducing CH_4 emissions.

3) Cropland and Grassland Land-use Conversions (CGLC): This category includes practices that convert cropland to grassland or grassland to cropland and reduce net GHG emissions by increasing carbon stocks, reducing N_2O emissions, and/or reducing CH_4 emissions.

The degraded grassland was restored through management measures such as rotation grazing, grazing prohibition and re-seeding of high-quality grass. The soil carbon storage was increased, and the emission of N_2O and CH_4 was reduced, which met the requirements of improved grassland management. As mentioned in Section 2.2.1 and shown in Figure 2-7 to Figure 2-9, the land use scenarios in the project area in 2010 and 2020 are all grassland. As a result, the native ecosystem of the project area was not cleared during the 10-year period prior to the start of the project.

Therefore, all the Tool used is the methodology VM0026/Version 1.1 referenced, and it is applicable for the project.

3.1.3 Project Boundary

As mentioned above, Altay City is taken as the project zone, and the area with reseeding and fence construction is taken as the project area, so the project boundary is the administrative boundary of Altay City, as shown in Figure 2-2 to Figure 2-3.

The carbon pools selected for under baseline and project accounting of carbon stock changes are shown in Table 3-1:

Table 3-1 Selected Carbon Pools under Baseline and Project

Carbon Pools	Included?	Justification/Explanation
Aboveground woody biomass	Yes	SGM may reduce aboveground woody biomass
Aboveground non-woody biomass	No	The increase of aboveground non-woody biomass resulting from SGM is transient in nature and can be conservatively excluded
Belowground biomass	No	It is a conservative choice to exclude the below-ground biomass
Dead wood	No	None of the applicable SGM practices decrease dead wood
Litter	No	None of the applicable SGM practices decrease the amount of litter
Soil organic carbon	Yes	A major carbon pool affected by grassland management practices that is expected to increase after adoption of SGM practices
Wood products	No	None of the applicable SGM practices increases or decreases wood products

The emission sources and GHGs selected for accounting are shown in Table 3-2:

Source		Gas	Included?	Justification/Explanation
Baseline	Use of fertilizers	CO_2	No	Not applicable
		CH_4	No	Not applicable
		N_2O	No	No fertilizer was used in baseline scenario
	Use of N-fixing species	CO_2	No	Not applicable
		CH_4	No	Not applicable
		N_2O	No	Methodological requirements
	Burning of biomass	CO_2	No	No burning of biomass occurred in baseline scenario
		CH_4	No	No burning of biomass occurred in baseline scenario
		N_2O	No	No burning of biomass occurred in baseline scenario
		CO_2	No	Methodological requirements

Source		Gas	Included?	Justification/Explanation
	Manure deposition on grassland	CH_4	Yes	There is manure deposition under the baseline scenario. It is a significant emission source
		N_2O	Yes	Main gas for this source. Annual precipitation in the project area is less than annual potential evapotranspiration, so indirect N_2O emissions from leaching and runoff can be excluded from the project boundary
	Farming machine	CO_2	No	No farming machinery was used in baseline scenario
		CH_4	No	No farming machinery was used in baseline scenario
		N_2O	No	No farming machinery was used in baseline scenario
	Animal respiration / Enteric fermentation	CO_2	No	Methodological requirements
		CH_4	Yes	Grazing exists in the project area under the baseline scenario and CH_4 is the main gas for this source
		N_2O	No	Methodological requirements
Project	Use of fertilizers	CO_2	No	Not applicable
		CH_4	No	Not applicable
		N_2O	No	No fertilizer was used in project scenario
	Use of N-fixing species	CO_2	No	Not applicable
		CH_4	No	Not applicable
		N_2O	No	No N-fixing species were planted in the project
	Burning of biomass	CO_2	No	No burning of biomass occurred in project scenario
		CH_4	No	No burning of biomass occurred in project scenario
		N_2O	No	No burning of biomass occurred in project scenario
	Manure deposition on grassland	CO_2	No	Methodological requirements
		CH_4	Yes	There is manure deposition under the project scenario. It is a significant emission source
		N_2O	Yes	Main gas for this source. Annual precipitation in the project area is less than annual potential evapotranspiration, so indirect N_2O emissions from leaching and runoff can be excluded from the project boundary
	Farming machine	CO_2	Yes	The use of trucks and tractors during the implementation of the project consumes diesel oil and emits CO_2
		CH_4	No	Methodological requirements
		N_2O	No	Methodological requirements

Source		Gas	Included?	Justification/Explanation
	Animal respiration / Enteric fermentation	CO_2	No	Methodological requirements
		CH_4	Yes	Grazing exists in the project area under the project scenario and CH_4 is the main gas for this source
		N_2O	No	Methodological requirements

3.1.4 Baseline Scenario

Step 1. Identification of alternative land use scenarios to the proposed SGM project

Sub-step 1a) Identify and list all credible alternative land use scenarios to the proposed SGM project:

According to "Sustainable Grassland Management" (Version 1.1), the project refers to the VCS Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities for guidance on identification of realistic and credible alternative land uses.

As stated in the following section 3.1.5, the identified land use scenarios shall at least include:

1) Continuation of pre-project land use

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

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

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

For 3), the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements, there are no legal requirements to carry out similar project activities. And according to the PRA Report and satellite pictures, the project area existed as degraded land more than ten years prior to the project start date. So 3) is not applicable.

Pre-project land use scenario is degraded grassland ecosystem which is the common situation in Altay City (See relevant proof process of Section 3.1.2), it is feasible for the project area taking into account local grassland resources were severely damaged for more than ten years. China has successively issued and revised a series of laws and administrative regulations such as "Law of the People's Republic of China on Grasslands" related to grassland in order to protect grasslands. But none of the laws and regulations mandate the restoration of degraded grassland the same as the project activities. Therefore, the degradation of the grassland of the project area would continue in the absence of the project, the restoration measures implemented by the project activities such as seeding grasses, building fences are not be

mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries[41], any systematically enforced law, statute or other regulatory framework. Thus Scenario 1) remains possible baseline scenario.

Scenario 2) faces the technical and investment which will be discussed in the next section. However, it does not violate any existing enforced mandatory applicable laws and regulations.

Outcome of Sub-step 1a: List of credible alternative land use scenarios that could have occurred on the land within the project boundary of the VCS AFOLU project.

As described before, the list of credible alternative land use scenarios is Scenario 1) and 2).

Sub-step 1b) Check the consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations:

China has successively issued and revised a series of laws and administrative regulations related to grassland, such as the Grassland Law[42], the People's Republic of China on the Protection of Wild Plants [43], the Regulation on Nature Reserve[44], the Regulation on Grassland Fire Control[45], and the Regulation on Forest Diseases and Pests Control[46], etc.

Although these regulations had set overall development goals for grassland development and were started before the adoption by the COP of the CDM M&P (/decision 17/CP.7, 11 November 2001), none of the regulations mandate the restoration of degraded grassland ecosystem. Thus the scenario1) Continuation of pre-project land use is in compliance with mandatory legislation and regulations.

And in China, there is no restrictions, fees or fines for the restoration of degraded grassland as long as the planting area has not been approved for other use. For this project, the project area is located in Altay City where all the land is approved for the restoration of degraded grassland, therefore scenario 2) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project is also in compliance with mandatory legislation and regulations.

Outcome of Sub-step 1b: List of plausible alternative land use scenarios to the VCS AFOLU project activity that are in compliance with mandatory legislation and regulations taking into account their enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

Thus Scenario 1) and 2) remains possible baseline scenarios.

Step 2: Select the most plausible baseline scenario

Sub-step 2a) Barrier analysis:

41 https://unfccc.int/non-annex-I-NCs
42 https://www.gov.cn/gongbao/content/2003/content_62420.htm
43 https://www.gov.cn/gongbao/content/2019/content_5468858.htm
44 http://www.forestry.gov.cn/main/3950/20170314/459882.html
45 https://www.gov.cn/zhengce/zhengceku/2008-12/05/content_2756.htm
46 http://www.forestry.gov.cn/c/www/gkxzfg/300054.jhtml

The barrier analysis was conducted to identify realistic and credible barriers that prevent implementation of these land use scenarios following the procedures described in Step 3 of the VCS Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities[47].

1. Investment barriers

According to the project design report, the project restored the degraded grassland by reseeding high-quality grass seed, fence rotation grazing and grazing prohibition. The total investment of the project was 39.894 million RMB, which was funded by the Altay Finance Bureau. In order to ensure the sustainable development of the project, according to "Management and maintenance contract", 1,975 of local herders were employed as grassland guardians, with an annual salary of 22,176 RMB (3,019.61 USD) per person[48], the total cost of 43.798 million RMB (5.96 million USD) per year needs to be raised by the project proponent. Since the project has no benefits, there is no institutional investment. Therefore, the investment barrier for this project is the lack of access to credit. *43.798 million RMB/year*

2. Technological barriers

According to the research of the Pan Qingming et al[49], the structure and functionality of grassland vegetation must currently be restored over a longer period of time in China, and the country lacks the capacity to create distinct restoration solutions for various types of grassland and stages of degradation. In addition, grassland grazing management technology is still in its growing stages. Most herdsmen are still in the initial free grazing stage of their grazing management. Because of the expensive expense of the fence, the grazing restriction technique cannot be widely adopted. For Scenario 2), project activity on the land within the project boundary performed without being registered as the VCS AFOLU project, the project owner needs to hire local residents to plant grass, but the survey conducted by the project owner[50] shows that local residents lack access to high-quality grass seeds and necessary tools, such as trucks, tractors and seeders, etc. They also lack skills in grass planting, rodent control, fire prevention, and sustainable grassland management. In addition, the lack of organizational instruments also prevents them from overcoming technological barriers. Therefore, the technological barrier for this project is the lack of access to planting materials and equipment for implementing the technology.

Upon applying for VCS and CCB project, the carbon revenue is the key to sustainable management of project area. And without applying for VCS, the investment barriers (lack of access to credit) and technological barriers (lack of access to planting materials and equipment for implementing the technology) would not be overcome.

Sub-step 2b) Eliminate alternative land use scenarios that face a barrier to implementation:

Scenario 1) does not require extra investment or labor force. Thus, it is not prevented by any of the identified barriers; Scenario 2) faces the investment and technological barriers (lack of access to credit, planting

[47] https://verra.org/methodologies/vt0001-tool-for-the-demonstration-and-assessment-of-additionality-in-vcs-agriculture-forestry-and-other-land-use-afolu-project-activities-v3-0/
[48] Salary payment record
[49] PAN Qingmin, SUN Jiamei, YANG Yuanhe, LIU Wei, LI Ang, PENG Yunfeng, XUE Jianguo, XIA Hao, HUANG Jianhui. Issues and Solutions on Grassland Restoration and Conservation in China. Bulletin of Chinese Academy of Sciences, 36(6): 666-674
[50] The PRA report

materials and equipment for implementing the technology) as stated above which should be eliminated of the list.

Sub-step 2c) Select most plausible baseline scenario (if allowed by barrier analysis):

As analyzed in Sub- step 2a and 2b, the baseline scenario of the project is Scenario 1): continuation of pre-project use (i.e. lands remain degraded grassland ecosystem).

3.1.5 Additionality

Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (version 3.0) is applied to demonstrate the additionality.

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

As described in step 1 of section 3.1.4, the methodology has confirmed the possible baseline scenarios.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

The project generates no financial or economic benefits other than VCS related income, then apply the simple cost analysis (Option I).

Sub-step 2b. – Option I. Apply simple cost analysis

According to the project design report, the total investment during the construction period of this project is 39.894 million yuan, and the annual management and protection cost in the whole life cycle is expected to be 29.21 million yuan. Since the project is based on reseeding of quality grass seed, fenced-off grazing, and rotational grazing on degraded grassland, there is no economic benefit other than generating VCS related income.

Then proceed to Step 4 (Common practice analysis) based on the tool.

STEP 4. Common practice analysis

The previous steps shall be complemented with an analysis of the extent to which similar activities have already diffused in the geographical area of the proposed VCS AFOLU project activity. According to the tool, similar activities are defined as that which are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the relevant geographical area, subject to further guidance by the underlying methodology. Other registered VCS AFOLU project activities shall not be included in this analysis. Considerations shall be limited to the period beginning 10 years prior to the project start date.

As the framework conditions vary significantly between each province and Autonomous region of China, the investment climate, tariff, land policy, regulations etc. for degraded grassland restoration project are only comparable in the same province or the same autonomous region. The project is located in Altay City, Altay Region, Xinjiang Uygur Autonomous Region, so the relevant geographical area for common practice analysis is selected to be Xinjiang Uygur Autonomous Region.

In terms of the project, similar activities should meet the applicability of methodology VM0026 Sustainable Grassland Management, v1.1. That is sustainable grassland management practices, such as improving the rotation of grazing animals between summer and winter pastures, limiting the timing and number of grazing animals on degraded pastures, and restoration of severely degraded land by replanting with perennial grasses and ensuring appropriate management over the long-term.

In this project, high-quality grass species are planted on the degraded grassland, or grazing control methods such as fence prohibition and rotational grazing are adopted. Considering ±50% of the project construction size, the similar project size is defined as 266655 to 399980 ha. The project commencement date is June 18, 2021, so similar considerations are limited to June 2011 commencement.

According to a check with the local government, except for some small-scale grassland restoration projects implemented since 2011, no degraded grassland restoration project similar in scale to the proposed project has been implemented in the area before.

As a result, no similar project activities were identified within the common practice boundaries, and thus step 4 was satisfied.

Therefore, the proposed project is not a common practice and the proposed project activities are not additional baseline programmers.

3.1.6 Methodology Deviations

Not applicable.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

1. Baseline N_2O emissions due to fertilizer use

According to the Baseline Survey Report and Participatory Rural Appraisal (PRA) Report of the project, no nitrogen fertilizer was applied in baseline scenario.

2. Baseline emissions due to the use of N-fixing species

According to the methodology (VM0026/Version 1.1), N_2O emissions due to the use of N-fixing species in the baseline are excluded.

3. Baseline emissions due to burning of biomass

According to the Baseline Survey Report and Participatory Rural Appraisal (PRA) Report, there was no biomass burning in the project area in baseline scenario.

4. Baseline CH_4 emissions due to enteric fermentation

Baseline CH_4 emissions from enteric fermentation are calculated using the following:

$$BE_{CH_4EF,b} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} P_{l,b} \times EF_l \times Days_{l,b}}{1000 \times 365} \quad (2)$$

Where:

GWP_{CH_4}	=	Global-warming potential for CH_4 (t CO_2e/t CH_4)
$P_{l,b}$	=	Population of grazing livestock type l in baseline year b (head)
l	=	Index of livestock type
EF_l	=	Enteric CH_4 emission factor per head of livestock type l per year (kg CH_4 head*year)
$Days_{l,b}$	=	Grazing days inside the project area for each livestock type l in baseline year b (days)
1000	=	Conversion factor for t CH_4 to kg CH_4
365	=	Conversion factor for years to days

According to the Grazing Displacement Management Plan, the population of cattle $P_{cattle,2021}$ is 178,300 and the population of sheep $P_{sheep,2021}$ is 406,900 in baseline year 2021. Grazing days of cattle and sheep inside the project area $Days_{l,2021}$ is 210 days. GWP_{CH_4} is 28 t CO_2e/t CH_4, derived from VCS Standard (Version 4.5). EF_{cattle} is 56 kg CH_4/ (head * year) and EF_{sheep} is 5 kg CH_4/ (head * year) which derived from 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. See Section 3.3.1 for the detail.

Finally, baseline CH4 emissions from enteric fermentation was calculated and the value is 193,626 tCO_2e.

5 Baseline N_2O and CH_4 emissions due to manure management

Baseline emissions from manure management include N_2O and CH_4 emissions from manure and urine deposited on grassland soil during the grazing season.

$$BE_{GHG_{MD},b} = BE_{N_2O_{MD},b} + BE_{CH_4{}_{MD},b} \quad (3)$$

Where:

$BE_{N_2O_{MD},b}$ = Baseline N_2O emissions from manure and urine deposited on grassland soil in baseline year b (t CO_2e)

$BE_{CH_{4_{MD}},b}$ = Baseline CH_4 emissions from manure and urine deposited on grassland soil in baseline year b (t CO_2e)

1) Baseline N_2O emissions from manure management

$$BE_{N_2O_{MD},b} = GWP_{N_2O} \times (BE_{D,N_2O_{MD},b} + BE_{ID,N_2O_{MD},b}) \quad (4)$$

Where:

GWP_{N_2O} = Global warming potential for N_2O (t CO_2e/t N_2O)

$BE_{D,N_2O_{MD},b}$ = Direct N_2O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N_2O)

$BE_{ID,N_2O_{MD},b}$ = Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N_2O)

2) Baseline direct N_2O emissions from manure and urine deposited on grassland soils

Direct Baseline direct N_2O emissions from manure and urine deposited on grassland soil are calculated using the following:

$$BE_{D,N_2O_{MD},b} = \sum_{l1=1}^{L1} F_{MD,l1,b} \times EF_{3,PRP,CPP} \times \frac{44}{12} \quad (5)$$

And/or

$$BE_{D,N_2O_{MD},b} = \sum_{l2=1}^{L2} F_{MD,l2,b} \times EF_{3,PRP,SO} \times \frac{44}{12} \quad (6)$$

$F_{MD,l1,b}$ and $F_{MD,l2,b}$ must be calculated using the following equation for livestock type l.

$$F_{MD,l1,b} = \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \quad (7)$$

Where:

$F_{MD,l1,b}$	=	Annual amount of nitrogen in cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_x (t N)
$F_{MD,l2,b}$	=	Annual amount of nitrogen in sheep and other animals manure and urine deposited on grassland soil during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_x (t N)
$EF_{3,PRP,CPP}$	=	N_2O emission factor for cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)
$EF_{3,PRP,SO}$	=	N_2O emission factor for sheep and other animals manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)
$l1$	=	Index of livestock cattle, poultry and pigs
$l2$	=	Index of livestock sheep and other animals
$P_{l,b}$	=	Population of livestock type l in baseline year b (head)
$W_{l,b}$	=	Average weight of livestock type l in baseline year b (kg livestock mass/head)
Nex_l	=	Nitrogen excretion of livestock type l (kg N deposited /(t livestock mass*day))
$1000a$	=	Conversion factor for t livestock mass to kg livestock mass
$H_{l,b}$	=	Average grazing hours per day for livestock type l in baseline year b (hour)
24	=	Conversion factor for days to hours
$Days_{l,b}$	=	Grazing days for livestock type l inside the project area in baseline year b (days)
$1000b$	=	Conversion factor for t N to kg N

$Frac_{GAS,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)
l	=	Index of grazing livestock types

See Section 3.2.1, according to the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, $EF_{3,PRP,CPP}$, $EF_{3,PRP,SO}$, $Frac_{GAS,MD}$ is 0.002 kg N_2O-N/kg N input, 0.003 kg N_2O-N/kg N input, 0.212 kg N volatilized/kg of N deposited respectively. $Nex_{lcattle}$ is 0.38 kg N deposited/(t livestock mass * day) and Nex_{sheep} is 0.32 kg N deposited/(t livestock mass * day). Average grazing hours per day for cattle and sheep in baseline year 2021 $Days_{l,2021}$is 8 hours. According to the local expert judgment, average weight of the cattle $W_{cattle,2016}$ and sheep $W_{sheep,2016}$ is 300 and 45 kg/head respectively. So, the direct N_2O emissions from manure and urine deposited on grassland soil during the grazing season in 2021 is 5 t N_2O.

