

# ZHANGYE IMPROVED GRASSLAND MANAGEMENT PROJECT

Document Prepared By Gansu Heihe Electric Power Sales Co. Ltd

|   |   |
|---|---|
| <b>Project Title</b>                    | Zhangye Improved Grassland Management Project   |
| <b>Project ID</b>                       | 2748  |
| <b>Version</b>                          | 04  |
| <b>Report ID</b>                        | /   |
| <b>Date of Issue</b>                    | 15- September -2022   |
| <b>Project Location</b>                 | Zhangye City, Gansu Province, China   |
| <b>Project Proponent(s)</b>             | Zhangye Academy of Forestry Sciences<br>Quan Jinpeng<br>Ten kilometers outside the east gate of Ganzhou District, Zhangye City, Gansu Province, China<br>+86 0936-8671238, 1622371231@qq.com  |
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| <b>GHG Accounting/ Crediting Period</b> | 25-July-2017 to 24-July-2057; 40-year lifetime  |
| <b>Monitoring Period of this Report</b> | 25-July-2017 to 31-December-2021  |
| <b>History of CCB Status</b>            | Under validation combined with the first verification   |

|                            |     |
|----------------------------|-----|
| <b>Gold Level Criteria</b> | N/A |
|----------------------------|-----|

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## 1 SUMMARY OF PROJECT BENEFITS

### 1.1 Unique Project Benefits

| Outcome or Impact  | Achievements during the Monitoring Period   | Section Reference | Achievements during the Project Lifetime  |
|--|---|-------------------|---|
| 1) Improve grassland productivity and forage quality in the project zone of Zhangye city, which could significantly improve the ecological aesthetics value of local touristic resources.  | Restore 261,059.80 ha of degraded grassland system by seeding grass, fence building and sustainable grassland management.   | 2.1               | Restore 261,059.80 ha of degraded grassland system by seeding grass, fence building and sustainable grassland management.   |
| 2) Develop the traditional culture of Yugur, which is ancient nomadic nationality unique to Gansu Province by full communication among stakeholders on a regular basis during the implementation of the project. Attracts tourists from all parties, which greatly promotes the diffusion of Yugur marriage custom culture (important intangible heritage of nomads) in Zhangye. | The project provided opportunities for local Yugur nationality to work together, and organize special community cultural activities during their traditional holidays, which improved interaction within the local Yugur nationality, and indirectly promoted the diffusion of Yugur marriage custom culture (important intangible heritage of nomads) in Zhangye | 4.1               | The project provided opportunities for local Yugur nationality to work together, and organize special community cultural activities during their traditional holidays, which improved interaction within the local Yugur nationality, and indirectly promoted the diffusion of Yugur marriage custom culture (important intangible heritage of nomads) in Zhangye |
| 3) Increase biodiversity of the project zone, such as Qilian mountains which has been regarded as ecological security barrier.   | The biodiversity in the project zone has increased  | 5.1               | The biodiversity in the project zone has increased.   |

## 1.2 Standardized Benefit Metrics

| Category                           | Metric   | Achievements during Monitoring Period | Section Reference | Achievements during the Project Lifetime |
|------------------------------------|--|---------------------------------------|-------------------|--|
| GHG emission reductions & removals | Net estimated emission removals in the project area, measured against the without-project scenario   | 2,725,950 tCO <sub>2</sub> e          | 3.2               | 2,725,950 tCO <sub>2</sub> e             |
|                                    | Net estimated emission reductions in the project area, measured against the without-project scenario   | Not applicable                        | /                 | Not applicable                           |
| Forest <sup>1</sup> cover          | For REDD <sup>2</sup> projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario  | Not applicable                        | /                 | Not applicable                           |
|                                    | For ARR <sup>3</sup> projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario  | Not applicable                        | /                 | Not applicable                           |
| Improved land management           | Number of hectares of existing production forest land in which IFM <sup>4</sup> practices have occurred as a result of the project's activities, measured against the without-project scenario | Not applicable                        | /                 | Not applicable                           |
|                                    | Number of hectares of non-forest land in which improved land management has occurred as a result of the project's activities, measured against the without-project scenario                    | Not applicable                        | /                 | Not applicable                           |
| Training                           | Total number of community members who have improved skills and/or  | 11,727                                | 2.3               | 11,727                                   |

<sup>1</sup> 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*)

<sup>2</sup> 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*)

<sup>3</sup> 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*)