3) Baseline indirect N_2O emissions from manure and urine deposited on grassland soils

According to the methodology (VM0026/Version 1.1) and the Project Design Report, the annual precipitation of the project area is less than annual potential evapotranspiration, so, indirect N_2O emissions from leaching and runoff can be excluded.

The indirect N_2O emissions from the atmospheric deposition of N volatilized as NH_3 and NO_x after urine and manure N is deposited on grassland soils in baseline year b, are calculated using the following:

$$BE_{ID,N_2O_{MD},b} = \sum_{l=1}^{L} F_{MD,l,b} \times Frac_{GAS,MD} \times EF_{4,MD} \times \frac{44}{28} \quad (8)$$

Where:

$BE_{ID,N_2O_{MD},b}$	=	Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N_2O)
$F_{MD,l,b}$	=	Annual amount of manure and urine deposited on grassland soil from livestock type l during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_x (t N)
$Frac_{GAS,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)
$EF_{4,MD}$	=	N_2O emission factor for atmospheric deposition of urine and manure N on

soils and water surfaces, (kg N_2O-N/(kg NH_3-N + NO_x-N volatilized))

L = Index of grazing livestock types

Refer to section 3.3.1 for relevant parameter references, according to the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, $Frac_{GAS,MD}$, $EF_{l,M}$ is 0.212 kg N volatilized/kg of N deposited, 0.6 kg CH_4/ (head * year) respectively. The indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in 2021 is 2 t N_2O.

Finally, baseline N_2O emissions from manure and urine deposited on grassland soil in 2021 is 1,975 tCO_2e. Please see the ER table for the detail.

4) CH_4 emissions from manure management

Baseline CH_4 emissions from manure management are calculated using the following:

$$BE_{CH_{4MD},b} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lM} \times P_{l,b} \times H_{l,b} \times Days_{l,b}}{1000 \times 24 \times 365} \quad (9)$$

Where:

$P_{l,b}$ = Population of grazing livestock type l, in baseline year b, head

EF_{lM} = CH_4 emission factor from manure of livestock type l (kg CH_4/(head*year))

$H_{l,b}$ = Average grazing hours per day for livestock type l in baseline year b (hour)

$Days_{l,b}$ = Grazing days for livestock type l inside the project area in baseline year b (days)

1000 = Conversion factor for t CH_4 to kg CH_4

365 = Conversion factor for years to days

24 = Conversion factor for days to hours

Refer to section 3.3.1 for relevant parameter references, and the baseline CH_4 emissions from manure management is 1,885 tCO_2e.

6. Baseline CO_2 emissions due to the use of fossil fuels for grassland management

According to the Participatory Rural Appraisal (PRA) Report and Project Design Report, there was no grassland management in baseline scenario, thus did not involve agricultural machinery.

7. Baseline emission removals from existing woody perennials

According to the Baseline Survey Report and Participatory Rural Appraisal (PRA) Report, there were no perennial woody plants in the project area under the baseline scenario.

8. Baseline emission removals due to changes in soil organic carbon

According to the methodology, since the applicability conditions limit the project to land that is degraded and is continuing to degrade, it can be conservatively assumed that the changes in SOC in the baseline scenario is 0 tCO_2e.

Baseline emissions and removals

The emissions and removals in baseline year b are calculated as follows:

$$BE_b = BE_{N_2O_{SN},b} + BE_{BBb} + BE_{CH_{4EF},b} + BE_{GHG_{MD},b} + BE_{FC,b} - BRWP_b \quad (10)$$

Where:

BE_b	=	Baseline emissions and removals in year b (t CO_2e)
$BE_{N_2O_{SN},b}$	=	Baseline N_2O emissions due to fertilizer use in baseline year b (t CO_2e)
BE_{BBb}	=	Baseline GHG emissions from biomass burning in baseline year b (t CO_2e)
$BE_{CH_{4EF},b}$	=	Baseline CH_4 emissions from enteric fermentation in baseline year b (t CO_2e)
$BE_{GHG_{MD},b}$	=	Baseline GHG emissions from manure management in baseline year b (t CO_2e)
$BE_{FC,b}$	=	Baseline CO_2 emissions from farming machine fossil fuel consumption in baseline year b, (t CO_2)
$BRWP_b$	=	Baseline removals from existing woody perennials in baseline year b (t CO_2)

As described above, baseline emissions due to enteric fermentation and manure management should be calculated.

$$BE_b = BE_{CH_{4EF},b} + BE_{GHG_{MD},b} \quad (11)$$

$$= BE_{CH_{4EF},b} + BE_{N_2O_{MD},b} + BE_{CH_{4MD},b}$$

$$= \frac{GWP_{CH_4} \times \sum_{l=1}^{L} P_{l,b} \times EF_l \times Days_{l,b}}{1000 \times 365} + GWP_{N_2O} \times \left(\sum_{l1=1}^{L1} \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,CPP} \times \frac{44}{12} + \sum_{l2=1}^{L2} \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,SO} \times \frac{44}{28} + \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lM} \times P_{l,b} \times H_{l,b} \times Days_{l,b}}{1000 \times 24 \times 365} \right)$$

$$= 193{,}626 + 1{,}975 + 1{,}885$$

=197,486 t CO_2e

Therefore, the baseline emissions are 197,486 t CO_2e, please refer to ER spreadsheet for detailed calculation.

3.2.2 Project Emissions

1. Project N_2O emissions due to fertilizer use

According to the Project Design Report of the project, no nitrogen fertilizer was applied in project scenario of the project area.

2. Project emissions due to the use of N-fixing species

According to the Project Design Report, the project reseeding *Medicago sativa* (Lucerne), *Agropyron cristatum* (Ice grass), *Bromus inermis* (Awnless brome) and *Festuca arundinacea* (Tall fescue) on the degraded grassland, which did not involve N-fixing species.

3. Project emissions due to burning of biomass

According to the records of grassland guardian and local forestry and grass bureau[51], there is no biomass burning in this project. So, project emissions due to burning of biomass is considered to be 0 tCO_2e.

4. Project CH_4 emissions due to enteric fermentation

Project CH_4 emissions from enteric fermentation are calculated using the following:

[51] The project employed 1,317 herders as guardians, who regularly patrol the grasslands, record abnormal phenomena and report to Altay Forestry and Grassland Bureau

$$PE_{CH_4EF,t} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} P_{l,t} \times EF_l \times Days_{l,t}}{1000 \times 365} \quad (12)$$

Where:

GWP_{CH_4}	=	Global-warming potential for CH_4 (t CO_2e/t CH_4)
$P_{l,t}$	=	Population of grazing livestock type l in year t under project (head)
l	=	Index of livestock type
EF_l	=	Enteric CH_4 emission factor per head of livestock type l per year (kg CH_4 head*year)
$Days_{l,t}$	=	Grazing days inside the project area for each livestock type l in project year t (days)
1000	=	Conversion factor for t CH_4 to kg CH_4
365	=	Conversion factor for years to days

Please refer to section 3.3.2 for relevant parameter references and values. Due to different management measures, the days of cattle and sheep grazing in the project area are different, resulting in different CH_4 emissions from enteric fermentation. Please see the ER table for the detail.

5. Project N_2O and CH_4 emissions due to manure management

Project emissions from manure management include N_2O and CH_4 emissions from manure and urine deposited on grassland soil during the grazing season.

Project N_2O and CH_4 emissions in different management practices are calculated using the following respectively:

$$PE_{GHG_{MD},t} = PE_{N_2O_{MD},t} + PE_{CH_{4MD},t} \quad (13)$$

Where:

$PE_{N_2O_{MD},t}$ = Project N_2O emissions from manure and urine deposited on grassland soil in year t (t CO_2e)

$PE_{CH_{4_{MD}},t}$ = Project CH_4 emissions from manure and urine deposited on grassland soil in year t (t CO_2e)

1) Project N_2O emissions from manure management

$$PE_{N_2O_{MD},t} = GWP_{N_2O} \times (PE_{D,N_2O_{MD},t} + PE_{ID,N_2O_{MD},t}) \quad (14)$$

Where:

GWP_{N_2O} = Global warming potential for N_2O (t CO_2e/t N_2O)

$PE_{D,N_2O_{MD},t}$ = Direct N_2O emissions from manure and urine deposited on grassland soil during the grazing season in year t (t N_2O)

$PE_{ID,N_2O_{MD},t}$ = Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in year t (t N_2O)

2) Project direct N_2O emissions from manure and urine deposited on grassland soils

Direct Project direct N_2O emissions from manure and urine deposited on grassland soil are calculated using the following:

$$PE_{D,N_2O_{MD},t} = \sum_{l1=1}^{L1} F_{MD,l1,t} \times EF_{3,PRP,CPP} \times \frac{44}{12} \quad (15)$$

And/or

$$PE_{D,N_2O_{MD},t} = \sum_{l2=1}^{L2} F_{MD,l2,t} \times EF_{3,PRP,SO} \times \frac{44}{12} \quad (16)$$

$F_{MD,l1,t}$ and $F_{MD,l2,t}$ must be calculated using the following equation for livestock type l.

$$F_{MD,l1,t} = \frac{P_{l,t} \times W_{l,p} \times Nex_l \times H_{l,t} \times Days_{l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \quad (17)$$

Where:

$F_{MD,l1,t}$	=	Annual amount of nitrogen in cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season in year t, adjusted for volatilization as NH_3 and NO_x (t N)
$F_{MD,l2,t}$	=	Annual amount of nitrogen in sheep and other animals manure and urine deposited on grassland soil during the grazing season in year t, adjusted for volatilization as NH_3 and NO_x (t N)
$EF_{3,PRP,CPP}$	=	N_2O emission factor for cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)
$EF_{3,PRP,SO}$	=	N_2O emission factor for sheep and other animals manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)
$l1$	=	Index of livestock cattle, poultry and pigs
$l2$	=	Index of livestock sheep and other animals
$P_{l,t}$	=	Population of livestock type l in year t (head)
$W_{l,p}$	=	Average weight of livestock/under project (kg livestock mass/head)
Nex_l	=	Nitrogen excretion of livestock type l (kg N deposited /(t livestock mass*day))
$1000a$	=	Conversion factor for t livestock mass to kg livestock mass
$H_{l,t}$	=	Average grazing hours per day for livestock type l in year t (hour)
24	=	Conversion factor for days to hours
$Days_{l,t}$	=	Grazing days for livestock type l inside the project area in year t (days)
$1000b$	=	Conversion factor for t N to kg N
$Frac_{GAS,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing

animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)

l = Index of grazing livestock types

3) Project indirect N_2O emissions from manure and urine deposited on grassland soils

According to the methodology (VM0026/Version 1.1) and the Project Design Report, the annual precipitation of the project area is less than annual potential evapotranspiration, so, indirect N_2O emissions from leaching and runoff can be excluded.

The indirect N_2O emissions from the atmospheric deposition of N volatilized as NH_3 and NO_x after urine and manure N is deposited on grassland soils in year t under the project, are calculated using the following:

$$PE_{ID,N_2O_{MD},t} = \sum_{l=1}^{L} F_{MD,l,t} \times Frac_{GAS,MD} \times EF_{4,MD} \times \frac{44}{28} \quad (18)$$

Where:

$PE_{ID,N_2O_{MD},t}$ = Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in year t (t N_2O)

$F_{MD,l,t}$ = Annual amount of manure and urine deposited on grassland soil from livestock type l during the grazing season in project year t, adjusted for volatilization as NH_3 and NO_x (t N)

$Frac_{GAS,MD}$ = Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)

$EF_{4,MD}$ = N_2O emission factor for atmospheric deposition of urine and manure N on soils and water surfaces, (kg N_2O-N/(kg NH_3-N + NO_x-N volatilized))

L = Index of grazing livestock types

4) CH_4 emissions from manure management

Project CH_4 emissions from manure management are calculated using the following:

$$PE_{CH_4MD,t} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lM} \times P_{l,t} \times H_{l,t} \times Days_{l,t}}{1000 \times 24 \times 365} \quad (19)$$

Where:

$P_{l,t}$	=	*Population of grazing livestock type l in year t, head*
EF_{lM}	=	CH_4 emission factor from manure of livestock type l (kg CH_4/(head*year))
$H_{l,t}$	=	Average grazing hours per day for livestock type l in year t (hour)
$Days_{l,t}$	=	Grazing days for livestock type l inside the project area in year t (days)
1000	=	Conversion factor for t CH_4 to kg CH_4
365	=	Conversion factor for years to days
24	=	Conversion factor for days to hours

6. Project CO_2 emissions due to the use of fossil fuels

According to Project Design Report, project emissions from the use of fossil fuels are larger than baseline emissions although the project construction follows the principle of energy conservation and environmental protection, so the project emissions from the use of fossil fuels must be account.

Project CO_2 emissions due to the use of fossil fuels are calculated using the following:

$$PE_{FC,t} = \frac{\sum_{p=1}^{P}\sum_{j=1}^{J}\sum_{k=1}^{K} FC_{p,j,k,t} \times EF_{CO_2,k} \times NCV_k}{1000} \quad (20)$$

Where:

$PE_{FC,t}$	=	Fuel consumption by fuel type k, by machine type j, on grassland parcel p, in year t (kg fuel/year)
$EF_{CO_2,k}$	=	CO_2 emission factor by fuel type k (t CO_2/GJ)
NCV_k	=	Thermal value of fuel type k (GJ/t fuel)

1000	=	Conversion factor for tonnes fuel to kg fuel
k	=	Index of grazing livestock types
j	=	Index of machine type
p	=	Index of grassland parcel

7. Project removals from woody perennials

According to the Project Design Report, the project planted grass on the degraded grassland, and no woody plants were planted. So, the project removals from woody perennials are considered to be 0 tCO_2e.

8. Project removals due to changes in soil organic carbon

Estimate of project removals due to changes in SOC using a direct measurement approach (Option 2). According to the methodology, for measuring soil organic carbon stock changes, soil sampling must follow a scientifically established method (e.g. methods described in Carter and Gregoroch, 2006), or a nationally-approved standard. For the project, the nationally-approved standard The Technical Specification for Soil Environmental Monitoring (HJ/T 166-2004)[52] was used for sampling process. National standard Method for Determination of Soil Organic Matter (NY/T 1121.6-2006)[53] was used to measure SOC of the soil samples.

Sampling procedures were designed such that the statistical significance of soil carbon stock changes between the baseline carbon stock and the carbon stock in time t can be determined with a 95 percent confidence interval. The Guidelines for sampling and surveys for CDM project activities and programmers of activities (Version 4.0) was followed to determine the sampling procedure and sample size.

The SOC stock in stratum s, sampling site i, under project in year t are calculated using the following:

$$P_{SOC_{mG,s,i,t}} = SOC_{mG,s,i,t} \times BD_{mG,s,i,t} \times Depth \times (1 - FC_{mG,s,i,t}) \times 0.1 \quad (21)$$

Where:

$P_{SOC_{mG,s,i,t}}$	=	SOC stock in the top 30 cm (or greater depth if required) of soil for management practice mG, stratum s, sampling site i under project in year t (t C/ha)

[52] https://www.doc88.com/p-360144165334.html, Issued by the Ministry of Ecology and Environment of the People's Republic of China in 2004
[53] Issued by the Ministry of Agriculture of the People's Republic of China in 2006

$SOC_{mG,s,i,t}$	=	SOC content in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum s, sampling site i under project in year t (t C/ha)
$BD_{mG,s,i,t}$	=	Soil bulk density in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum s, sampling site i under project in year t (t C/ha)
$Depth$	=	Top soil depth, for calculating grassland SOC stock in the top 30 cm of soil (or greater depth if required) (cm)
$FC_{mG,s,i,t}$	=	Percentage of rocks larger than 2mm, roots, and other dead residues with a diameter in the top 30 cm of soil (or greater depth if required), for management practice mG, stratum s, sampling site i under project in year t (t C/ha)
0.1	=	Conversion factor for SOC to t C/ha
mG	=	Index of management practice
s	=	Index of stratum
i	=	Index of sampling site

Calculate average carbon stock of all monitored sites in management practice mG, stratum s, under project using the following:

$$P_{SOC_{mG,s,t}} = \frac{\sum_{i=1}^{I} PSOC_{mG,s,i,t}}{I} \quad (22)$$

Where:

$P_{SOC_{mG,s,t}}$	=	Average carbon stock in stratum s under project (t C/ha)
$SOC_{mG,s,i,t}$	=	SOC stock in the top 30 cm (or greater depth if required) of soil for management practice mG, stratum s, sampling site i under project in year t (t C/ha)
I	=	Monitored sites in stratum s, under project

The following is used to calculate the difference between the carbon stock for management practice mG, under project in year t, and the carbon stock under the baseline scenario, for all strata.

$$P_{mG,t} = \sum_{s=1}^{S} (P_{SOC_{mG,s,t}} - SOC_{S,Baseline}) \times PA_{mG,s,t} \quad (23)$$

Where:

$P_{mG,t}$	=	Average carbon stock in stratum s under project (t C/ha)
$PA_{mG,s,t}$	=	Project areas with management practice mG in stratum s in year t (ha)
$P_{SOC_{mG,s,t}}$	=	Average carbon stock in stratum s under project in year t (t C / ha)
$SOC_{S,Baseline}$	=	Baseline SOC stock of stratum s, in the top 30 cm soil layer (or greater depth if required) (t C / ha)
S	=	Strata under project
s	=	Index of stratum

The following is applied to calculate average carbon stock of all management practice, under project in year t.

$$P_t = \sum_{mG=1}^{M} P_{mG,t} \quad (24)$$

Where:

P_t	=	Carbon stock under project in year t (t C)
M	=	Number of management practice

For the first monitoring of SOC stock, the annual project removals due to changes in SOC stock in year t must be calculated using the following:

$$PR_t = \frac{(P_t)}{n} \times \frac{44}{12} \quad (25)$$

Where:

PR_t = Project removals due to changes in SOC in year t (t CO_2e)

n = Number of years from the project start date to year t (years)

For the second and subsequent monitoring of SOC stock, the annual project removals due to changes in SOC stock in year t must be calculated using the following:

$$PR_t = \frac{(P_t - P_{t-f})}{f} \times \frac{44}{12} \quad (26)$$

Where:

PR_t = Project removals due to changes in SOC in year t (t CO_2e)

P_t = Carbon stock under project in year t (t C)

P_{t-f} = Carbon stock under project in year t – f (t C)

f = SOC monitoring frequency (years)

9. Uncertainty analysis

All parameters are selected according to section 9.1 and 9.2 of the methodology (VM0026, Version 1.1), and soil organic carbon data are obtained by laboratory tests. For the project, the project proponent conducted a survey of all grazing agents whose livestock grazed in the project area prior to the project start date. This survey covered a full census of project participants and project non-participants whose livestock graze in the project area during the baseline period (covering the one year prior to the project start date) covered by the survey, and collected grazing data in the project area under the baseline scenario, such as the number and days of grazing, etc. Also, the project proponent and the Altay Forestry and Grassland Bureau recorded all the diesel oil consumed by the project. The parameters about grazing and diesel oil consumption are conservative, and the uncertainty is considered to be 0.