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

| Category    | Metric   | Achievements during Monitoring Period | Section Reference | Achievements during the Project Lifetime |
|-------------|--|---------------------------------------|-------------------|--|
|             | knowledge resulting from training provided as part of project activities   |                                       |                   |  |
|             | Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities    | 6,039                                 | 2.3               | 6,039                                    |
| Employment  | Total number of people employed in of project activities, <sup>5</sup> expressed as number of full-time employees <sup>6</sup>                 | 952 <sup>7</sup>                      | 2.3               | 952                                      |
|             | Number of women employed in project activities, expressed as number of full-time employees   | 493                                   | 2.3               | 493                                      |
| Livelihoods | Total number of people with improved livelihoods <sup>8</sup> or income generated as a result of project activities                            | 11,727                                | 2.3               | 11,727                                   |
|             | Number of women with improved livelihoods or income generated as a result of project activities  | 6,039                                 | 2.3               | 6,039                                    |
| Health      | Total number of people for whom health services were improved as a result of project activities, measured against the without-project scenario | Not applicable                        | /                 | Not applicable                           |
|             | Number of women for whom health services were improved as a result of  | Not applicable                        | /                 | Not applicable                           |

<sup>5</sup> 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.

<sup>6</sup> 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 UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

<sup>7</sup> During the implementation of the project, about 11,727 local herders will directly participate in grass seeding and rodent control, of which 51.5% were women. According to the payment records, the working hours was 1,904,000 hours per year during this monitoring period, and the legal working hours is 2,000 hours per year according to Labour Law of China. Therefore, total number of people employed in the project expressed as number of full-time employees is 952 (1,904,000/2,000 =952).

<sup>8</sup> 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   | Achievements during Monitoring Period | Section Reference | Achievements during the Project Lifetime |
|------------|--|---------------------------------------|-------------------|--|
|            | project activities, measured against the without-project scenario  |                                       |                   |  |
| Education  | Total number of people for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario                        | Not applicable                        | /                 | Not applicable                           |
|            | Number of women and girls for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario                     | Not applicable                        | /                 | Not applicable                           |
| Water      | Total number of people who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario | Not applicable                        | /                 | Not applicable                           |
|            | Number of women who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario        | Not applicable                        | /                 | Not applicable                           |
| Well-being | Total number of community members whose well-being <sup>9</sup> was improved as a result of project activities   | 11,727                                | 2.3               | 11,727                                   |
|            | Number of women whose well-being was improved as a result of project activities  | 6,039                                 | 2.3               | 6,039                                    |

<sup>9</sup> 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, Health, Education, Water, etc.), but could also include other benefits such as empowerment of community groups, strengthened legal rights to resources, conservation of access to areas of cultural significance, etc.

| Category                  | Metric  | Achievements during Monitoring Period | Section Reference | Achievements during the Project Lifetime |
|---------------------------|---|---------------------------------------|-------------------|--|
| Biodiversity conservation | Change in the number of hectares significantly better managed by the project for biodiversity conservation, <sup>10</sup> measured against the without-project scenario                                     | 4,087,400 <sup>11</sup>               | 2.1               | 4,087,400                                |
|                           | Number of globally Critically Endangered or Endangered species <sup>12</sup> benefiting from reduced threats as a result of project activities, <sup>13</sup> measured against the without-project scenario | 7 <sup>14</sup>                       | 5.1               | 7  |

<sup>10</sup> 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.

<sup>11</sup> According to PRA Report, the total area of Zhangye city is 4,087,400 ha. The project restored degraded grassland, guided herders to graze reasonably, prevented sustainable degradation of grassland, provided more habitats for wild animals and increased biodiversity in the project zone.

<sup>12</sup> Per IUCN's Red List of Threatened Species

<sup>13</sup> In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

<sup>14</sup> The numbers were globally Critically Endangered or Endangered species that were protected result of the reduced threats.

## 2 GENERAL

### 2.1 Project Description

#### 2.1.1 Implementation Description

Zhangye Improved Grassland Management Project (hereafter as “the project”) is located in Zhangye City, Gansu Province of China. Zhangye City is located in the northwest of Gansu Province and in the middle of Hexi corridor where the Qinghai Tibet Plateau and Mongolia Plateau meet. The project’s aim is to restore the local degraded grassland ecosystem by seeding grass and building fence on the degraded grassland, increase carbon sequestration and contribute to local development by introducing sustainable grazing and management of grassland. The project proponent is Zhangye Academy of Forestry Sciences.