As mentioned before, the project use Option 2 (measurement approach) to estimate project removals due to changes in SOC, the measured SOC changes is derived from sample surveys undertaken within the project area, and the sample size is large, therefore a conservative estimate of carbon sequestration by

carbon pools in the project scenario should be given by adopting a value that represents the lower bound of the 95% confidence interval (sample mean - 1.96 × standard error).

However, for the ex-ante estimation in this PD, the SOC changes in project scenario is based on the literature sources[54], therefore the uncertainty is considered to be zero. And the confidence interval will be adopted in the following verification.

Project net GHG emissions by sources and removals by sinks

Project net GHG emissions by sources and removals by sinks are calculated as follows:

$$PE_t = PE_{N_2O_{SN},t} + PE_{N_2O_{NF},t} + PE_{GHG_{BB},t} + PE_{CH_{4EF},t} + PE_{GHG_{MD},t} - PE_{FC,t} - PRWP_t - PR_t \quad (27)$$

Where:

PE_t	=	Project net GHG emissions by sources and removals by sinks in year t (t CO_2e)
$PE_{N_2O_{SN},t}$	=	Project N_2O emissions as a result of N-fixing species within the project area in year t (t CO_2e)
$PE_{N_2O_{NF},t}$	=	Project N_2O emissions as a result of N-fixing species within the project area in year t (t CO_2e)
$PE_{GHG_{BB},t}$	=	Project GHG emissions from biomass burning in year t (t CO_2e)
$PE_{CH_{4EF},t}$	=	Project CH_4 emissions from enteric fermentation in year t (t CO_2e)
$PE_{GHG_{MD},t}$	=	Project GHG emissions from manure management in year t (t CO_2e)
$PE_{FC,t}$	=	Project CO_2 emissions from farming machine fossil fuel consumption in year t (t CO_2)
$PRWP_t$	=	Project average net change in carbon stocks of existing woody biomass in year t (t CO_2)
PR_t	=	Project removals due to changes in SOC in year t (t CO_2e)

[54] Zhou Xiaoyan.(2019) Impacts of different restoration years of returning grazing land to grassland on community characteristics and soil nutrients of alpine grassland in Maqu County

As described above, project emissions due to enteric fermentation, manure management and the use of fossil fuels, and project removals due to changes in soil organic carbon should be calculated.

$$PE_t = PE_{CH_{4EF},t} + PE_{GHG_{MD},t} + PE_{FC,t} - PR_t \quad (28)$$

$$= PE_{CH_{4EF},t} + PE_{N_2O_{MD},t} + PE_{CH_{4MD},t} + PE_{FC,t} - PR_t$$

$$= \frac{GWP_{CH_4} \times \sum_{l=1}^{L} P_{l,t} \times EF_l \times Days_{l,t}}{1000 \times 365} + GWP_{N_2O} \times \left(\sum_{l1=1}^{L1} \frac{P_{l,t} \times W_{l,p} \times Nex_l \times H_{l,t} \times Days_{l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,CPP} \times \frac{44}{28} + \right. \quad (29)$$

$$\left. \sum_{l2=1}^{L2} \frac{P_{l,t} \times W_{l,p} \times Nex_l \times H_{l,t} \times Days_{l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,SO} \times \frac{44}{28} + \sum_{l=1}^{L} F_{MD,l,t} \times Frac_{GAS,MD} \times EF_{4,MD} \times \frac{44}{28} \right) + PE_{CH_{4MD},t}$$

$$= \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lM} \times P_{l,t} \times H_{l,t} \times Days_{l,t}}{1000 \times 24 \times 365} + PE_{FC,t} \frac{\sum_{p=1}^{P} \sum_{j=1}^{J} \sum_{k=1}^{K} FC_{p,j,k,t} \times EF_{CO_2,k} \times NCV_k}{1000} -$$

$$\frac{\sum_{mG=1}^{M} \sum_{s=1}^{S} \left(\frac{\sum_{i}^{I} SOC_{mG,s,i,t} \times BD_{mG,s,i,t} \times Depth \times (1 - FC_{mG,s,i,t}) \times 0.1}{I} - SOC_{S,Baseline} \right) \times PA_{mG,s,t}}{n} \times \frac{44}{12}$$

Project net GHG emissions during the crediting period is summarized in the following table, please refer to ER spreadsheet for detailed calculation.

Table 3-3 The ex ante estimation of project GHG emissions removals during the crediting period

Crediting period	$PE_{CH_{4EF},t}$	$PE_{N_2O_{MD},t}$	$PE_{CH_{4MD},t}$	$PE_{FC,t}$	PR_t	PE_t
Year	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2021	157,441	1,606	1,533	4,362	448,480	-283,538
2022	155,480	1,586	1,514	99	448,480	-289,801
2023	155,480	1,586	1,514		448,480	-289,900
2024	155,480	1,586	1,514		448,480	-289,900
2025	155,480	1,586	1,514		448,480	-289,900
2026	155,480	1,586	1,514		448,480	-289,900
2027	155,480	1,586	1,514		448,480	-289,900
2028	155,480	1,586	1,514		448,480	-289,900
2029	155,480	1,586	1,514		448,480	-289,900
2030	155,480	1,586	1,514		448,480	-289,900
2031	155,480	1,586	1,514		448,480	-289,900
2032	155,480	1,586	1,514		448,480	-289,900
2033	155,480	1,586	1,514		448,480	-289,900
2034	155,480	1,586	1,514		448,480	-289,900
2035	155,480	1,586	1,514		448,480	-289,900
2036	155,480	1,586	1,514		448,480	-289,900
2037	155,480	1,586	1,514		448,480	-289,900
2038	155,480	1,586	1,514		448,480	-289,900
2039	155,480	1,586	1,514		448,480	-289,900

Crediting period	$PE_{CH_{4_{EF}},t}$	$PE_{N_2O_{MD},t}$	$PE_{CH_{4_{MD}},t}$	$PE_{FC,t}$	PR_t	PE_t
Year	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2040	155,480	1,586	1,514		448,480	-289,900
2041	155,480	1,586	1,514		448,480	-289,900
2042	155,480	1,586	1,514		448,480	-289,900
2043	155,480	1,586	1,514		448,480	-289,900
2044	155,480	1,586	1,514		448,480	-289,900
2045	155,480	1,586	1,514		448,480	-289,900
2046	155,480	1,586	1,514		448,480	-289,900
2047	155,480	1,586	1,514		448,480	-289,900
2048	155,480	1,586	1,514		448,480	-289,900
2049	155,480	1,586	1,514		448,480	-289,900
2050	155,480	1,586	1,514		448,480	-289,900
2051	155,480	1,586	1,514		448,480	-289,900
2052	155,480	1,586	1,514		448,480	-289,900
2053	155,480	1,586	1,514		448,480	-289,900
2054	155,480	1,586	1,514		448,480	-289,900
2055	155,480	1,586	1,514		448,480	-289,900
2056	155,480	1,586	1,514		448,480	-289,900
2057	155,480	1,586	1,514		448,480	-289,900
2058	155,480	1,586	1,514		448,480	-289,900
2059	155,480	1,586	1,514		448,480	-289,900
2060	155,480	1,586	1,514		448,480	-289,900
Total	6,221,161	63,460	60,579	4,461	17,939,200	-11,589,539

3.2.3 Leakage

Under this methodology, project activities must not involve increase in use of fossil fuels or fuel wood and must not include significantly different manure management practices. Therefore, the only potential sources of leakage in this methodology estimated as follows:

$$LE_t = LE_{M,t} + LE_{GD,t} \quad (30)$$

Where:

LE_t = Leakage emissions in year t (t CO_2e)

$LE_{M,t}$ = Leakage emissions due to market leakage in year t (t CO_2e)

$LE_{GD,t}$ = Leakage emissions due to grazing displacement in year t (t CO_2e)

(1) Leakage emissions due to market leakage

Estimation of emissions from market leakage (VMD0033, Version 1.0) is used to calculate the leakage emissions due to market leakage.

The module provides methods for estimating whether reductions in the production of commodities (such as wood, animals or agricultural products) resulting from the project activity is likely to result in increased emissions from the production of those products elsewhere, and provides methods for determining the volume of such emissions.

This project mainly produces cattle and sheep in the project area. Grazing is strictly prohibited within 5 years after the implementation of the grazing ban, fences are set up in the rotation grazing area to strictly control the grazing time and frequency of each pasture, and grazing is controlled according to the growth situation of pasture in the area of supplementary seeding of high-quality grass. In addition, the Forestry and Grassland Bureau of Altay City measures the yield of pasture in the surrounding grassland of the project area, and guides the herders to graze in reasonable areas. According to the Annual Statistical Yearbook of Altay City (2021-2022), the annual yield of cattle and sheep in Altay City has not decreased. The project does not result in a reduction in cattle and sheep production; therefore, the market leakage is considered to be 0 tCO_2e.

(2) Leakage emissions due to grazing displacement

Leakage from Displacement of Grazing Activities (VMD0040, Version 1.0) is used to calculate the leakage emissions due to grazing displacement, and is applicable under the following conditions:

The project area is subject to livestock grazing in the baseline scenario.

According to the PRA Report and Project Design Report, local herders graze in the project area under the baseline scenario. Therefore, Leakage from Displacement of Grazing Activities (VMD0040, Version 1.0) is applicable for the proposed project.

In the first five years after the implementation of the no-grazing area, grazing is prohibited, and grazing is strictly controlled in the rotation grazing area. After that, grazing is allowed according to the growth situation of pasture. Altay Forestry and Grass Bureau measures the yield of pasture in the surrounding grasslands of the project area, and guides herders to graze in reasonable areas. Therefore, the leakage of grazing activity displacement outside the engineering boundary should be calculated.

1) Assess whether Grazing Displacement Takes Place

According to the baseline survey report and the project design report, in the baseline scenario, local herders in the project area will graze, and grazing will be prohibited for 5 years after the implementation of the grazing ban; grazing time and frequency will be strictly controlled in the rotation grazing area, and grazing will be controlled according to the growth of pasture. Therefore, it is likely that there will be an alternative to grazing activities and then the next step will be taken.

2) Survey of Grazing Displacement and Relocation Plans

According to (VMD0040, Version 1.0), a survey must be conducted of all grazing agents whose livestock graze in the project area prior to the project start date. The period covered by this survey must be consistent with the baseline period used to quantify baseline emissions within the project area (i.e. covering the five years period prior to the project start date, or if management records for this period are unavailable, at a minimum covering the one year prior to the project start date). This survey must cover a full census or representative sample of project participants and project non-participants whose livestock graze in the project area during the baseline period covered by the survey. Where sample surveys are used, sampling approaches must enable estimation of the sample mean within a 95 percent confidence interval to a precision of 15 percent. For both types of grazing agent, the survey must quantify the number and type of livestock and the duration of each year that these livestock graze in the project area. The survey must additionally collect data on the number and type of livestock, and duration, that livestock under the control of project participants graze outside the project area during the period covered by the survey. For both types of grazing agent, the survey must also collect information on intended location of grazing after implementation of the project.

For the project, Altay Forestry and Grassland Bureau conducted a survey of all grazing agents whose livestock grazed in the project area prior to the project start date (15- March -2020 to 25-May-2021)[55], which met the requirements of the tool (VMD0040, Version 1.0). This survey covered a full census of project participants and project non-participants whose livestock graze in the project area during the baseline period (covering the one year prior to the project start date) covered by the survey. In addition, the survey collected data on the number and type of livestock, and duration, that livestock under the control of project participants graze outside the project area during the period covered by the survey.

According to the survey, in the baseline scenario, the project participants stocked 178,300 cattle and 406,900 sheep in the project area, grazing for about 210 days per year for 8 hours per day. In the baseline and project scenarios, non-project participants do not graze in the project area.

In 2020, the Forestry and Grass Bureau of Altay City measured the yield of pasture grass around the project area, calculated the reasonable grazing amount, and delimit the grazing area of 347,700 ha. Project participants grazed their animals in a designated area under the guidance of the Altay Municipal Forestry and Grassland Bureau. However, the specific plots available to project participants may change from year to year based on the actual conditions of the grassland, such as pasture yield.

3) Prepare a Grazing Displacement Management Plan

Based on the survey of grazing migration and relocation plans, a grazing migration management plan was developed. The Grazing Migration Management plan records the planned grazing activities of all livestock that will move to land outside the project area and are under the control of project participants. According to the survey, project non-participants would not graze in the project area in both the baseline scenario and the project scenario. The Grazing Displacement management plan records the following data for several years after the commencement of the project:

- The identity of each grazing agent

[55] Pasture Census records in Altay City from March 15, 2020 to May 25, 202021

- The number of days each year which they will graze outside the project area (measured in days, or the whole year if appropriate)
- The location and area in hectares of each land parcel to which grazing will be relocated
- A unique identifier code (where applicable) for each land parcel to which grazing will be relocated
- The type of land (grassland, forest land, cropland) of each parcel to which grazing will be relocated, and where appropriate note the status (e.g., degradation level) of the lands to which grazing will be relocated; and
- Any planned actions to avoid loss of above- or belowground carbon pools on the land parcels to which grazing will be relocated

In May and September each year, Altay Forestry and Grassland Bureau measured the grass yield of the grassland around the project area, then calculate the reasonable grazing quantity. And the project participants grazed in the designated area under the guidance of Altay Forestry and Grassland Bureau. But the specific land parcels available for use by project participants may change from year to year, based on the actual situation of grassland. And the grazing displacement management plan record the number and type of livestock to be relocated and the type of land (grassland, forest land, cropland) to which grazing is planned to be displaced. In this case, the type of land to which grazing may be displaced must be categorized as unidentified grassland.

Based on the pasture census records of Altay City in 2020-2021, all grazing agents were interviewed to collect information on the number and species of livestock to be relocated. As mentioned in Section 2.5, project participants will receive subsidies due to the prohibition of grazing. To this end, the project sponsor and the Altay Forestry and Grassland Bureau will visit all the project participants to investigate the project situation and issue subsidies accordingly.

4) Determine whether Lands to which Livestock are Displaced are Identified or Unidentified

The grazing displacement management plan does not record the geographic location to which livestock under the control of project participants were relocated. Besides, the process of identifying the specific land areas to which livestock will be relocated would be not feasible at reasonable cost (because project non-participants are scattered over wide distances and not contactable at reasonable cost). So, the land to which livestock grazing activity is displaced should be categorized as unidentified.

For unidentified land, assessment procedures mandate the use of conservative assumptions that do not underestimate the effects of grazing displacement on carbon stocks in unidentified lands, and in the case of land that remains unidentified after monitoring begins, conservative assumptions that do not underestimate leakage emissions caused by grazing displacement must also be used.

5) Define the Type of Land to which Grazing will be Relocated

In 2020, the Forestry and Grass Bureau of Altay City measured the yield of pasture grass around the project area, calculated the reasonable grazing amount, and delimit the grazing area of 347,700 ha. Project participants grazed their animals in a designated area under the guidance of the Altay Municipal Forestry

and Grassland Bureau. But the specific land parcels available for use by project participants may change from year to year, based on the actual situation of grassland, such as grass yield. So, the relocated lands should be categorized as unidentified grassland.

Estimation of Leakage Emissions due to Displacement of Livestock Grazing to Unidentified Grasslands

Step 1: Estimate the area of grassland needed to sustain the population of livestock relocated to unidentified grasslands

The total area of unidentified grassland required to sustain the population of livestock relocated to unidentified grassland is to be calculated as:

$$DMI_{GUI,t} = \sum_{l=1}^{L} \left(\frac{DMI_{day,I} \times P_{GUI,I,t}}{1000} \times DayS_{GUI,l,t}\right) \quad (31)$$

Where:

$DMI_{GUI,t}$	=	Dry matter intake required to sustain the total number of livestock of all types l relocated to unidentified grasslands in year t (t dm)
$DMI_{day,I}$	=	Daily dry matter intake requirement of each type of livestock I (kg dm/(head*day))
$P_{GUI,I,t}$	=	Population of livestock of each type relocated to unidentified grasslands in year t (head)
$DayS_{GUI,l,t}$	=	Days that the population of each type of relocated livestock of type l graze in unidentified grassland in year t (days)

The total area of unidentified grassland required to sustain the population of livestock relocated to unidentified grassland is to be calculated as:

$$Area_{GUI,t} = \frac{DMI_{GUI,t}}{ANPP_{GUI,REF}} \quad (32)$$

Where:

$Area_{GUI,t}$	=	Area required to sustain the population of livestock displaced to unidentified grasslands in year t (ha)
$DMI_{GUI,t}$	=	Dry matter intake required to sustain the total number of livestock of all types l relocated to unidentified grasslands in year t (t dm)
$ANPP_{GUI,REF}$	=	Aboveground net primary productivity in the reference region that is the likely location of unidentified grasslands to which livestock are relocated (t dm/ha)

According to the Agricultural Industry Standard of the People's Republic of China (NY/T635-2015)[56], Daily dry matter intake requirement of cattle and sheep is 8.1 and 1.8 kg dm/(head*day) respectively. For aboveground net primary productivity in the reference region that is the likely location of unidentified grasslands, a peer-reviewed studies of Tian jie et al. (2021) investigated that the value is 1.89 t dm/ha[57].