The project area is located in Zhangye City, which covers Su’nan Country, Gaotai County, Ganzhou district, Shandan County, Minle County and Shandan Racecourse. Shandan Racecourse is the largest central local enterprise in Zhangye. Although its geographical location is in Zhangye, it is directly managed by the central government. Therefore, it is an independent administrative region.

According to the baseline survey, before the implementation of the project, the grassland in the region has been facing serious degradation and even desertification due to the impact of climate change and human activities. According to the National standard documents of the people’s Republic of China<sup>15</sup> 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 seriously degraded grasslands.

Totally, 261,059.80 ha of degraded grassland have been managed sustainably by fence building and reseeding of local high-quality forage. There are three main restoration measures as followed in the project during this monitoring period:

Rotational grazing was implemented in moderately degraded areas where total grass yield is about 53.94 Kg/Mu<sup>16</sup> which decreased by 35.75% compared with the non-degraded grassland data in 1988<sup>17</sup>. 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 grazing order, grazing cycle and zoning grazing time, the grassland is grazed area by area and used in turn. 76,608.83 ha of degraded grassland have been managed sustainably by the implementation of rotational grazing.

Rest grazing was also implemented in moderately degraded areas and requires that grazing shall not be carried out within 90 days when the grass turns green every year by building the fence and sustainable management. 107,448.54 ha of degraded grassland have been managed sustainably by the implementation of rest grazing.

Reseeding grass was implemented in seriously degraded grasslands (total grass yield is about 40.86 Kg/Mu which decreased by 51.33% compared with the non-degraded grassland data in

<sup>15</sup> GB19377-2003 Parameters for degradation, sandification and salification of rangelands

<sup>16</sup> 1ha=15 Mu

<sup>17</sup> Ren Jichou (1988) *Grassland resources in Zhangye area of Gansu Province*

1988<sup>18</sup>) where grass seeds of local high-quality forage was sowed such as *Elymus nutans* (Hook head grass), *Elymus sibiricus* (Barley grass) and *Poa pratensis* (Bluegrass), *Agropyron cristatum* (Ice grass), *Festuca rubra* (Pennlawn). and *Artemisia sphaerocephala* (sagebrush) under the condition of fencing enclosure for 2 years. 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 approved livestock carrying capacity. In this project, 77,002.43 ha of seriously degraded grassland have been managed sustainably by the implementation of reseeding grass.

The implementation of the project will generate GHG emission removals by increasing soil organics, mitigate the impact of climate change on the local ecological environment, such as slow down the melting of snow-capped mountains, increase local biodiversity by protect and restore wildlife habitat, enhance the capabilities of local communities and improve their income by providing them with relevant technical skills training and employment opportunities.

The project proponent and the County Forestry and Grassland Bureau visited all project participants every year to investigate the management of the project, including whether grazing is carried out according to the planned frequency. Also, the grassland guardians conduct daily patrols on the grassland, record and report the risks that affect the sustainable development of the grassland in the project area, such as overgrazing, rodent damage and fires, etc.

According to the PD, leakage from displacement of grazing activities to outside the project boundary should be calculated, and the relevant parameters were monitored on the basis of Leakage from Displacement of Grazing Activities (VMD0040, Version 1.0). For non-permanence risk factors, the project has been evaluated against the all the three categories of risk factors during this monitoring period by regular records of the relevant events and comprehensive analysis, the results of the monitoring and evaluation was summarized in the relevant non-permanence risk report.

From 16-September 2021 to 01-October-2021, the project proponent has conducted a field monitoring for the climate and community impacts of the project actually achieved during the first monitoring period (from 25-July-2017 to 31-December -2021<sup>19</sup>). According to the patrol records, during the monitoring period, there were no events that may impact the GHG emission reductions or removals and monitoring occurred.

To monitor the biodiversity impact, the project proponent has conducted two filed surveys in winter season (3-November-2020 to 7-December-2020) and summer season (25-May-2021 to 20-June-2021) respectively. Please refer to Section 5.3 and 5.4 for details.

In conclusion, during this monitoring period, the project has generated net GHG emission removals of 2,725,950 tCO<sub>2</sub>e, with an average annual net GHG emission removals of 545,190 tCO<sub>2</sub>e and improved local environment through reseeding grass and fence building on the degraded grassland, increased income of local residents by offering job opportunities from the project and improve tourism income, enhanced the capabilities of local communities and residents by providing their

<sup>18</sup> Ren Jichou (1988) *Grassland resources in Zhangye area of Gansu Province*

<sup>19</sup> According to the methodology, the monitoring of SOC stock should be at the end of growing season in the year measured, therefore the field monitoring activities for this monitoring period has been conducted in September and October of 2021, and the monitoring period end at the end of the year measured, i.e. 31-December-2021.

relevant technical skills training, promote cultural communication by attracting tourists and increased local biodiversity due to the restoration of grassland ecosystem.