[56] https://www.sdtdata.com/fx/fmrule/tsLibCard.doView

[57] Tian J, Xiong JN, Zhang YC, Cheng WM, He YC, Ye CC, He W. Quantitative Assessment of the Effects of Climate Change and Human Activities on Grassland NPP in Altay Prefecture. Journal of Resources and Ecology, 2021, 12 (6): 748-748

For other parameters, please refer to section 3.3.2 for relevant parameter references and values. The final area required to sustain the population of livestock displaced to unidentified grasslands is 24,614 ha[58].

Step 2: Assess the risk of soil carbon loss due to overgrazing in unidentified grasslands

The calculation result of step 1 shows that, the total area of unidentified grassland required to sustain the population of livestock relocated to unidentified grassland is 24,614 ha (See the ER table for details). And the available grassland area is 347,700 ha ha in Altay City, which is much higher than the displacement area.

So, the grazing displacement will not lead to consumption exceeding 50% of available biomass, and leakage due to soil carbon loss does not need to be accounted for.

Step 3: Estimate emissions from livestock displacement to unidentified grasslands

Step 3a: Estimate methane emissions from enteric fermentation by livestock displaced to unidentified grasslands

Calculate the leakage emissions due to enteric fermentation by livestock displaced to all unidentified grasslands outside the project area using:

$$LE_{GUI,CH_{4EF},t} = \frac{\sum_{l=1}^{L} P_{GUI,l,t} \times Days_{GUI,l,t} \times GWP_{CH_4} \times EF_l}{1000 \times 365} \quad (33)$$

Where:

$LE_{GUI,CH_{4EF},t}$	=	Leakage emissions in year t from enteric fermentation by livestock displaced to unidentified grasslands (t CO_2e)
$P_{GUI,l,t}$	=	Population of grazing livestock type l in year t displaced outside the project area to unidentified grasslands (head)
$Days_{GUI,l,t}$	=	Days in year t that livestock of each type l grazes on unidentified grassland (days)
GWP_{CH_4}	=	Global-warming potential of CH_4 (t CO_2e/t CH_4)
EF_l	=	Enteric CH_4 emission factor per head of livestock type l per year (kg CH_4/(ha*year))
l	=	Index of grazing livestock types

[58] Year 2021 when all the project has been finished.

Step 3b: Estimate GHG emissions from manure management

Calculate the N_2O and CH_4 leakage emissions due to manure deposition on grassland caused by relocating the livestock to unidentified grasslands outside the project area using:

$$LE_{GUI_{MD},t} = LE_{GUI,N_2O_{MD},t} + LE_{GUI,CH_{4MD},t} \quad (34)$$

Where:

$LE_{GUI_{MD},t}$	=	Leakage emissions from manure and urine deposited on unidentified grassland in year t (t CO_2e)
$LE_{GUI,N_2O_{MD},t}$	=	Leakage emissions from manure and urine deposited on unidentified grassland in year t (t CO_2e)
$LE_{GUI,CH_{4MD},t}$	=	Leakage CH_4 emissions from manure and urine deposited on unidentified grasslands in year t (t CO_2e)

$LE_{GUI,N_2O_{MD},t}$ is calculated as the sum of direct N_2O emissions and indirect N_2O emissions using:

$$LE_{GUI,N_2O_{MD},t} = GWP_{N_2O} \times (LE_{GUI_D,N_2O_{MD},t} + LE_{GUI_{ID},N_2O_{MD},t}) \quad (35)$$

Where:

$LE_{GUI,N_2O_{MD},t}$	=	Leakage N_2O emission from manure and urine deposited on unidentified grasslands in year t (t CO_2e)
GWP_{N_2O}	=	Global-warming potential of N_2O (t CO_2e/t N_2O)
$LE_{GUI_D,N_2O_{MD},t}$	=	Leakage direct N_2O emissions from manure and urine deposited on unidentified grasslands in year t (t N_2O)
$LE_{GUI_{ID},N_2O_{MD},t}$	=	Leakage indirect N_2O emissions from manure and urine deposited on unidentified grasslands in year t (t N_2O)

Leakage direct N_2O emission from manure and urine deposited on unidentified grasslands $LE_{GUI_D,N_2O_{MD},t}$ is calculated using:

$$LE_{GUI_D,N_2O_{MD},t} = \sum_{l1=1}^{L1} F_{MD,GUI,t,l1} \times EF_{3,PRP,CPP} \times \frac{44}{28} \quad (36)$$

And/or

$$LE_{GUI_D,N_2O_{MD},t} = \sum_{l2=2}^{L2} F_{MD,GUI,t,l2} \times EF_{3,PRP,SO} \times \frac{44}{28} \quad (37)$$

Where:

$LE_{GUI_D,N_2O_{MD},t}$	=	Leakage direct N_2O emissions from manure and urine deposited on unidentified grasslands in year t (t N_2O)
$F_{MD,GUI,t,l1}$	=	Annual amount of nitrogen in cattle, poultry and pig manure and urine deposited on unidentified grasslands in year t, adjusted for volatilization as NH_3 and NO_x (t N)
$F_{MD,GUI,t,l2}$	=	N_2O emission factor for cattle (dairy, non-dairy and buffalo), poultry and pigs' manure and urine deposited on grasslands (kg N_2O-N/kg N input)
$EF_{3,PRP,CPP}$	=	Leakage indirect N_2O emissions from manure and urine deposited on unidentified grasslands in year t (t N_2O)
$EF_{3,PRP,SO}$	=	N_2O emission factor for sheep and other animals' manure and urine deposited on grasslands (kg N_2O-N/kg N input)

$$F_{MD,GUI,t,l} = \frac{P_{GUI,l,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \quad (38)$$

Where:

$F_{MD,GUI,t,l}$	=	Annual amount of nitrogen in manure and urine deposited on unidentified grasslands by livestock type l, adjusted for volatilization as NH_3 and NO_x (t N)
$P_{GUI,l,t}$	=	Population of grazing livestock type l in year t displaced outside the project area to unidentified grasslands (head)
W_l	=	Average weight of livestock l displaced to unidentified grasslands (kg/head)

Nex_l	=	Nitrogen excretion from livestock type l (kg N/(t animal mass*day))
$1000a$	=	Conversion factor for nitrogen excretion (kg/t livestock mass) to nitrogen excretion (kg/kg livestock mass)
$H_{GUI,t}$	=	Average grazing hours per day during grazing season for livestock of each type l displaced to unidentified grassland in year t (hours)
24	=	Conversion day to hour
$Days_{GUI,l,t}$	=	Grazing days in year t for livestock type l displaced to unidentified grasslands (days)
$1000b$	=	Conversion factor for kg to t
$Frac_{GAS,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)
t	=	Tear
l	=	Index of grazing livestock types

Leakage from indirect N_2O emissions from atmospheric deposition of N volatilized from urine and manure N deposited on unidentified grasslands is calculated using:

$$LE_{GUI_{ID},N_2O_{MD},t} = \sum_{l1=1}^{L1} F_{MD,GUI,t,l} \times Frac_{GAS,MD} \times EF_4 \times \frac{44}{28} \quad (39)$$

Where:

$LE_{GUI_{ID},N_2O_{MD},t}$	=	Leakage indirect N_2O emissions from manure and urine deposited on unidentified grasslands in year t (t N_2O)
$F_{MD,GUI,t,l}$	=	Annual amount of nitrogen in manure and urine deposited on unidentified grasslands by livestock type l, adjusted for volatilization as NH_3 and NO_x (t N)
$Frac_{GAS,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)
EF_4	=	N_2O emission factor for atmospheric deposition of manure N on soils and water surfaces under project activity (kg N_2O-N/(kg NH_3-N + NO_x-N volatilized))

CH_4 emission from manure management due to displacement of livestock to unidentified grasslands is calculated using:

$$LE_{GUI,CH_{4MD},t} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lm} \times P_{GUI,l,t} \times H_{GUI,l,t} \times Days_{GUI,l,t}}{1000 \times 24 \times 365} \quad (40)$$

Where:

$LE_{GUI,CH_{4MD},t}$	=	Leakage CH_4 emissions from manure and urine deposited on unidentified grasslands in year t (t CO_2e)
GWP_{CH_4}	=	Global-warming potential of CH_4 (t CO_2e/t CH_4)
EF_{lm}	=	CH_4 emission factor per head of livestock type l in manure management system m (kg CH_4/(head*yr)
$P_{GUI,l,t}$	=	Population of livestock type l in year t displaced to unidentified grasslands (head)
$H_{GUI,l,t}$	=	Average grazing hours per day during grazing season for livestock of each type l displaced to unidentified grassland in year t (hours)
$Days_{GUI,l,t}$	=	Grazing days in year t for livestock type l displaced to unidentified grasslands (days)
1000	=	Conversion factor for kg to t

For the parameters listed above, please refer to section 3.3.2 for relevant references and values. The final results are listed in ER table.

Step 4: Calculate total leakage emissions from relocation of grazing to unidentified grasslands

Total leakage emissions from relocation of grazing to unidentified grasslands must be calculated as:

$$LE_{GUI,t} = LE_{OGGUI,t} + LE_{GUI,CH_4EF,t} + LE_{GUI_{MD,t}} \quad (41)$$

Where:

$LE_{GUI,t}$	=	Leakage due to displacement of livestock to unidentified grasslands in year t (t CO_2e)
$LE_{OGGUI,t}$	=	Leakage due to soil carbon loss resulting from overgrazing due to displacement of livestock to unidentified grasslands in year t (t CO_2e)
$LE_{GUI,CH_4EF,t}$	=	Leakage due to enteric fermentation by livestock displaced to unidentified grasslands in year t (t CO_2e)
$LE_{GUI_{MD},t}$	=	Leakage due to N_2O and CH_4 emissions in manure and urine deposited on grasslands by livestock displaced to unidentified grasslands in year t (t CO_2e)

As described above, project leakage due to grazing displacement would be calculated as follows:

$$LE_t = LE_{GD,t} = LE_{GUI,t} = LE_{GUI,CH_4EF,t} + LE_{GUI_{MD},t} \quad (42)$$

$$= LE_{GUI,CH_4EF,t} + LE_{GUI,N_2O_{MD},t} + LE_{GUI,CH_{4MD},t}$$

$$= \frac{\sum_{l=1}^{L} P_{GUI,l,t} \times Days_{GUI,l,t} \times GWP_{CH_4} \times EF_l}{1000 \times 365} + GWP_{N_2O} \times \left(\sum_{l1=1}^{L1} \frac{P_{GUI,l,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,CPP} \times \frac{44}{28} + \sum_{l2=1}^{L2} \frac{P_{GUI,l,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,SO} \times \frac{44}{28} + \sum_{l1=1}^{L1} F_{MD,GUI,t,l} \times Frac_{GAS,MD} \times EF_4 \times \frac{44}{28}\right) + \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lm} \times P_{GUI,l,t} \times H_{GUI,l,t} \times Days_{GUI,l,t}}{1000 \times 24 \times 365}$$

The total leakage emissions during the crediting period is summarized in the following table, please refer to ER spreadsheet for detailed calculation.

Table 3-4 The Estimation of leakage emissions from relocation of grazing during the crediting period

Year	$LE_{GUI,CH_4EF,t}$	$LE_{GUI,N_2O_{MD},t}$	$LE_{GUI,CH_{4MD},t}$	LE_t
	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2021	17,745	181	173	18,099
2022	19,706	201	192	20,099
2023	19,706	201	192	20,099
2024	19,706	201	192	20,099
2025	19,706	201	192	20,099
2026	19,706	201	192	20,099
2027	19,706	201	192	20,099
2028	19,706	201	192	20,099
2029	19,706	201	192	20,099
2030	19,706	201	192	20,099

Year	$LE_{GUI,CH_4EF,t}$	$LE_{GUI,N_2O_{MD},t}$	$LE_{GUI,CH_{4_{MD}},t}$	LE_t
	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2031	19,706	201	192	20,099
2032	19,706	201	192	20,099
2033	19,706	201	192	20,099
2034	19,706	201	192	20,099
2035	19,706	201	192	20,099
2036	19,706	201	192	20,099
2037	19,706	201	192	20,099
2038	19,706	201	192	20,099
2039	19,706	201	192	20,099
2040	19,706	201	192	20,099
2041	19,706	201	192	20,099
2042	19,706	201	192	20,099
2043	19,706	201	192	20,099
2044	19,706	201	192	20,099
2045	19,706	201	192	20,099
2046	19,706	201	192	20,099
2047	19,706	201	192	20,099
2048	19,706	201	192	20,099
2049	19,706	201	192	20,099
2050	19,706	201	192	20,099
2051	19,706	201	192	20,099
2052	19,706	201	192	20,099
2053	19,706	201	192	20,099
2054	19,706	201	192	20,099
2055	19,706	201	192	20,099
2056	19,706	201	192	20,099
2057	19,706	201	192	20,099
2058	19,706	201	192	20,099
2059	19,706	201	192	20,099
2060	19,706	201	192	20,099
Total	786,279	8,020	7,661	801,960

3.2.4 Net GHG Emission Reductions and Removals

The amount of emission reductions achieved by the project in project year t must be calculated as follows:

$$ER_t = BE_b - PE_t - LE_t \quad (43)$$

Where:

ER_t = Emission reductions in year t (t CO_2e)

BE_b = Baseline emissions and removals in year b (t CO_2e)

PE_t = Project emissions and removals in year t (t CO_2e)

LE_t = Leakage emissions in year t (t CO_2e)

The net anthropogenic GHG removals by sinks by the project are summarized below.

Table 3-5 The net GHG emission removals

Year	Estimated baseline emissions	Estimated project emissions	Estimated leakage emissions	Estimated net GHG emission removals
	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2021	197,486	-283,538	18,099	462,925
2022	197,486	-289,801	20,099	467,188
2023	197,486	-289,900	20,099	467,287
2024	197,486	-289,900	20,099	467,287
2025	197,486	-289,900	20,099	467,287
2026	197,486	-289,900	20,099	467,287
2027	197,486	-289,900	20,099	467,287
2028	197,486	-289,900	20,099	467,287
2029	197,486	-289,900	20,099	467,287
2030	197,486	-289,900	20,099	467,287
2031	197,486	-289,900	20,099	467,287
2032	197,486	-289,900	20,099	467,287
2033	197,486	-289,900	20,099	467,287
2034	197,486	-289,900	20,099	467,287
2035	197,486	-289,900	20,099	467,287
2036	197,486	-289,900	20,099	467,287
2037	197,486	-289,900	20,099	467,287
2038	197,486	-289,900	20,099	467,287
2039	197,486	-289,900	20,099	467,287

Year	Estimated baseline emissions	Estimated project emissions	Estimated leakage emissions	Estimated net GHG emission removals
	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2040	197,486	-289,900	20,099	467,287
2041	197,486	-289,900	20,099	467,287
2042	197,486	-289,900	20,099	467,287
2043	197,486	-289,900	20,099	467,287
2044	197,486	-289,900	20,099	467,287
2045	197,486	-289,900	20,099	467,287
2046	197,486	-289,900	20,099	467,287
2047	197,486	-289,900	20,099	467,287
2048	197,486	-289,900	20,099	467,287
2049	197,486	-289,900	20,099	467,287
2050	197,486	-289,900	20,099	467,287
2051	197,486	-289,900	20,099	467,287
2052	197,486	-289,900	20,099	467,287
2053	197,486	-289,900	20,099	467,287
2054	197,486	-289,900	20,099	467,287
2055	197,486	-289,900	20,099	467,287
2056	197,486	-289,900	20,099	467,287
2057	197,486	-289,900	20,099	467,287
2058	197,486	-289,900	20,099	467,287
2059	197,486	-289,900	20,099	467,287
2060	197,486	-289,900	20,099	467,287
Total	7,899,440	-11,589,539	801,960	18,687,019
Annual average	197,486	-289,738.475	20,049	467,175.475

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Data / Parameter	GWP_{N_2O}
Data unit	t CO_2e/t N_2O
Description	Global-warming potential for N_2O
Source of data	VCS Standard (Version 4.5)
Value applied	265
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of baseline emissions Calculation of project emissions
Comments	N/A

Data / Parameter	$EF_{4,MD}$
Data unit	kg N_2O-N/(kg NH_3-N + NO_x-N volatilized)
Description	N_2O emission factor for atmospheric deposition of urine and manure N on soils and water surfaces
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.005
Justification of choice of data or description of measurement methods and procedures applied	The default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.3, Chapter 11, Volume 4) of IPCC good practice guidance for AFOLU have been followed. Since the project area belongs to cool temperate, dry of IPCC climate zones, the default factor is 0.005.
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of Leakage emissions
Comments	N/A

Data / Parameter	GWP_{CH_4}
Data unit	t CO_2e/t CH_4
Description	Global-warming potential for CH_4
Source of data	VCS Standard (Version 4.5)
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of Leakage emissions
Comments	N/A

Data / Parameter	$Days_{l,b}$
Data unit	Days
Description	Grazing days for livestock type l in baseline year b
Source of data	Grazing Displacement Management Plan
Value applied	Baseline scenario:210
Justification of choice of data or description of measurement methods and procedures applied	According to the Survey of Grazing Displacement, the average grazing days of herders under the baseline scenario are counted in Grazing Displacement Management Plan.
Purpose of data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	EF_l
Data unit	kg CH_4/ (head * year)
Description	Enteric CH_4 emission factor per head of livestock type l per year
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	Cattle:56 Sheep:5
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable. the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 10.10 or 10.11, Chapter 10, Volume 4). According to the Project Design Report, local productivity system is low productivity system which based on animal feeding systems where locally produced roughage (e.g. crop residues) or low quality rangelands represent the major source of feed utilized. So the default factor of sheep is 5. The cattle in the project area are basically yaks, not dairy cattle, so the default value is 56.
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of Leakage emissions
Comments	N/A