### 2.1.2 Project Category and Activity Type

According to Appendix of 1 Eligible AFOLU Project Categories of the VCS Standard (version 4.2), eligible Agricultural Land Management (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<sub>2</sub>, N<sub>2</sub>O and/or CH<sub>4</sub> emissions from soils, which include Improved Cropland Management (ICM), Improved Grassland Management (IGM) and Cropland and Grassland Land-use Conversions (CGLC).

The project restores degraded grassland by planting grass and rotational grazing and rest grazing thus increasing soil carbon stocks. So, the project is developed under VCS scope 14 "Agriculture, Forestry and Other Land Use (AFOLU)" with a project category of Agricultural Land Management (ALM), and belongs to the category of Improved Grassland Management (IGM) that demonstrably reduce net GHG emissions of grassland ecosystems by increasing soil carbon stocks. The project is not a grouped project.

### 2.1.3 Project Proponent(s)

|                   |   |
|-------------------|---|
| Organization name | Zhangye Academy of Forestry Sciences  |
| Contact person    | Quan Jinpeng  |
| Title             | President   |
| Address           | Ten kilometers outside the east gate of Ganzhou District, Zhangye City, Gansu Province, China |
| Telephone         | +86 0936-8251641  |
| Email             | hhsdyinlongxing@vip.163.com   |

The project proponent Zhangye Academy of Forestry Sciences is in rich experience in sustainable grassland management in Zhangye city, including rodent control, grassland protection and management, technical training, carbon measurement and monitoring and biodiversity assessment.

### 2.1.4 Other Entities Involved in the Project

|                     |  |
|---------------------|--|
| Organization name   | Gansu Heihe Electric Power Sales Co. Ltd   |
| Contact person      | Liu Mengde   |
| Title               | Project Manager  |
| Role in the project | Consultant   |
| Address             | Level 6, Heihe Electric Power Mansion, 116 Changshou Road, Ganzhou District, Zhangye City, Gansu Province, China |
| Telephone           | +86 0936-8251641   |
| Email               | hhsdyinlongxing@vip.163.com  |

Gansu Heihe Electric Power Sales Co. Ltd., as a state-owned holding enterprise, is in rich experience in carbon credits sales in Gansu Province, which can help it coordinate various issues in the project development and sales process in the whole project lifetime. Meanwhile, it receives regular training on the development of carbon emission reduction programs from the shareholder Gansu Heihe Hydropower Industrial Investment Co. LTD. who has rich experience in the development of CDM, CCER (Chinese Certified Emission Reduction) and VCS programs.

|                     |   |
|---------------------|---|
| Organization name   | Climate Bridge (Shanghai) Ltd.  |
| Contact person      | Gao Zhiwen  |
| Role in the project | VCU buyer   |
| Title               | General Manager   |
| Address             | Block C, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China |
| Telephone           | +86 21 6246 2036  |
| Email               | gao.zhiwen@climatebridge.com  |

Climate Bridge (Shanghai) Ltd., who has tremendous experience in development of forestry related VCS+CCB projects, will also provide some forest carbon project development experience to Gansu Heihe Electric Power Sales Co. Ltd to maintain the project to apply for carbon credits successfully.

### 2.1.5 Project Start Date (G1.9)

According to VCS standard (v4.2), the project start date is the date on which activities that lead to the generation of GHG emission reductions or removals are implemented, for this project, the project start date is 25-July-2017 when the grass reseeding and fence building started.

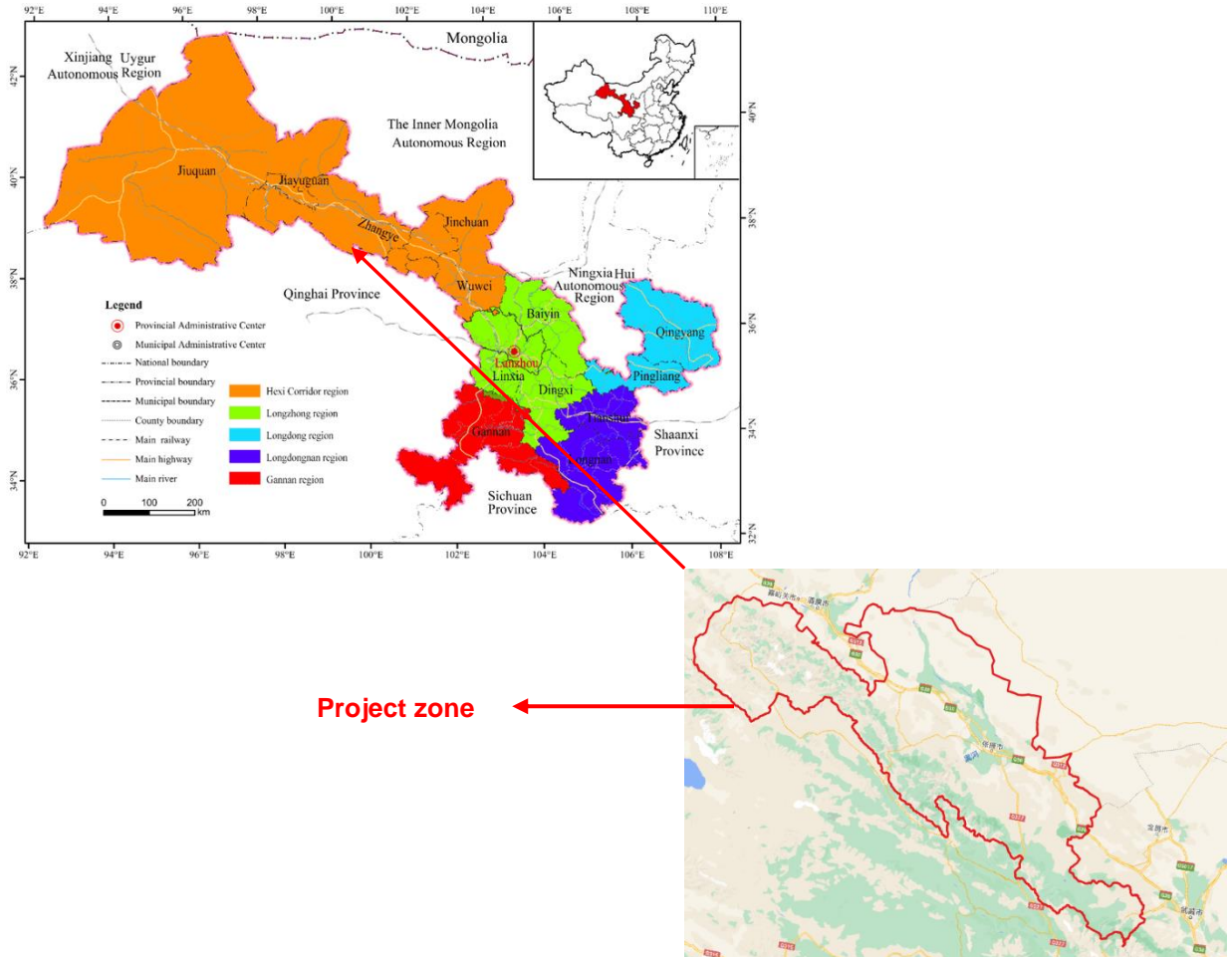
### 2.1.6 Project Crediting Period (G1.9)

The project crediting period is from 25-July-2017 to 24-July-2057 with a lifetime of 40 years which is the same as the CCB benefits assessment period.

### 2.1.7 Project Location

The project is located in Zhangye City, Gansu Province of China. The geographical coordinates of the project are east longitude 97°20'~ 102°12' and north latitude 37°28'~39°57'.

According to CCB standard, Zhangye City is defined as the project zone, and the planting and fence building areas in a state-owned enterprise (Shandan Racecourse), four counties, and a district are defined as project area, and the project activities in the project area will generate net climate benefits. The boundaries of project area and project zone is shown in Figure 2-2, and the KML file has also been submitted.