Data / Parameter	$EF_{3,PRP,CPP}$
Data unit	kg N_2O-N/kg N input
Description	N_2O emission factor for cattle (dairy, non-dairy and buffalo), poultry and pigs manure and urine deposited on of applied to grassland
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.002
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable. the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4). Since the project area belongs to cool temperate, dry of IPCC climate zones, the default factor is 0.002.
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of Leakage emissions

Comments	N/A

Data / Parameter	$EF_{3,PRP,SO}$
Data unit	kg N_2O-N/kg N input
Description	N_2O emission factor for sheep and other animals' manure and urine deposited on of applied to grassland
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.003
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable. the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4).
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of Leakage emissions
Comments	N/A

Data / Parameter	Nex_i
Data unit	kg N deposited/(t livestock mass * day)
Description	Nitrogen excretion of livestock type I
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	Cattle:0.38 Sheep:0.32
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable. the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4).
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of Leakage emissions
Comments	N/A

Data / Parameter	Nex_i
Data unit	kg N deposited/(t livestock mass * day)
Description	Nitrogen excretion of livestock type l
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	Cattle:0.38 Sheep:0.32
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable. the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4).
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of Leakage emissions
Comments	N/A

Data / Parameter	$W_{l,b}$
Data unit	kg
Description	Average weight of livestock l, in baseline year b
Source of data	Local expert judgment
Value applied	Cattle:300 Sheep:45
Justification of choice of data or description of measurement methods and procedures applied	PRA Report, data from local expert judgement that are specific to the project area.
Purpose of data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$P_{l,b}$
Data unit	Head
Description	Population of livestock type l under project in year b
Source of data	Grazing Displacement Management Plan
Value applied	Cattle: 178,300 Sheep:406,900
Justification of choice of data or description of measurement methods and procedures applied	According to the Survey of Grazing Displacement, the population of cattle and sheep under the baseline scenario are counted in Grazing Displacement Management Plan.
Purpose of data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$H_{l,b}$
Data unit	Hours
Description	Average grazing hours for livestock type l per day during the grazing season in baseline year b
Source of data	Grazing Displacement Management Plan
Value applied	8
Justification of choice of data or description of measurement methods and procedures applied	According to the Survey of Grazing Displacement, the average grazing hours of herders under the baseline scenario are counted in Grazing Displacement Management Plan.
Purpose of data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$Frac_{GAS,MD}$
Data unit	kg N volatilized/kg of N deposited
Description	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.212
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable, the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. According to the methodology, the project activities cannot involve the manure management system, so Table 8A.1, Chapter 11, Volume 4 are finally adopted.
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	N/A

Data / Parameter	$EF_{l,M}$
Data unit	kg CH_4/ (head * year)
Description	CH_4 emission factor from manure of livestock type l
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.6
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable, the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. According to the methodology, the project activities involve the Pasture Range and Paddock management system, so Table 10.14, Chapter 10, Volume 4 are finally adopted.
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	N/A

Data / Parameter	$EF_{CO_2,k}$
Data unit	t CO_2/GJ
Description	CO_2 emission factor by fuel type k
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Diesel: 0.0741
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of project emissions
Comments	N/A

Data / Parameter	NCV_k
Data unit	GJ/t fuel
Description	Thermal value of fuel type k
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Diesel:43.0
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of project emissions
Comments	N/A

Data / Parameter	$SOC_{S,Baseline}$
Data unit	t C/ha
Description	Baseline SOC stock in the top 30 cm of soil layer (or greater depth if required) in stratum s
Source of data	Laboratory test data
Value applied	Please refer ER calculation sheets for details
Justification of choice of data or description of measurement methods and procedures applied	Option 2 was applied to estimate project removals due to changes in SOC, and the procedures of Section 8.2.8 in VM0026 were follow. The $SOC_{S,Baseline}$ was tested in 2020, which less than two years prior to the project start time. From January 3 to September 17, 2021, the organic carbon, bulk density and sand-gravel ratio (percentage of rocks larger than 2mm, roots, and other dead residues with a diameter in the top 30 cm of soil) of 60 soil samples were measured by Key Laboratory of Arid Area Eco-Hydrology and Disaster Control, State Forestry and Grassland Administration. Soil sampling followed The Guidelines for Sampling and Surveys for CDM Project Activities and Programmers of Activities (v 4.0). The nationally approved standard Method for Determination of Soil Organic Matter (NY/T 1121.6-2006) was used to measure SOC of the soil samples.
Purpose of data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$DMI_{day,l}$
Data unit	kg dm/(head*day)
Description	Daily dry matter intake requirement of each type of livestock l
Source of data	National standards The notice on standardizing and unifying the statistics of grassland carrying capacity data, which was issued by the Ministry of agriculture of the people's Republic of China
Value applied	Sheep: 1.8, Cattle: 8.1
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of leakage emissions
Comments	N/A

Data / Parameter	$ANPP_{GUI,FEF}$
Data unit	t dm/ha
Description	Aboveground net primary productivity in the reference region that is the likely location of unidentified grasslands to which livestock are relocated
Source of data	Tian J, Xiong JN, Zhang YC, Cheng WM, He YC, Ye CC, HE W. Quantitative Assessment of the Effects of Climate Change and Human Activities on Grassland NPP in Altay Prefecture. Journal of Resources and Ecology, 2021, 12 (6): 748-748.
Value applied	1.89
Justification of choice of data or description of measurement methods and procedures applied	Values come from published studies in the project region.
Purpose of data	Calculation of leakage emissions
Comments	N/A

Data / Parameter	$H_{GUI,I,t}$
Data unit	Hours
Description	Average grazing hours per day during grazing season for livestock of each type I displaced to unidentified grassland in year t
Source of data	Grazing Displacement Management Plan
Value applied	8
Justification of choice of data or description of measurement methods and procedures applied	According to the Survey of Grazing Displacement, the average grazing days of herders under the baseline scenario are counted in Grazing Displacement Management Plan.
Purpose of data	Calculation of leakage emissions
Comments	N/A

3.3.2 Data and Parameters Monitored

<table>
<tr><td>Data / Parameter</td><td>$P_{l,t}$</td></tr>
<tr><td>Data unit</td><td>Head</td></tr>
<tr><td>Description</td><td>Population of livestock type l under project in year t</td></tr>
<tr><td>Source of data</td><td>Project records</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>The project proponent and the Altay Forestry and Grassland Bureau visit all the project participants every year to investigate the situation of the project.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Annually</td></tr>
<tr><td>Value applied</td><td><table><tr><th>Livestock type</th><th>2021</th><th>2022</th><th>2023</th></tr><tr><td>Cattle</td><td>160,240</td><td>158,244</td><td>158,244</td></tr><tr><td>Sheep</td><td>365,684</td><td>361,127</td><td>361,127</td></tr></table></td></tr>
<tr><td>Monitoring equipment</td><td>N/A</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>Guidance provided in IPCC, 2003 chapter 5 or IPCC, 2000 chapter 8 is applied</td></tr>
<tr><td>Purpose of data</td><td>Calculation of project emissions</td></tr>
<tr><td>Calculation method</td><td>N/A</td></tr>
<tr><td>Comments</td><td>N/A</td></tr>
</table>

Data / Parameter	$H_{l,t}$
Data unit	Hours
Description	Average grazing hours per day of livestock type l during grazing season in year t
Source of data	Project records
Description of measurement methods and procedures to be applied	The project proponent and the County Forestry and Grassland Bureau visit all the project participants every year to investigate the situation of the project.
Frequency of monitoring/recording	Annually
Value applied	The ex-ante value is 8 which comes from Grazing Displacement Management Plan. Please refer ER calculation sheets for details.
Monitoring equipment	N/A
QA/QC procedures to be applied	Guidance provided in IPCC, 2003 chapter 5 or IPCC, 2000 chapter 8 is applied
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	$W_{l,p}$
Data unit	kg
Description	Average weight of livestock under project
Source of data	Local expert judgment
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	Recorded with each measurement taken
Value applied	Cattle: 300 Sheep: 45
Monitoring equipment	N/A
QA/QC procedures to be applied	Crosscheck with previous records and reconduct the survey if there is a significant change observed
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	$Days_{l,t}$
Data unit	Days
Description	Grazing days of lives tock l in year t under project
Source of data	Project records
Description of measurement methods and procedures to be applied	The project proponent and the Altay Forestry and Grassland Bureau visit all the project participants every year to investigate the situation of the project.
Frequency of monitoring/recording	Annually
Value applied	The ex-ante value is 190 which comes from project records from Altay Forestry and Grassland Bureau.
Monitoring equipment	N/A
QA/QC procedures to be applied	Crosscheck with previous records and reconduct the survey if there is a significant change observed
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	$FC_{p,j,k,t}$
Data unit	Kg fuel
Description	Fuel consumption by type k, machine type j, parcel grassland p, in year t under project
Source of data	Project records
Description of measurement methods and procedures to be applied	The project proponent recorded the fuel consumption
Frequency of monitoring/recording	Record fuel consumption just after the application of machine
Value applied	Combined with the standard conversion coefficient at that time, it will be uniformly converted into tons of diesel oil for the calculation of energy consumption and emission of the project.
Monitoring equipment	N/A
QA/QC procedures to be applied	Guidance provided in IPCC, 2003 chapter 5 or IPCC, 2000 chapter 8 is applied
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

<table>
<tr><td>Data / Parameter</td><td>$PA_{mG,s,i,t}$</td></tr>
<tr><td>Data unit</td><td>ha</td></tr>
<tr><td>Description</td><td>Project areas of grassland with management practice mG in stratum s in year t</td></tr>
<tr><td>Source of data</td><td>Project records</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Record the area of grassland with management practice mG in stratum s.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Record the area and management practice just after the management practice has taken place and report annually</td></tr>
<tr><td>Value applied</td><td>
<table>
<tr><th>Strata</th><th>$PA_{mG,S,2021}$(ha)</th><th>Management practice</th></tr>
<tr><td>Total</td><td>266,655.29</td><td>/</td></tr>
<tr><td>1</td><td>128143.28</td><td>Rotational grazing</td></tr>
<tr><td>2</td><td>30295.06</td><td>Rotational grazing</td></tr>
<tr><td>3</td><td>56646.29</td><td>Rotational grazing</td></tr>
<tr><td>4</td><td>13976.2</td><td>Rotational grazing</td></tr>
<tr><td>5</td><td>29996.42</td><td>Grazing prohibition</td></tr>
<tr><td>6</td><td>152.23</td><td>Reseeding grass</td></tr>
<tr><td>7</td><td>6512.48</td><td>Reseeding grass</td></tr>
<tr><td>8</td><td>933.33</td><td>Reseeding grass</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>N/A</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>Crosscheck with previous records and satellite images</td></tr>
<tr><td>Purpose of data</td><td>Calculation of project emissions</td></tr>
<tr><td>Calculation method</td><td>N/A</td></tr>
<tr><td>Comments</td><td>N/A</td></tr>
</table>

Data / Parameter	$SOC_{mG,s,i,t}$
Data unit	g C/kg soil
Description	SOC stock in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum s (or greater depth if desired), sampling site i
Source of data	Project records
Description of measurement methods and procedures to be applied	Handling, storage, processing, measurement, and quality control of soil samples must follow scientifically established procedures such as the procedures described in Carter and Gregoroch, 2006, OECD, 1998, or nationally approved standards. Soil sampling based on the nationally-approved standard Soil Quality Guidelines for Soil Sampling Techniques (GB/T 361972018). The SOC measurement based on the nationally-approved standard Method for Determination of Soil Organic Matter (NY/T 1121.6-2006) was used to.
Frequency of monitoring/recording	At least once every five years, at the end of growing season in the year measured, until the end of the project crediting period.
Value applied	For ex-ante calculation, the $SOC_{mG,s,i,t}$ were measured by Key Laboratory of Arid Area Eco-Hydrology and Disaster Control, State Forestry and Grassland Administration. And the growth rate of SOC is 1.02%, which comes from previous study. Zhou Xiaoyan. (2019). Impacts of different restoration years of returning grazing land to grassland on community characteristics and soil nutrients of alpine grassland in Maqu County (Master's thesis, Northwest Normal University). Please refer ER calculation sheets for details.
Monitoring equipment	Soil sample, electric furnace, test tube, oil bath pot, wire cage and dropper.
QA/QC procedures to be applied	The collection of soil samples for measuring SOC will be carried by suitably trained staff. The measurement of SOC will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices, outlined in OECD (1998).
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	$BD_{mG,s,i,t}$
Data unit	g soil/cm^3
Description	Soil bulk density in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum s (or greater depth if desired), sampling site i
Source of data	Project records
Description of measurement methods and procedures to be applied	Handling, storage, processing, measurement, and quality control of soil samples must follow scientifically established procedures such as the procedures described in Carter and Gregoroch, 2006, OECD, 1998, or nationally approved standards. Soil sampling based on the nationally-approved standard Soil Quality Guidelines for Soil Sampling Techniques (GB/T 361972018). The $BD_{mG,s,i,t}$ measurement based on the nationally-approved standard Method for Determination of Soil Organic Matter (NY/T 1121.6-2006) was used to.
Frequency of monitoring/recording	At least once every five years, at the end of growing season in the year measured, until the end of the project crediting period.
Value applied	For ex ante calculation, the $BD_{mG,s,i,t}$ were measured by Key Laboratory of Arid Area Eco-Hydrology and Disaster Control, State Forestry and Grassland Administration, which was registered in Xi'an City, Shaanxi Province in 31- December 2020. Please refer ER calculation sheets for details.
Monitoring equipment	Ring knife, electronic scale, rubber hammer, oven and dryer.
QA/QC procedures to be applied	The collection of soil samples for measuring SOC will be carried by suitably trained staff. The measurement of SOC will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices, outlined in OECD (1998).
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	$FC_{mG,s,i,t}$
Data unit	percent
Description	Percentage of rocks with a diameter larger than 2 mm, roots, and other dead residues in the top 30 cm of soil (or greater depth if desired), for management practice mG, stratum s, sampling site i
Source of data	Project records
Description of measurement methods and procedures to be applied	Handling, storage, processing, measurement, and quality control of soil samples must follow scientifically established procedures such as the procedures described in Carter and Gregoroch, 2006, OECD, 1998, or nationally approved standards. Soil sampling based on the nationally-approved standard Soil Quality Guidelines for Soil Sampling Techniques (GB/T 361972018). The $BD_{mG,s,i,t}$ measurement based on the nationally-approved standard Method for Determination of Soil Organic Matter (NY/T 1121.6-2006) was used to.
Frequency of monitoring/recording	At least once every five years, at the end of growing season in the year measured, until the end of the project crediting period.
Value applied	For ex ante calculation, the $BD_{mG,s,i,t}$ were measured by Key Laboratory of Arid Area Eco-Hydrology and Disaster Control, State Forestry and Grassland Administration in 3-January to 17-January 2021. Please refer ER calculation sheets for details.
Monitoring equipment	Ring knife, electronic scale, rubber hammer, oven and dryer.
QA/QC procedures to be applied	The collection of soil samples for measuring SOC will be carried by suitably trained staff. The measurement of SOC will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices, outlined in OECD (1998).
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	$Depth$
Data unit	cm
Description	Total soil depth, for calculating grassland SOC stock in the top 30 cm of soil (or greater depth if required)
Source of data	Project records
Description of measurement methods and procedures to be applied	Collect soil samples with soil drill with 30cm scale
Frequency of monitoring/recording	Recorded with each measurement taken
Value applied	Due to full depth of affected soil layers is not known, a minimum depth of 30 cm was applied.
Monitoring equipment	Soil drill with scale.
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

<table>
<tr><td>Data / Parameter</td><td>$P_{GUI,l,t}$</td></tr>
<tr><td>Data unit</td><td>Head</td></tr>
<tr><td>Description</td><td>Total population of livestock of each type relocated to unidentified grasslands in year t</td></tr>
<tr><td>Source of data</td><td>Project Grazing records</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>The project proponent and the Altay Forestry and Grassland Bureau visit all the project participants every year to conduct the Survey of Grazing Displacement and investigate the grazing situation of the project.
Then the population of livestock of herders under the project are summarized in Project grazing records.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Annually</td></tr>
<tr><td>Value applied</td><td><table>
<tr><th>Livestock type</th><th>2021</th><th>2022</th><th>2023</th></tr>
<tr><td>Cattle</td><td>18,060</td><td>20,056</td><td>20,056</td></tr>
<tr><td>Sheep</td><td>41,216</td><td>45,773</td><td>45,773</td></tr>
</table></td></tr>
<tr><td>Monitoring equipment</td><td>N/A</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>Guidance provided in IPCC, 2003 chapter 5 or IPCC, 2000 chapter 8 is applied</td></tr>
<tr><td>Purpose of data</td><td>Calculation of project emissions</td></tr>
<tr><td>Calculation method</td><td>N/A</td></tr>
<tr><td>Comments</td><td>N/A</td></tr>
</table>

Data / Parameter	$Days_{GUI,l,t}$
Data unit	Days
Description	Days that the population of each type of relocated livestock of type l graze in unidentified grassland in year t
Source of data	Project Grazing records
Description of measurement methods and procedures to be applied	According to the Survey of Grazing Displacement, the average grazing days of herders under the project scenario are counted in Project Grazing records.
Frequency of monitoring/recording	Annually
Value applied	190
Monitoring equipment	N/A
QA/QC procedures to be applied	Guidance provided in IPCC, 2003 chapter 5 or IPCC, 2000 chapter 8 is applied
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

3.3.3 Monitoring Plan

Describe the process and schedule for obtaining, recording, compiling and analyzing the monitored data and parameters set out in Section 3.3.2 (Data and Parameters Monitored) above. Include details on the following:

- The methods for measuring, recording, storing, aggregating, collating and reporting data and parameters. Where relevant, include the procedures for calibrating monitoring equipment.
- The organizational structure, responsibilities and competencies of the personnel that will be carrying out monitoring activities.
- The policies for oversight and accountability of monitoring activities.
- The procedures for internal auditing and QA/QC.
- The procedures for handling non-conformances with the validated monitoring plan.
- Any sampling approaches used, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures.

Where appropriate, include line diagrams to display the GHG data collection and management system.

1. Operation and management structure

The project proponent hired local herders and communities (monitoring staff and auditing staff) for daily supervision and data management during the project implementation while office manager oversees the whole working group. A monitoring group has been established by Xinjiang Altay City Zhujin Investment Co. Ltd. to carry out the monitoring work. The structure of the monitoring group is as follows:

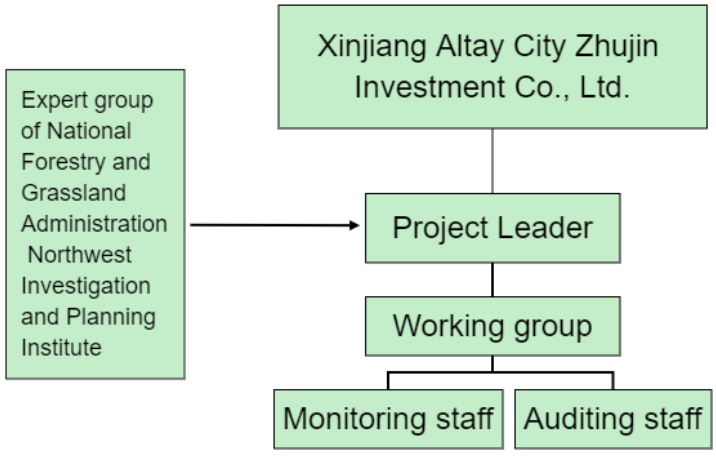


Figure 3-1 Organization structure of the monitoring team

The responsibilities of each role in the team structure are:

- Project leader has the overall management responsibility, especially supervising the implementation of the monitoring plan, and assigning each member of the monitoring team their individual responsibility during the monitoring;

- Expert group provides professional technique related to monitoring activities to make sure all the monitoring activities meet the requirement of VCS and CCB standards;

- Monitoring staff conducts the following monitoring process, measures the required parameters of the project as listed in the above Section 3.3.2 particularly, and collects all the original evidence and data and make relevant records;

- Auditing staff performs internal verification of the measurement, reviews all the monitoring records and documents, crosschecks evidence and calculates emission removals during each verification period.

A Monitoring Manual will be provided to each member of the monitoring team with a specific explanation to make sure they fully understand all the monitoring process and issues concerned.

The monitoring activities will be arranged before each verification and the detailed plan for the certain monitoring activities will be reviewed by the expert group who come from Altay Forestry and Grassland Bureau and National Forestry and Grassland Administration Northwest Investigation and Planning Institute as well as the draft monitoring results, to make sure the monitoring is implemented in line with monitoring plan. If there are non-conformances founded, expert group will ask the monitoring team to take necessary compensation measures (redo some of the monitoring activities or calculation) until all the non-conformances been corrected. If the registered monitoring plan is unable to be implemented, or the monitoring would permanently deviate from the applied methodologies, the applied standardized baselines, or the other applied methodological regulatory documents, the project participants shall describe the nature and extent of the non-conforming monitoring in a revised monitoring plan and submitted to Verra to request a change of the monitoring plan.

2. Monitoring process

1) Monitor the applicability conditions listed in methodology

As mentioned in Section 3.1.2, the methodology VM0026/Version 1.1 “Sustainable Grassland Management” is applicable under the following conditions:

- The project area is grassland at the start of the project. The project area is land that is degraded at the start of the project and degradation will continue in the baseline scenario on the basis that degradation drivers or pressures are still present in the baseline scenario. The procedures outlined the latest version of the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities must be used to determine both that the land is degraded at the start of the project and that in the baseline scenario the land will continue to degrade.

- The project area is subject to livestock grazing, burning, and/or nitrogen fertilization in the baseline scenario.

- In the baseline scenario, more than 95 percent of animal dung from grazing animals deposited on grassland is allowed to lie as is, and is not managed, and in the project scenario no more than 5 percent of the animal dung from grazing animals within the project area is managed with alternative manure management systems.

According to the analysis in Section 3.1.2, all the conditions are applicable at the start of the project activity due to the baseline survey. During the following verification, the project proponent should monitor the possible change of the project boundary, if there is a change to the project boundary, the applicability conditions should be re-assessed for the changed project area.

Step 1: Monitoring of boundary

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

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

During this monitoring time, three different management practices for project implementation and cover the project area measured as followed:

NO.	Management practice	Description	Area(ha)
1	Rotational grazing	It requires that the grazing time shall be halved by dividing grasslands into seasonal grazing land according to the livestock carrying capacity of the grassland by fence building. Then based on specified order, grazing cycle and zoning grazing time, the grassland is grazed area by area and used in turn.	229,060.82
2	Grazing prohibition	Grazing is prohibited on severely degraded grassland by building fences, and grazing is strictly prohibited for 5 years after the implementation of the project, after	29,996.42

NO.	Management practice	Description	Area(ha)
		which it is sustainably managed according to the health of the grassland plants	
3	Reseeding grass	Reseeding grass was implement in moderately degraded grasslands where grass seeds of local high-quality forage was sowed such as *Medicago sativa* (Lucerne), *Agropyron cristatum* (Ice grass), *Bromus inermis* (Awnless brome) and *Festuca arundinacea* (Tall fescue).	7,598.05

Step 2: monitor the applicability conditions

- Collect documented evidence to prove that the project area is grassland at the start of the project, which has been classified as “degraded”, such as local, regional, national or international land classification system or peer-review study, participatory rural appraisal, satellite imagery and/or photographic evidence in the last 10 years.

- Through documented evidence collection, questionnaire surveys and interviews proved that the project area is subject to livestock grazing, burning, and/or nitrogen fertilization in the baseline scenario.

- Through questionnaire surveys and interviews confirmed that animal manure treatment both in baseline scenario and project scenario.

Step3: Go through applicability checklist

If there is any change in the boundary happened, the monitoring team will go through a specific checklist of the applicability conditions, records all relevant results for each monitoring period.

In case any non-conformance of the applicability conditions, the expert group should evaluate the situation and submit the deviation or change to the methodology to Verra for approval.

2) Monitoring of Project Implementation

A record of the grazing agents (e.g. herder households) involved the project.

- The project proponent and Altay Forestry and Grassland Bureau should record each household involved in the sustainable grassland management project.

- Each household should be given a unique ID. Their name, location of their land, and date of entering into the agreement and leaving the agreement should be recorded.

A record of the geographic location of the project area for all areas of grassland

- The geodetic coordinates of the project area (and any stratification inside the area) must be established, recorded and archived. This can be achieved by field survey (e.g. using GPS), or by using geo-referenced spatial data (e.g. maps, GIS datasets).

A record of grassland management

- The grassland management plan, together with a record of the plan as actually implemented during the project crediting period must be available for validation and verification.

3) Recording of Data and Parameters Monitored

The following parameters must be record and monitored during the project. When applying the equations provided in this methodology (VM0026/Version 1.1) for the ex-ante calculation of net anthropogenic GHG removals by sinks, the project proponent must provide transparent estimations for the parameters that are monitored during the project crediting period. These estimates must be based on measured or existing published data where possible and the project proponent must apply a conservative approach: that is, if different values for a parameter are equally plausible, a value that does not lead to over-estimation of net anthropogenic GHG removals by sinks must be selected.

As described in Section 3.2.2, no chemical fertilizer would be used in the project

For the estimate of annual CH_4 emissions from enteric fermentation, population of livestock type l ($P_{l,t}$) and grazing days of livestock type l ($Days_{l,t}$) must be recorded annually during the project crediting period.

For the estimate of annual CH_4 and N_2O emissions from manure deposition during grazing, grazing days of livestock of type l ($Days_{l,t}$) and average grazing hours per day of livestock type l during the grazing season must be recorded in every grazing season, in each year during the project crediting period.

For the estimate of annual CO_2 emissions due to the use of fossil fuels for SGM, Fuel consumption by type k, machine type j, parcel grassland p, in year t under project ($FC_{p,j,k,t}$) must be recorded at each time a management practice using machines is adopted and reported annually during the project crediting period:

To estimate project removals due to changes in SOC, the following parameters must be monitored at least once every five years during the project crediting period. The soil sampling, handling and storage, processing and measurement, and quality control procedures implemented in soil organic carbon analysis that follow a scientific peer-reviewed or nationally approved standard.

- SOC content ($SOC_{mG,s,i,t}$)
- Soil bulk density ($BD_{mG,s,i,t}$)
- Percentage of rocks with a diameter larger than 2 mm, roots and other dead residues ($FC_{mG,s,i,t}$)

As mentioned in Section 3.2.2, the project uses direct measurement approach (Option 2) to determine the project removals due to changes in SOC, and the sampling procedures were designed such that the statistical significance of soil carbon stock changes between the baseline carbon stock and the carbon stock in time t can be determined with a 95 percent confidence interval. The Guidelines for sampling and

surveys for CDM project activities and programmes of activities was followed to determine the sampling procedure and sample size.

For the estimate of leakage emissions, the monitoring parameters required in the VCS modules VMD0040 Estimation of Leakage Emissions from Displacement of Grazing Activity due to Implementation of Sustainable Grassland Management Activities must be recorded annually during the project crediting period. The following parameters were monitored and recorded:

Total population of livestock of each type relocated to unidentified grasslands in year t ($P_{GUI,l,t}$)

Days that the population of each type of relocated livestock of type l graze in unidentified grassland in year t ($Days_{GUI,l,t}$)

4) Sampling Design and Stratification

As mentioned above, the project removals due to changes in SOC will be determined by direct measurement approach (Option 2) by using soil sampling procedures according to nationally-approved standard (HJ/T 166-2004).

Due to the heterogeneity of soil carbon, stratification of the project area into relatively homogeneous units can either increase the measuring precision without increasing the cost unduly or reduce the cost without reducing measuring precision because of the lower variance within each homogeneous unit.

According to the methodology (VM0026/Version 1.1), four main requirements was met before the stratified sampling is chosen:

- Population must be stratified in advance of the sampling

  The project area was stratified before sampling

- Classes must be exhaustive and mutually exclusive (i.e. all elements of the population must fall into exactly one class).

  For the project, classes were determined by two different soil texture within project boundary and the different management, which are exhaustive and mutually exclusive and all elements of the population fell into exactly one class.

- Classes must differ in the attribute or property under study, otherwise there is no gain in precision over simple random sampling

The grazing situation is basically the same in the project area, but there are three different restoration measures in the project area. Soil carbon accumulation was also significantly affected by different soil textures, such as poor water retention and fertility in sandy soils and better water retention and fertility in loamy soils. For this project, according to the remediation measures and soil texture, the pre-project strata are listed in the table below.

- Selection of items to represent each class (i.e. the sample drawn from each class) must be random.

The location of sample sites was set by systematic sampling with a random start. For each strata, using GIS to set a random start plots, and then set the constraint boundary for the rest plots (within the range of the certain strata and the horizontal and vertical distances from the boundary should be no less than 30m).

Table 3-6 The Project ex ante Stratification for carbon calculation

Strata	Area (ha)	Grassland type	Management practice	Soil texture
Total	**266,655.29**			
1	128143.28	Alpine Meadow Grassland	Rotational grazing	loam
2	30295.06	Desertification Grassland	Rotational grazing	Sandy loam
3	56646.29	Mountain Grassland	Rotational grazing	loam
4	13976.2	Mountain Grassland	Rotational grazing	Sandy loam
5	29996.42	Desertification Grassland	Grazing prohibition	Sandy loam
6	152.23	Alpine Meadow Grassland	Reseeding grass	loam
7	6512.48	Desertification Grassland	Reseeding grass	Sandy loam
8	933.33	Mountain Grassland	Reseeding grass	Loam

Updating of strata

The ex-post stratification must be updated due to the following reasons:

- Unexpected disturbances occurring during the project crediting period (e.g. due to fire, pests or disease outbreaks), affecting differently various parts of an originally homogeneous stratum;
- Grassland management activities (planting) may be implemented in a way that affects the existing stratification.

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

Sampling framework

According to the methodology, Guidelines for sampling and surveys for CDM project activities and programmes of activities (version 4.0) should be followed to determine the sampling procedure and sample size.

According to the Guidelines for sampling and surveys for CDM project activities and programmes of activities (version 4.0), the project proponents may use the sample size calculator available in the CDM website. See Sample Size Calculator Table for detail.

The mean SOC with the project boundary and the standard deviation of SOC in each stratum were estimated from a preliminary sample, the project monitoring team has selected 3 preliminary sample sites for each strata and calculated the mean value and standard deviation of the biomass stock in each stratum which were used to calculate the final number of sample sites based on the Sample Size Calculator Table as mentioned above.

The initial calculated sample size was 24 at the 95% confidence level and 15% precision was used. Considering the large area of the project boundary, the number of samples per stratum was increased to a minimum of 6 samples per stratum and a maximum of 14 samples per stratum, and the final actual sample size was increased to 60. Please refer to the sample size calculator table for details.

For each stratum, using GIS to set a random start sites, and then set the constraint boundary for the rest plots (within the range of the certain strata and the horizontal and vertical distances from the boundary should be no less than 30m).

5) Monitoring for leakage emission

For the estimate of leakage emissions, the monitoring parameters required in the VCS modules VMD040 Estimation of Leakage Emissions from Displacement of Grazing Activity due to Implementation of Sustainable Grassland Management Activities were recorded annually during the monitoring period.

During the implementation of the project, Altay Forestry and Grass Bureau continuously monitored the grazing activities in the project area, and monitored the number of grazing days($Days_{GUI,l,t}$) in the grazing area and the leakage area and quantity of cattle and sheep rotating back and forward in the two areas($P_{GUI,l,t}$). All are summarized in the project grazing records.

3. Monitoring frequency

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

4. Data management

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

5. QA/QC procedures

The following QA/QC procedures will be adopted:

1) Training will be provided to the staff to guarantee the implementation of the monitoring plan; all the relevant staff is obliged to take the training course before the operation starts;

2) The monitoring team will check the monitoring equipment regularly to make sure their normal operation before each monitoring activities;

3) If the validated monitoring plan cannot be conducted during the following monitoring process due to some reason, an updated monitoring plan should be submitted to VVB during the corresponding verification by indicating the relevant deviation of the original plan and the reason for the deviation.

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

The monitoring plan will be published on VCS and CCB website which can be easily download by stakeholders. Also, the summary of project description in local language will be disseminated to local communities through Altay Forestry and Grassland Bureau, as long as the summary of monitoring reports during verification. At the same time, public notice boards in each village will be used to publicize information regarding how to access to the monitoring plan and results through internet. Technical staff from Altay Forestry and Grassland Bureau will also explain the monitoring plan to local residents, especially to illiterate or under-educated herders. Also, a contact person with phone number will be published in case any stakeholders want to directly contact the project proponent and raise opinions.

For the following periodical verification, the dissemination of monitoring plan and results is same as the first verification. And the monitoring team will summarize all the comments received from stakeholders and corresponding responses regarding the monitoring plan and results, and published on VCS and CCB website along with the monitoring report for each monitoring period.

3.4 Optional Criterion: Climate Change Adaptation Benefits

3.4.1 Regional Climate Change Scenarios (GL1.1)

N/A

3.4.2 Climate Change Impacts (GL1.2)

N/A

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

N/A

4 COMMUNITY

4.1 Without-Project Community Scenario

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

As mentioned in section 2.1.8 and 2.1.9, there are 8 main community groups identified which will be affected by this project:

- Local residents

- Local women

- Local herders

- Local Kazakh

- Grassland guardians

- Village collectives

- Altay Forestry and Grassland Bureau

- Local government

Among those community groups, local residents and village collectives are the most important groups who would be significantly influenced by the implementation of the project.

Well-being information

The total GDP of the city in 2020 was 10.138 billion yuan. Compared with the previous year, the added value of the primary industry was 1.372 billion yuan, the added value of the secondary industry was 1.611 billion yuan, and the added value of the tertiary industry was 7.154 billion yuan. County agriculture, forestry, animal husbandry and fishery total output value of 2.485 billion yuan, farmers and herdsmen per capita disposable income of 34,507 RMB.

There are 30 schools of various types in the city, including 1 adult higher education school, 1 higher vocational school, 4 secondary vocational schools, 2 general middle schools, 2 junior middle schools, 19 primary schools and 1 special education school.

The city's public library has a total collection of 405,000 volumes, 123 health institutions, 1,416 beds, and 2,177 health technicians, including 783 occupational doctors and 951 registered nurses.

At the beginning of the project, herding was a traditional livelihood for local residents and there were not many other job opportunities. Local women used to stay at home and do housework, and most of them had no income. The per capita disposable income of farmers and herdmen in Altay is one of the lowest in China and far lower than that of developed countries. Overgrazing is the main factor leading to grassland degradation, which may reduce grazing productivity and is not conducive to increasing the income of local herders in the long term.

Natural grassland is an important part of Altay's ecosystem, which plays an irreplaceable role in improving regional ecological environment, conserving water and soil, preventing wind and fixing sand, regulating climate and so on. At the same time, it is also an important means of production of grassland animal husbandry and plays an important role in promoting the economic development of pastoral areas. Animal husbandry is the pillar industry of the city's national economy, but the overloading rate of grassland is as high as 90%, more than 80% of grassland is generally degraded, grassland coverage is reduced, and pasture yield is reduced.

To increase the income of farmers and herdmen is the most prominent problem in the rural economic development of Altay City. The grassland is the main economic resource in Altay pastoral area. Before the economic structure of pastoral areas had not been fundamentally improved and non-agricultural industries had not been fully developed, grassland animal husbandry was still the main source of income increase for herders for a long time, but grassland degradation seriously restricted the economic development of pastoral areas.

Community characteristics

Kazakh is one of the world’s most famous nomads. This is mainly because the herders usually have to raise hundreds of cattle and sheep to survive, so they need to constantly choose pastures to meet the supply of cattle and sheep. When they settle down in a place, they check out the local pasture, water resources, etc. Herdsmen generally follow the natural and do not wait until the surrounding grass has been eaten up before moving. In order to resist the harsh winter, for the circulation of the grassland, but also for their own cattle and sheep to survive, they forage for water, grass and raise cattle. Moreover, such a traditional transition life has continued for nearly 3,000 years, the history of the Kazakh is written in nomadism.

Altay means "golden mountain" in Turkic and Mongolian, and is named for the gold in the mountain. In 1950, Ashan District was set up, and the office was stationed in Chenghua County. It has jurisdiction over Chenghua, Fuyun, Qinghe, Fuhai, Burqin, Habahe, Jeminay and other 7 counties. 1953 the original Chenghua County renamed Altay County. In 1954, Altay County was renamed Altay County. The original Ashan area renamed Altay area, in Altay County. It has jurisdiction over Altay, Qinghe, Fuyun, Fuhai, Jeminay, Burqin, Habahe and other 7 counties. In 1970 Altay area renamed Altay region, the region in Altay County. It has jurisdiction over Altay, Qinghe, Fuyun, Fuhai, Jeminay, Burqin, Habahe and other 7 counties. On November 17, 1984, The State Council approved the abolition of Altay County and the establishment of Altay City.