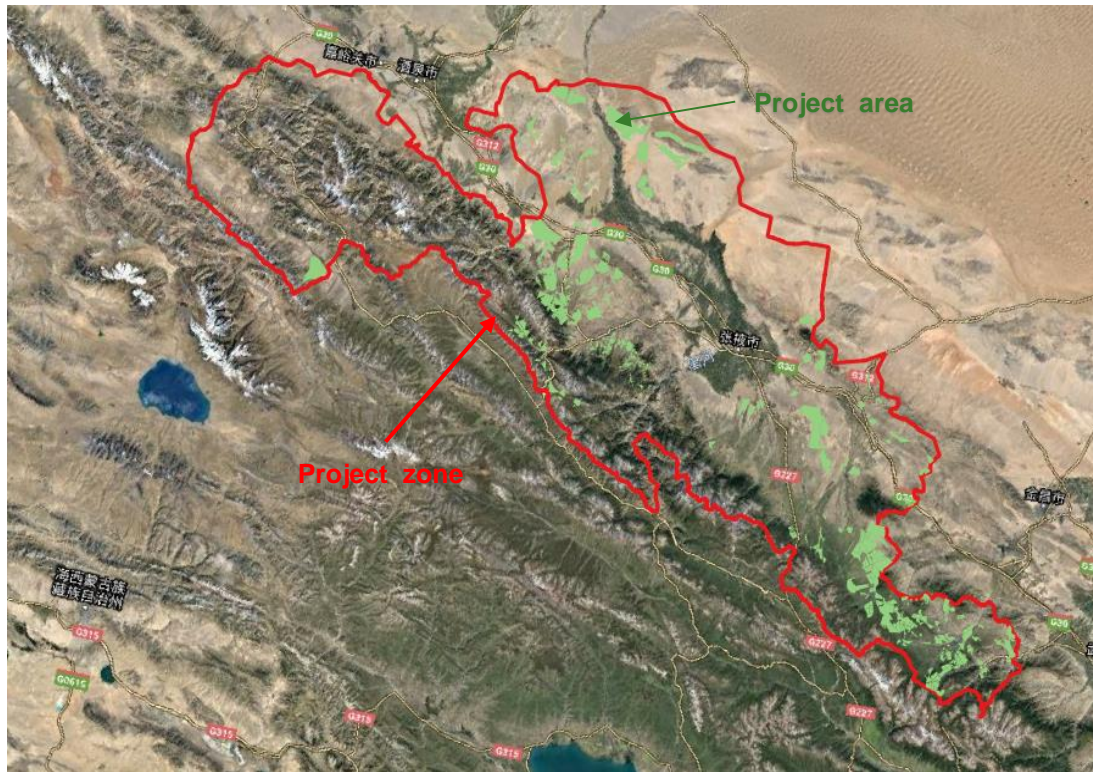


Figure 2-1 The project location

The location of communities is as shown in Figure 2-2.

There are no offsite biodiversity impacts areas and no negative well-being impacts on other stakeholders.

As described in section 3.2.3, grazing was controlled and allowed depending on the growth situation of the forage. 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 2-2.