Altay City is a multi-ethnic county, including Han, Kazak, Hui, Mongolian and so on. The main local languages are Mandarin and Kazakh.

Diversity within the community

In 2020, the total population of Altay was 196,200 people, of which: 99,900 people of Han nationality, accounting for 51.0% of the total population, 79,900 people of Kazak nationality, accounting for 40.7%, and 16,400 people of other nationalities, accounting for 8.3%. Altay has Han nationality, Kazak nationality, Hui nationality, Uygur nationality, Mongolian nationality, Tibetan nationality, Miao nationality, Zhuang nationality, Yi nationality, Buyi nationality, Korean nationality, Manchu nationality, Dong nationality, Yao nationality, Tujia nationality, Dai nationality, Li nationality, Dongxiang nationality, Kirgiz nationality, Tu nationality, Salar nationality, Xibe nationality, Uzbek nationality, Russian nationality, Tatar nationality and so on.

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

The community groups of the project including Local residents, local women, local herders, grassland guardians, village collectives and other stakeholders were barely active. Some project land belongs to village collectives, before the implementation of the project, local residents lived by grazing, and most of the female rural workers have to stay at home with no income. And other community groups are far from the project area. So, the interaction between community groups was considered incipient and/or superficial due to the geographic distance and the absence of common activities to be carried out jointly by the communities.

4.1.3 High Conservation Values (CM1.2)

No HCVs was identified related to community well-being in the project zone.

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

At the start of the project, local herders lived by grazing, and the grassland will continue to degrade due to overgrazing. So, the local community will stay in the current well-being level with no potential income increase.

In addition, without the implementation of the project, the traditional livelihood of local Kazakh herding and grazing would be continuously threatened by the degradation of the grassland ecosystem, which will further affect the development of local animal husbandry and tourism. Due to the lack of new economic growth engine, local medical, educational and cultural undertakings cannot develop better. Therefore, the well-being of the community may deteriorate further.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

The project provided job and training opportunities for local residents, which would enhance their ability, improve their family income, increase the interaction between communities, and benefit the protection and dissemination of Kazakh culture.

Also, the project would empower women and build community capacity in gender equity. With other employees participating in community activities, women may get more happiness than doing housework only, so their well-being would be significantly improved.

Furthermore, Altay Forestry and Grassland Bureau guided herders to graze reasonably, which is conducive to the restoration of degraded grassland ecosystem and improve their living standard in long-term.

All of these could guarantee the long-term community benefits.

Community Group	Local residents
Community Group	Local women Grassland guardians
Impact(s)	Identify impact(s) Create 5,669 job opportunities, which is equally offered to local women and men; Predicted direct benefits Empower women and build community capacity in gender equity.
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	During the project implementation, about 13,167 local residents participated in grass seeding and fences building, and about 1,975 local residents are grassland guardians. Over 40.7% of the employed local residents are Kazakh and 43% are women. The job opportunities provided by the project have increased local household income. The local Forestry and Grassland Bureau regularly provides local residents with training on rodent control, grassland fire prevention and sustainable management of grassland. 13,167 local residents participated in the training, and their abilities were also improved. The project restored the degraded grassland and is beneficial to rebuild local pleasant and beautiful ecological system which has higher ecological aesthetic value of tour and sightseeing which improve their living environment. Without the project, local women in order to work at home and participating the community activities together with other employees, women may gain more happiness compares to doing housework only, thus positive welfare outcomes for local households are more likely to be expected.

Community Group	Local Kazakh
Impact(s)	5,359 of the local Kazakh have been offered job positions and training opportunities for sustainable and scientific grazing skills, and the potential improvement of grazing productivity after grassland restoration would help to promote their traditional livelihood.
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	The traditional livelihood of local Kazakh is herding and grazing which has been threatened by the degradation of the grassland ecosystem. The implementation of the project could restore the ecosystem of the traditional grassland for local Kazakh which is beneficial to conservation of the traditional culture. Furthermore, local Kazakh have more opportunities to work together and organize more social activities and hence increase the interaction within the community, which can indirectly promote the protection and diffusion of Kazakh culture.
Community Group	Local herders
Impact(s)	Enhance capabilities of local herders and increase their household income;

	Improve grazing productivity.
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	The project will not change the ownership of the project land, but some herders are affected by the project, because about 29,996.24 hectares of area are strictly prohibited from grazing for the first five years after the project. However, the herders in the project area can obtain corresponding subsidies for forbidding grazing. After consultation with stakeholders, the local herders are satisfied with the policy. In addition, herders can still graze reasonably in the rotation grazing area of about 229060.82 hectares. Moreover, herders can graze outside the project area under the relevant guidance of the local forestry and grass bureau. Of course, this project also considers the leakage emission caused by the displacement of grazing activities. In addition, after 5 years, grazing control was implemented according to the growth situation of herbage. The Forestry and Grass Bureau of Altay City measured the yield of herbage in the surrounding grasslands of the project area, and guided herders to graze in reasonable areas. Therefore, the project will not result in a reduction in grazing yield, but rather a significant increase in long-term yield is expected due to the restoration of degraded grassland

Community Group	Village collectives
Impact(s)	Restore grassland productivity of village collectives; Provides more opportunities for village collectives from Kazakh nationality to transport their traditional culture in a positive way
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	The ownership of grasslands belongs to township collectives, village collectives and herdsmen. The project restores degraded grassland and increases grassland productivity. The project indirectly promotes the spread of traditional culture by organizing special village collective cultural activities to strengthen the connection between local Kazakh herders and other members
Community Group	Local herders

4.2.2 Negative Community Impact Mitigation (CM2.2)

Community Group	Altay Forestry and Grassland Bureau Local government
Impact(s)	Create local job opportunities, improve the local ecological environment.
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	Altay Forestry and Grass Bureau is responsible for supervising and managing the local grassland and ecological construction, and the implementation of the project will help them improve the local environmental conditions. Restore the degraded grassland and alleviate the ecological crisis of grassland. Create 13,167 jobs (1,317 permanent and 11,850 temporary) and solve the employment problem.

According to the Chinese Grassland Law, the local government should carry out the construction of grassland fire prevention facilities, and once a fire disaster occurs, the local government should be responsible for relevant rescuing immediately. And the project proponent is experienced in local natural risk control and has established a Grassland Management Manual for the project which includes specific instruction in fire prevention.

As described in section 2.3.17, negative well-being impacts on community groups including fires, emergencies, and dangerous driving, this can be alleviated through technical and awareness training to local herders/communities, strengthening patrolling and monitoring. Also, the project proponent and Altay Forestry and Grassland Bureau provided relevant skill training for local herders, to strengthen the safety awareness of herders. Also, local herders the local forestry and grassland bureau was equipped with fire protection facilities, such as fire protection clothing, fire trucks, and fire water guns, etc., in addition, the local herders conducted daily patrols on the grasslands, which could prevent grassland fires. Furthermore, there is a first aid kit on the grassland patrol vehicle to prevent emergencies.

According to the project design report, grazing shall be strictly prohibited in the first five years in the no-grazing area, reasonable grazing shall be allowed in the rotation grazing area and the area of supplementary seeding of high-quality grass, and then grazing control shall be allowed according to the growth situation of pasture. Instead, Altay Municipal Forestry and Grass Bureau measures the pasture yield of the surrounding grasslands of the project area, and guides herders to graze in a reasonable area, which will not reduce grazing productivity. In addition, the local government also pays subsidies to herders who ban grazing in the project area. As mentioned in Section 2.3.7, all pastoralists agreed to the subsidy policy and were willing to participate in the project.

In addition, no HCVs was identified related to community well-being in the project zone.

Therefore, all the negative well-being impacts have been mitigated.

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

As summarized in Section 4.2.1, the expected community impacts are all benefit, no potential cost or risk, therefore the net well-being impacts of the project are positive for all identified community groups compared with their anticipated well-being conditions under the without-project land use scenario.

Improve grazing methods and increase household income

As mentioned in Section 2.1.11, the project will offer some short-term and long-term job opportunities for local herders which could increase the income of the households. Also, sustainable grazing is conducive to the protection of grassland and could increase the total production of herding and maintain a long-term benefit for local herders. In addition, after the implementation of the project, local herders have more opportunities to work together, which will give them the motivation to organize more social activities and hence increase the interaction within the community. All these will significantly improve the well-being of local communities.

Benefit to conservation of traditional Kazakh culture

As mentioned in Section 4.1.3, The project is located in Altay City where the local Kazakh comprise a large proportion (40.7%) of the total population. The traditional livelihood of local Kazakh is herding and grazing which has been threatened by the degradation of the grassland ecosystem. The implementation of the project will restore the ecosystem of the traditional grassland for local Kazakh which is beneficial to conservation of the traditional culture. In addition, the job and training opportunities provided by the project could bring more opportunities for local Kazakh to work together and organize more social activities and hence increase the interaction within the community.

Improve gender equity

There is evidence that when women receive income, positive welfare outcomes are more likely: gender equity can thus be key to wider poverty and equity impacts. Generally, women are more involved in subsistence activities like planting, protecting, or caring for seedlings, as well as in home orchards and public land. The project provided them job opportunities, which is equally offered to local women and men. In fact, about 43% of the local residents directly involved in the project are women. Which makes women gain more professional identity and higher happiness.

Promote technical capability of local communities

There is a workbook provided for each employee which includes technical advice for their work, and all the workers were offered the technical training immediately once they were hired. Such skills and knowledge include are useful for grassland management, such as fire prevention and forage supplementary sowing technology. These technical manuals were distributed to each household in the local villages, including the villagers who haven't participated in the project.

Besides the training on technical skills of grass planting, local workers were trained on relevant skills for their future livelihood, such as sustainable grassland management. These skills will benefit the long-term development of the local communities who participate in the project.

4.2.4 High Conservation Values Protected (CM2.4)

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

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

The project 'do no harm' to the well-being of other stakeholders. In contrary, it will provide valued experience of sustainable grassland management and carbon trading to other stakeholder, which in some way could encourage more followers to engage in similar projects for sustainable development.

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

The project restored degraded grassland, provided sustainable grazing guidance for herders in the project area, and provided a demonstration for other herders outside the project area.

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

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

The project will provide valued experience of sustainable grassland management and carbon trading to other stakeholder, which in some way could encourage more followers to engage in similar projects for sustainable development. So the project activities are not anticipated to result in net negative impacts on the well-being of other stakeholders.

4.4 Community Impact Monitoring

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

To in depth track the social economic changes resulted from the project activities in the communities and households, and understand issues raised and difficulties encountered during the project implementation, as well as their opinions and comments on the project activities, so as to adjust and improve the project activities in a timely manner, a PRA process will be conducted before every verification, as described below.

Procedures:

a) Establishing PRA team: The teams will be set up to conduct the PRA process, which consists of social experts, project officers, local government officials and technical staff with various background (grassland, sociology and ecology) from county forest bur eau;

b) Developing SOPs for the field PRA process;

c) Training: A training workshop will be held for discussing and training of PRA teams in order to ensure all PRA members fully understand the purposes, contents, procedures and specific methods of the PRA field survey.

d) Preparation: Developing detail PRA field survey plan including responsibility of each member of PRA team; and contacting with relevant project counties, nature reserves, forestry farms and towns/townships and informing them PRA plan.

e) PRA survey: conducting PRA survey following SOPs.

Methods:

a) Village meeting: A meeting of herder representatives will hold in villages sampled. The general agenda are:

(i) Introducing PRA team members and the purpose, procedures, methods and time schedules of the PRA process;

(ii) Explaining the way of villagers' participation;

(iii) Collecting information regarding the project progress, social-economic and environmental benefits shared from the projects, existing problems/difficulties encountered by local communities during the project implementation, as well as comments and suggestions on improvement of the project.

(iv) Collect information on the impact of project implementation on HCV (hydrological services and Kazakh cultural dissemination).

b) Semi-structured interviews: This includes VIP interview, herder household interview and group interview

(i) Interviewing of VIP: including villager leaders, distinguished villagers, elder villagers and head of ethnic minority.

(ii) Interviewing of household: Some herder households will be selected for the interview. The interviewed households shall cover rich household, poor household, new inhabitant household, etc.

(iii) Group interview: Villagers are grouped based on gender, age classes or land use types. The group interviews were conducted together with village meeting.

c) Questionnaire: Questionnaire forms will be developed and distributed among different stakeholders, including herder households, village committees, forest farms, township governments and Forestry and Grassland Bureau.

The following key variables will be monitored during each verification of the project:

Variable	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities
monitoring methods to be applied	Training records Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local residents, local herders, Local women, grassland guardians
Purpose of monitoring	Evaluate the technical improvement resulting from the project

Variable	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities
monitoring methods to be applied	Training records Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local women
Purpose of monitoring	Evaluate the technical improvement resulting from the project

Variable	Total number of people expected to be employed in project activities, expressed as number of full-time employees
monitoring methods to be applied	Working contracts and payment records Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local women, local herders, Local residents, grassland guardians
Purpose of monitoring	Evaluate the technical improvement resulting from the project

Variable	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees
monitoring methods to be applied	Working contracts and payment records Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local women
Purpose of monitoring	Evaluate the technical improvement resulting from the project

Variable	Total number of people expected to have improved livelihoods or income generated as a result of project activities
monitoring methods to be applied	Working contracts and payment records Questionnaire and interview Training records
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local women, local herders, Local residents, grassland guardians
Purpose of monitoring	Evaluate the change of livelihoods and household income due to the implementation of the project, such as increased job opportunities and improved grazing productivity

Variable	Number of women expected to have improved livelihoods or income generated as a result of project activities
monitoring methods to be applied	Working contracts and payment records Questionnaire and interview Training records
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local women
Purpose of monitoring	Evaluate the change of livelihoods and household income due to the implementation of the project, such as increased job opportunities and improved grazing productivity

Variable	Total number of community members whose well-being is expected to improve as a result of project activities
monitoring methods to be applied	Working contracts and payment records Questionnaire and interview Training records
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local women, local herders, Local residents, grassland guardians, Village collectives
Purpose of monitoring	Evaluate the change of well-being due to the implementation of the project

Variable	Number of women whose well-being is expected to improve as a result of project activities
monitoring methods to be applied	Working contracts and payment records Questionnaire and interview Training records
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local women, Village collectives
Purpose of monitoring	Evaluate the change of well-being due to the implementation of the project

Variable	Area of degraded grassland restored
monitoring methods to be applied	Project records
Frequency of monitoring/recording	Before every verification event
Affected community groups	Altay Forestry and Grassland Bureau Village collectives Local government
Purpose of monitoring	Evaluate the environmental improvement resulting from the project

Variable	Number of Kazakh benefiting from project activities
monitoring methods to be applied	Working contracts and payment records Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local Kazakh
Purpose of monitoring	Evaluate the conservation and diffusion of Kazakh cultural resulting from the project, such as organizing special community cultural activities

4.4.2 Monitoring Plan Dissemination (CM4.3)

The community monitoring plan and results of first verification will be published on VCS and CCB website which could be easily download by stakeholders. Also, the summary of project description in local language was disseminated to local communities through Altay Forestry and Grassland Bureau, as long as the summary of monitoring reports during this verification. At the same time, public notice boards were used to publicize information regarding how to access to the community monitoring plan through internet. Technical staff from Altay Forestry and Grassland Bureau would explain the community monitoring plan to local herders, especially to illiterate or under-educated herders. Also, a contact person with phone number was published in case any stakeholders want to directly contact the project proponent and raise opinions.

4.5 Optional Criterion: Exceptional Community Benefits

N/A

4.5.1 Exceptional Community Criteria (GL2.1)

N/A

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

N/A

4.5.3 Community Participation Risks (GL2.3)

N/A

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

N/A

4.5.5 Net Impacts on Women (GL2.5)

N/A

4.5.6 Benefit Sharing Mechanisms (GL2.6)

N/A

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

N/A

4.5.8 Governance and Implementation Structures (GL2.8)

N/A

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

N/A

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

In recent years, due to overgrazing, the grassland in the project area has experienced varying degrees of degradation and even desertification, which has seriously damaged the growth conditions of plants and the habitats on which wild animals depend, resulting in the decline of biodiversity.

The biodiversity within the project zone at the start of the project are summarized as follows:

Vegetation species in Altay City can be roughly divided into six categories, including forest vegetation, shrub vegetation, desert vegetation, grassland vegetation, meadow and swamp vegetation and artificial vegetation.

According to the biodiversity baseline report, there are 79 species of animals in the project zone. Among them, there are 19 species of mammals, 60 species of birds, and 4 species of national level I protected species, 14 species of national level II protected species in the project zone. Furthermore, there are 1 endangered species (*Oxyura leucocephala*) and 2 critically endangered species (*Emberiza aureola, Saiga tatarica*) are listed in the IUCN Red List.

Table 5-1 Endangered and critically endangered species in the project zone

No.	Species	National Protection level	Red List of IUCN
1	*Oxyura leucocephala*	Ⅰ[59]	EN[60]
2	*Emberiza aureola*	Ⅰ	CR
3	*Saiga tatarica*	Ⅰ	CR
4	*Equus hemionus*	Ⅰ	NT
5	*Tetraogallus altaicus*	Ⅱ	LC
6	*Pterocles orientalis*	Ⅱ	LC
7	*Otus scops*	Ⅱ	LC
8	*Bubo scandiacus*	Ⅱ	VU
9	*Bubo bubo*	Ⅱ	LC
10	*Strix uralensis*	Ⅱ	LC
11	*Surnia ulula*	Ⅱ	LC
12	*Asio otus*	Ⅱ	LC
13	*Alauda arrensis*	Ⅱ	LC

[59] http://www.forestry.gov.cn/html/main/main_5461/20210205122239482485322/file/20210205122347636743107.pdf

[60] The IUCN's Red List of Endangered Species is divided into nine categories, according to criteria such as the rate of decline, the total number of species, geographical distribution, and the degree of population dispersion. The highest category is extinction (EX), followed by extinction in the wild (EW). The three levels of "critical" (CR), "endangered" (EN) and "vulnerable" (VU) are collectively referred to as "threatened", followed by "near" (NT), "not at risk" (LC), "data lacking" (DD) and "not assessed" (NE).