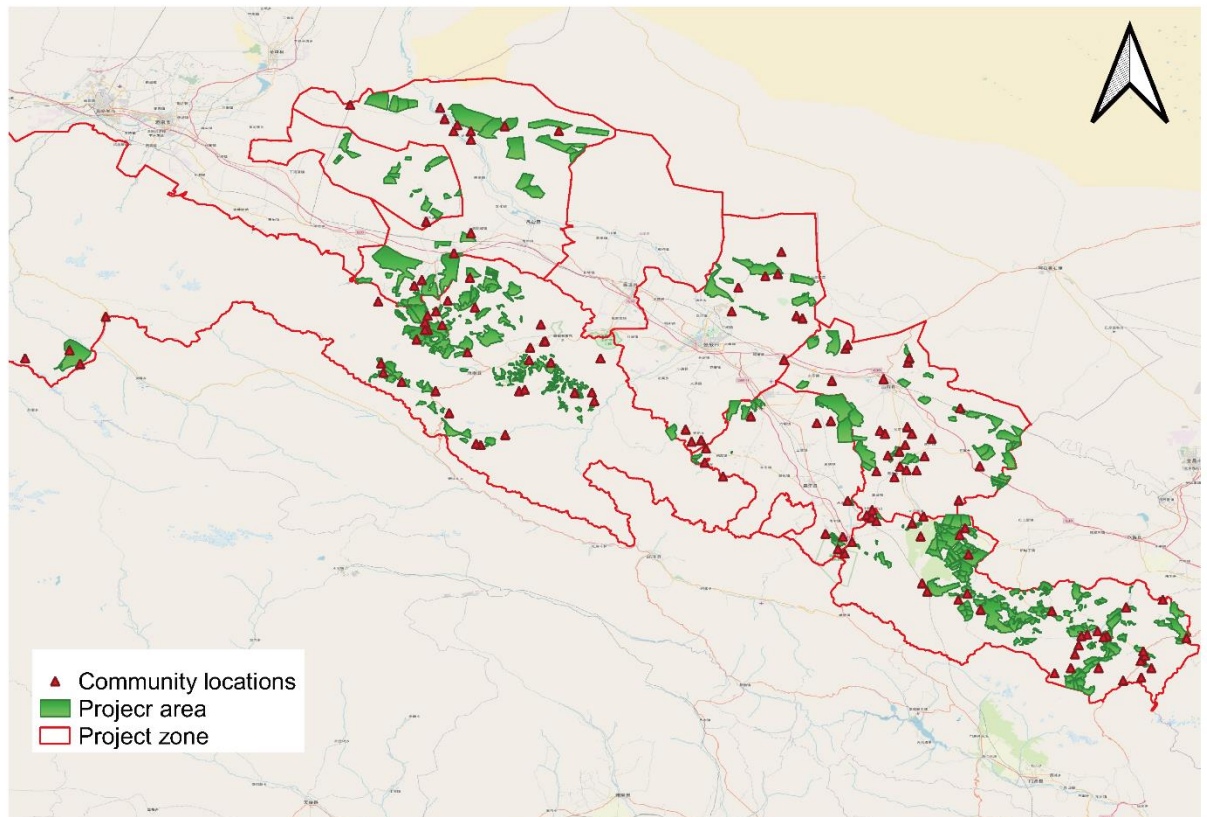


Figure 2-2 The project area and community location of the project zone

### 2.1.8 Title and Reference of Methodology

- VM0026 Sustainable Grassland Management, v1.1
- Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, v3.0
- Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM AR Project Activities, v1.0
- Guidelines for Sampling and Surveys for CDM project Activities and Programmes of Activities, v 4.0
- VMD0033 Estimation of Emissions from Market Leakage, v1.0
- VMD0040 Leakage from Displacement of Grazing Activities, v1.0

### 2.1.9 Other Programs (G5.9)





The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading;


The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates, during this monitoring period;

The project is not seeking registration under any other GHG programs.

### 2.1.10 Sustainable Development

According to the United Nations Sustainable Development Goals, the project provided many benefits that will help to achieving the goals as following:

|  |   |
|--|---|
|  <p>1 NO POVERTY</p>                  | <p>All the employees that were involved in grass seeding, fence building were paid 150 RMB (23.13 USD) /day. Grassland guardians were paid around 2,000 RMB (313.2 USD) / year. Women and vulnerable people who come from the poorest local households were not only provided with equal opportunities but also consciously ensured that they can be part of the project. These measures could improve the income and reduce poverty of local residents (monitored and recorded in Section 4: Community).</p> |
|  <p>3 GOOD HEALTH AND WELL-BEING</p> | <p>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 county forestry and grassland bureau (monitored and recorded in Section 4: Community).</p>  |
|  <p>5 GENDER EQUALITY</p>           | <p>During the project implementation, about 11,727 local herders participated in the project, of which 6,039 are women. By being trained with the sustainable grassland management skills and participating the community activities together with other employees, women may gain more happiness compares to doing housework only. This will contribute to empower women and build community capacity in gender and sustainable grassland management (monitored and recorded in Section 4: Community).</p>   |
|  <p>13 CLIMATE ACTION</p>           | <p>The purpose of the project is to restore the degraded grassland ecosystem by seeding grass or managed grazing which will generate GHG emission removals by increasing soil organics or avoiding soil degradation, mitigate the impact of climate change on the local ecological environment (monitored and recorded in Section 3: Climate).</p>  |

|   |  |
|---|--|
|  | <p>The project can improve the quality and quantity of the grassland vegetation and provide more habitat for wild animals to enhance biodiversity conservation by reseeding grass or scientific grazing (monitored and recorded in Section 5: Biodiversity).</p> |
|---|--|

For monitoring and reporting, all the achievements have been recorded with related evidence, and the certain contributions on climate, community and biodiversity have been calculated and evaluated as per the related standard and methodologies.