No.	Species	National Protection level	Red List of IUCN
14	*Vulpes vulpes*	Ⅱ	LC
15	*Otocolobus manul*	Ⅱ	LC
16	*Lynx lynx*	Ⅱ	LC
17	*Ovis ammon*	Ⅱ	NT
18	*Capra sibirica*	Ⅱ	NT
19	*Alectoris chukar*		LC
20	*Phasianus colchicus*		LC
21	*Syrrhaptes paradoxus*		LC
22	*Columba livia*		LC
23	*Columba rupestris*		LC
24	*Columba oenas*		LC
25	*Streptopelia turtur*		VU
26	*Streptopelia orientalis*		LC
27	*Streptopelia decaocta*		LC
28	*Streptopelia senegalensis*		LC
29	*Cuculus canorus*		LC
30	*Caprimulgus europaeus*		LC
31	*Apus pacificus*		LC
32	*Coracias garrulus*		LC
33	*Merops apiaster*		LC
34	*Upupa epops*		LC
35	*Lanius isabellinus*		LC
36	*Lanius minor*		LC
37	*Lanius excubitor*		LC
38	*Garrulus glandarius*		LC
39	*Pica pica*		LC
40	*Podoces hendersoni*		LC
41	*Corvus monedula*		LC
42	*Corvus dauuricus*		LC
43	*Corvus frugilegus*		LC
44	*Corvus corone*		LC
45	*Melanocorypha bimaculata*		LC
46	*Melanocorypha leucoptera*		LC
47	*Calandrella brachydactyla*		LC
48	*Calandrella cheleensis*		LC
49	*Galerida cristata*		LC
50	*Eremophila alpestris*		LC
51	*Hirundo rustica*		LC
52	*Acrocephalus dumetorum*		LC
53	*Sylvia nisoria*		LC
54	*Sylvia minula*		LC

No.	Species	National Protection level	Red List of IUCN
55	*Sylvia nana*		LC
56	*Pastor roseus*		LC
57	*Oenanthe isabellina*		LC
58	*Oenanthe oenanthe*		LC
59	*Oenanthe pleschanka*		LC
60	*Oenanthe deserti*		LC
61	*Oenanthe picata*		LC
62	*Pyrgilauda davidiana*		LC
63	*Anthus campestris*		LC
64	*Bucanetes mongolicus*		LC
65	*Rhodospiza obsoleta*		LC
66	*Emberiza buchanani*		LC
67	*Emberiza hortulana*		LC
68	*Mustela altaica*		NT
69	*Mustela eversmanni*		LC
70	*Vormela peregusna*		VU
71	*Sus scrofa*		LC
72	*Lepus tolai*		LC
73	*Ochotona dauurica*		LC
74	*Marmota baibacina*		LC
75	*Spermophilus undulatus*		LC
76	*Myospalax myospalax*		LC
77	*Lagurus lagurus*		LC
78	*Microtus arvalis*		LC
79	*Hemiechinus auritus*		LC

Threats to the biodiversity

According to previous studies, the factors threatening biodiversity mainly include the following aspects:

Climatic factors

Project zone is located in the arid area of Northwest China, with obvious continental climate characteristics. With global warming, permafrost melts in a large area, permafrost activation, snow line rise and water conservation function decline. In addition, the increase of temperature is not conducive to vegetation growth and breeding, resulting in the decline of litter yield, the input of soil organic matter and biodiversity.

Insect and rodent damage factors

Serious insect and rodent damage is one of the important factors for grassland degradation in project zone. The main rodents include Ochotona curzoniae, *Myospalax fannieri*, *Meriones unguiculatus*, etc. These rodents directly destroy grassland vegetation by gnawing grass leaves and roots, and have the living habits

of digging holes, burrowing and accumulating sand and soil, damaging grass roots, burying forage plants and destroying soil structure indirectly inhibited the normal breeding of forage. In addition, rats competed with cattle and sheep for forage, which further exacerbated the contradiction between forage and livestock.

Overload overgrazing

Long term overgrazing is the main cause of grassland degradation and desertification in project zone. Grassland overgrazing is mainly due to two reasons: one is the decline of the absolute amount of grassland suitable for grazing, resulting in a significant reduction in the area of grassland available for livestock grazing; Second, the animal husbandry population has increased, the total amount of livestock has increased, and the grazing intensity has increased. Specifically, the adverse effects of overgrazing on grassland ecosystem mainly include three aspects: first, it reduces the overall productivity of grassland by feeding a large number of plants; Second, selective feeding significantly inhibited the growth of high-quality forages, provided space for the invasion of inedible poisonous weeds and weeds, and the community tended to degenerate; Third, the high-intensity and high-density trampling of livestock leads to the increase of soil compactness, the decrease of porosity, and it is difficult to effectively retain water, which is not conducive to root growth and development. Grassland degradation and destruction lead to the loss of biological habitat and the reduction of animal population.

5.1.2 High Conservation Values (B1.2)

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

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

As mentioned above, the without-project land use scenario is continuing “degraded” of the current grassland ecosystem due to overgrazing. Without the implementation of the project, the conservation of the local biodiversity would not be achieved under the continued degradation of grassland ecosystem, which would be a serious threat to local climate conditions and ecosystem, especially for the endangered species mentioned above.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Biodiversity Element	Grassland coverage of the project area
Estimated Change	Positive, the coverage is estimated to be increased
Justification of Change	The project planted *Elymus nutans*, *Agropyron cristatum*, *Festuca rubra* and *Artemisia sphaerocephala* on degraded grassland, the grassland coverage of the project area will increase. The restored grassland is more suitable for the survival of animals and will increase the biodiversity of the project area.

Biodiversity Element	Number of grass species in the project area
Estimated Change	Positive, the number of the species is expected to be increased
Justification of Change	Four native grass species (Elymus nutans, Agropyron cristatum, Festuca rubra and Artemisia sphaerocephala) have been planted in project area which will be maintained under long-term management.

Biodiversity Element	Threats to endangered animals
Estimated Change	Positive, the threats are expected to be reduced
Justification of Change	The project prevented the continued degradation of the local grassland ecosystem and increased the natural habitats for the endangered animals, so the threats to endangered animals will be reduced as a result of the project activities

5.2.2 Mitigation Measures (B2.3)

The main measure of the project is to implement rotational grazing and grazing prohibition through the construction of grassland fencing and planting of grass on degraded grassland. Through scientific and sustainable grazing management, related technical skills training, and scientific and effective management plans, soil desertification can be mitigated, grassland vegetation restored, soil carbon stocks and local biodiversity improved. The management team has experience in sustainable grassland management as described in Section 2.4.2, and has established an integrated management system for project implementation, including rodent control, fire protection, technical training of staff, etc., to minimize the intensity and periodicity of the need for intervention. The implementation of the project has improved the ecological environment of the project area, increased biodiversity, and provided more habitats for endangered species. In addition, all grass species are native and no invasive species are introduced.

Therefore, implementation of this project will not decrease biodiversity of project sites.

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

As mentioned before, without the project, the project area will continue degraded with much threat to local climate and biodiversity condition. And the main object of the project is to restore the degraded grassland ecosystem, by planting with mix species of native grass, therefore the net with-project change of biodiversity is positive.

First, there are 4 native species of grass planted in this project, including *Medicago sativa (Lucerne), Agropyron cristatum (Ice grass), Bromus inermis (Awnless brome) and Festuca arundinacea (Tall fescue)*. The mix planting of the species will have more positive impacts on biodiversity according to relevant research.

Second, through sustainable grassland management, including rodent control, grassland fire prevention and reasonable grazing guidance, the degraded grassland ecosystem is gradually restored. This will make sure the project can bring net biodiversity benefit compares to the with-out project scenario.

Third, the implementation of the project can improve grassland productivity and increase the coverage which is beneficial of water conservation, reduce drought and flood risk, promote soil nutrient cycle, improve local micro-climate and other ecological environment. Therefore, the population of animals will increase due to the restoration of the habitat.

5.2.4 High Conservation Values Protected (B2.4)

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

5.2.5 Species Used (B2.5)

Medicago sativa (Lucerne), *Agropyron cristatum* (Ice grass), *Bromus inermis* (Awnless brome) and *Festuca arundinacea* (Tall fescue) were planted on the degraded grassland in project area.

5.2.6 Invasive Species (B2.5)

All grass species are native species and no invasive species were and will be introduced into any area affected by the project

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

No non-native species will be used in the project zone.

5.2.8 GMO Exclusion (B2.7)

No GMOs will be used in the project to generate GHG emissions reductions or removals.

5.2.9 Inputs Justification (B2.8)

According to the Project Design Report, there are no chemical fertilizer applied in the project area. In order to alleviate the pressure of grassland forage, artificial feeding grassland is built around the project area, but only farm manure is applied.

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

Name	Biological control agents
Justification of Use	The biological control agents are environmentally friendly and do not have any side effects for humans. Upon routine overseeing, the pest will be treated by biological control once occurred according to local Pest Control and Prevention Policy. Different biological control agents: 1) Fungus, as a biocontrol method, forms a biological method of pest control. Fungi as a biocontrol method are considered a rapidly developing method and do not cause any harm to the environment. Fungi as a biocontrol method have proved to be a very effective alternative to chemical pesticides. Fungi as a biocontrol method are gaining widespread popularity in recent times. 2)The parasitoids lay eggs in the body of their hosts which ultimately leads to the death of the host. The dead host is then used by the larvae as a food source as is one of the most prevalent methods of biological control.
Potential Adverse Effect	Biological control may have potential adverse effects on the ecology of plants and animals if exotic natural enemies of insects are used. Since the project is planted with local species, there are local natural enemies for pest and disease control. Meanwhile, the project has established a risk evaluation mechanism to avoid the use of exotic natural enemies in the process of biological control.

5.2.10 Waste Products (B2.9)

The waste products resulting from the project activities may include:

(1) Rubbish: Local people will clear off the rubbish, such as plastics, metals, papers and other abandoned items from the project area regularly when they manage the grassland. Project owner will also carry out frequent visit to ensure the waste and waste products are well identified and cleaned.

(2) Human waste: There might be some human waste because there is no toilet in the field. However, the amount will be quite small and can be degraded naturally, so there is no particular treatment needed.

(3) Chemical pesticides waste: In order to prevent the pollution of pesticide waste, guarantee public health and protect the ecological environment, this project has strictly followed the management of pesticide waste in accordance with China Population Packaging Waste Recycling Management[61]. In the process of application, the pesticide in the packaging will be fully used by cleaning and other ways to reduce pesticide residues. At the same time, actively fulfilled the obligation of recycling and treatment of pesticide waste, set up a recycling station to recycle pesticide waste in time, and finally transfer the recycled waste to the waste disposal agency designated by the local government for subsequent treatment. The project owners will disseminate and train forest rangers in relevant knowledge to ensure strict compliance with the above-mentioned procedures.

5.3 Offsite Biodiversity Impacts

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

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

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

As described above, there are no potential negative offsite impacts on biodiversity, the net effect of the project on biodiversity is positive.

5.4 Biodiversity Impact Monitoring

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

As shown in Figure 3-1, the project owner established a monitoring team to conduct biodiversity monitoring. The responsibilities of each role in the team structure are:

- The project leader has the overall management responsibility, especially supervising the implementation of the monitoring plan, and assigning each member of the monitoring team their individual responsibility during the monitoring.

- Expert group provides professional technique related to monitoring activities to make sure all the monitoring activities meet the requirement of VCS and CCB standards.

[61] http://www.moa.gov.cn/govpublic/ZZYGLS/202008/t20200828_6351145.htm

- Monitoring group conducts the following monitoring process, measures the required parameters of the project as listed in the above Section 3.3.2 particularly, and collects all the original evidence and data and make relevant records.

- Auditing group performs internal verification of the measurement, reviews all the monitoring records and documents, crosschecks evidence and calculates emission removals during each verification period.

A Monitoring Manual has been provided to each member of the monitoring team with a specific explanation to make sure they fully understand all the monitoring process and issues concerned.

As mentioned in Section 2.1.11, the main objective of the project is to restore the degraded grassland ecosystem, by planting *Medicago sativa (Lucerne), Agropyron cristatum (Ice grass), Bromus inermis (Awnless brome) and Festuca arundinacea (Tall fescue)*. Also, grazing was strictly forbidden in the first five years after seeding, and then controlled grazing will be allowed depending on the growth situation of the forage. And based on the analysis in Section 2.1.18, the risks of fire, rodents, pests and overgrazing might threat the aim of the project and need to be intervened.

According to Section 5.4 of SBIA Manual-Part 3, the traditional monitoring protocols often require significant inputs of time, money, and scientific expertise, which are hard to sustain over long periods, while providing few benefits to local communities[62]. So-called “community-based monitoring” would appear to be a good fit for many carbon projects, its focus on practical issues of sustainability, such monitoring also has the potential to interact in a positive way with the social component of carbon projects. The involvement of local residents in monitoring programs can improve methods and results by incorporating their knowledge of the region’s biodiversity into protocols and can improve data quality by allowing programs to collect data year-round rather than during occasional expert visits. Likewise, local involvement in monitoring can empower communities by helping instil a greater sense of ownership of and responsibility for the biodiversity objectives of a project. Following the guidelines of SBIA Manual, the project chose multiple indicators and Pressure, State, and Response (PSR) indicators for the monitoring of biodiversity, while vegetation and animals were both involved to be monitored and the threaten and risk factors such as fire and disease are included, therefore the monitoring indicators should be considered as reasonable, considering the balance of high-quality data, low costs, regular measurements, and community participation.

According to SBIA-Part 3, three types of monitoring indicators will be chosen, including Pressure, State, and Response (PSR). Since natural systems are extremely complex, and even variables that are carefully chosen to reflect the health of a system will sometimes fluctuate for reasons unrelated to the project. In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit. Usually, the abundance of endangered animals can accurately reflect the status of the local ecosystem. The greater the number of endangered animals, indicating the better the ecological environment in the region. And considering the cost efficiency, the indicators that can be monitored with relative ease and reflect local conditions should be chosen. Therefore, the project chooses “reduced threats to endangered animals” and “population status of animals” as indicators to monitor the project’s impact on animals which should be appropriate for a sustainable grassland management project.

[62] Gardner, T. 2010. Monitoring forest biodiversity: Improving conservation through ecologically responsible management. Earthscan Ltd., London. 360 pages.

Also, the indicators of “population status of animals” and “reduced threats to endangered animals” are used to monitor the quantity and quality of grassland in the project area (a state indicator), together with other indicators (“grassland coverage” and “species of vegetation”), therefore the general benefit of local biodiversity could be reflected by the overall monitoring results of the multiple indicators.

All the original monitoring results will be recorded by auditing staff and assessed by the expert group to measure the net biodiversity impact and the effectiveness of the measures taken by the project activities.

The detailed monitoring plan for biodiversity is listed in the following table:

Indicator type	Description	Monitoring indicator	Indicator unit	Monitoring method	Monitoring frequency
State variables	The quantity and quality of grassland in the project area	Grassland coverage in the project area	ha	Sample plots of the same size are installed nearby each SOC sample plots to monitor the coverage (totally 60 sample plots were set up, please refer to Section 3.3.3 for the detailed sampling procedures). Plot size is set to be a rectangle land with 5m*5m ($25m^2$). Calculate grassland coverage by estimating the projected area of vegetation.	Before every verification
		Grass species in the project area	/	Sample plots have been set to monitor the species of vegetation which were the same as the sample plots set for monitoring of climate (totally 60 sample plots were set up, please refer to Section 3.3.3 for the detailed sampling procedures). Plot size is set to be a rectangle land with 5m*5m ($25m^2$).	Before every verification
		Population status of animals	/	A total of 64 monitoring lines would be set up, 8 monitoring lines (each of 3km) have been set in each strata to monitor endangered animals which were selected randomly from the sample plots set for monitoring of climate, and the monitoring team will walk along each monitoring line for at least one day (first monitoring was from 07:00 to 11:00 and repeated monitoring from 15:00 to 18:00) during the monitoring period to observe the occurrence of animals. And the set-up of monitoring lines is in accordance with the national standard ("Technical Regulations on Bird Biodiversity Survey and Assessment" and "Technical Regulations on Mammals Biodiversity Survey and Assessment" issued by the Ministry of Ecology and Environment of the People's Republic of China) which should be scientifically corroborated.	Before every verification
		Reduced threats to endangered animals. (Reduced grazing days and wildlife theft)	/	The grassland guardians patrolled the management and protection area regularly, once every 15 days, supervise and prevent wildlife theft, record the grazing days and report the protect situation to the Altay Forestry and Grassland Bureau	Before every verification
Pressure variables	The frequency or intensity of	Number of fires occurred	/	Recorded by grassland guardians and confirmed by local Forest Bureau	Once every year

Indicator type	Description	Monitoring indicator	Indicator unit	Monitoring method	Monitoring frequency
	anthropogenic impacts that are directly harmful to biodiversity in the project zone	Effected grassland area suffered rodents and pests	ha	Recorded by grassland guardians and confirmed by local Forest Bureau	Once every year
		Overgrazing	ha	Recorded by grassland guardians and confirmed by local Forest Bureau	Once every year
		Fertilizer and Chemical pesticides	t	Recorded by grassland guardians and confirmed by local Forest Bureau	Once every year
Response variables	The frequency or intensity of project interventions relevant to biodiversity	Grassland area under prevention control from fires	ha	Recorded by grassland guardians and confirmed by local Forest Bureau	Once every year
		Grassland area under prevention control from rodents and pests	ha	Recorded by grassland guardians and confirmed by local Forest Bureau	Once every year
		Project area of sustainable grassland management	ha	Recorded by grassland guardians and confirmed by local Forest Bureau	Once every year
		Project area for restoration of degraded grassland	ha	Recorded by grassland guardians and confirmed by local Forest Bureau	Once every year

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The biodiversity monitoring plan and the results of the first verification will be published on the VCS and CCB websites, where stakeholders can easily download them. At the same time, a summary of the project description in the local language, as well as a summary of the monitoring report at the time of the first verification, was disseminated to the local community through the Altai Municipal Forestry and Grassland Bureau. At the same time, public bulletin boards were used to publicize how to obtain information on biodiversity monitoring programs through the Internet. Technicians from the Altay Forestry and Grassland Bureau also explain the biodiversity monitoring program to local residents, especially those who are illiterate or poorly educated. In addition, the phone number of the contact person is published so that any stakeholder wants to contact the project proponent directly and make comments.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

N/A

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

N/A

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

N/A