## 2.2 Project Implementation Status

### 2.2.1 Implementation Schedule (G1.9)

Table 2-1 Timeline of the project

| Date   | Milestone(s) in the project's development and implementation                                     |
|--|--|
| September-2016   | The Project Design Report was completed  |
| 15-November-2016   | The Participatory Rural Appraisal (PRA) Report including community baseline survey was completed |
| November-2016  | Baseline Survey Report was completed   |
| 20-December-2016   | The baseline biodiversity survey report was completed  |
| 27-December -2016  | The Project Design was approved by Zhangye animal husbandry and Veterinary Bureau                |
| 25-July-2017   | Started grass reseeding and fence building (start date of project activity and crediting period) |
| 25-July -2017 to 10-September - 2017                                 | Grass reseeding and fence building   |
| 04-August-2018 to 04-september-2018                                  | Fence building in 2018   |
| 01-October-2018 to 07-October-2018                                   | Grass reseeding in 2018  |
| 24-April-2019 to 24-May-2019   | Grass reseeding and fence building in 2019   |
| September-2019   | Completed reseeding and fence building   |
| 03-November-2020 to 07-December-2020 and 25-May-2021 to 20-June-2021 | Biodiversity monitoring in winter and summer season respectively                                 |

|                                      |  |
|--------------------------------------|--|
| 16-September-2021 to 1-October-2021  | Filed monitoring and survey for climate and community impact |
| 22-November-2021                     | Draft PD and PD summary finished                             |
| 25-November-2021                     | Draft MR and MR summary finished                             |
| 07-January-2022 to 06-February-2022  | Public comment period for draft PD and MR                    |
| 24-January -2022 to 27-January -2022 | VVB site visit   |

**2.2.2 Methodology Deviations**

Not applicable.

**2.2.3 Minor Changes to Project Description (Rules 3.5.6)**

Not applicable.

**2.2.4 Project Description Deviations (Rules 3.5.7 – 3.5.10)**

Not applicable.

**2.2.5 Grouped Projects**

Not applicable.

**2.2.6 Risks to the Project (G1.10)**

Table 2-2 The Project Risks Table

| Identify Risk | Potential impact of risk on climate, community and/or biodiversity benefits  | Actions needed and designed to mitigate the risk   | The actual risk during this monitoring period             |
|---------------|--|--|---|
| Fire          | The restored area is degraded grassland with low coverage; thus, the risk of fire is quite low in the early phase of the project. With the increase of grassland coverage, the risk of fire may increase, and the project owner will adopt the necessary measures for fire preventing. | According to the Chinese Grassland Law and Regulations on grassland fire prevention, the local government should carry out the construction of grassland fire prevention facilities, strengthen grassland fire observation during dry grass period to strictly prevent grassland fire. Once a fire disaster occurs, the local government should be | During this monitoring period, no fire disaster occurred. |

|                   |   |   |   |
|-------------------|---|---|---|
|                   |   | responsible for relevant rescuing immediately.  |   |
| Rodents and pests | There could be rodents and pests that may damage the grassland, but the rodents and pests will be prevented by routine overseeing.  | The biological methods are used to control rodents, such as building eagle's nest. The chemical pesticides are allowed to be used only if there is a serious pest problem erupted in the project area, and the pesticides will be used in accordance with the National Pesticides Policy. The project proponent is also experienced in local natural risk control and has established a Grassland monitoring technical manual for the project which includes specific instruction in rodents and pest prevention and control. | During this monitoring period, no rodents and pests disaster occurred.                |
| Overgrazing       | Overgrazing is the main factor leading to grassland degradation. It is possible that a few herdsmen do not obey sustainable management and overgrazing occurs             | The local government guide herders to carry out sustainable grazing, which can slow down the degradation of grassland. Also, local forestry and grassland bureau vigorously promotes grassland protection, provides relevant training for herders, and raises herders' awareness of grassland protection.   | During this monitoring period, no overgrazing occurred in the project area.           |
| Frost             | The project area is located in the North foot of Qilian Mountains, where the Grassland and forest are adjacent, so the frost disaster has little impact on the grassland. | Grass species planted in the project are native species, which can adapt to the local climate. In case of frost disaster, grass can grow smoothly in the second year.   | During this monitoring period, frost disaster has no significant impact on grassland. |

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 and Non-Permanence Risk Report of the project for more detailed analysis of project risk.

## 2.2.7 Benefit Permanence (G1.11)

To maintain and enhance the climate, community and biodiversity benefits, the project build grassland fences to achieve rotational grazing and rest grazing and carrying out sustainable grassland management. Meanwhile, the forage suitable for alpine region (*Elymus nutans*, *Elymus sibiricus*, *Poa pratensis*, *Agropyron cristatum*, *Festuca rubra*, and *Artemisia sphaerocephala*) were selected to be planted in the project. After the completion of the project, strictly implement the Grassland Law Regulations on Grassland Fire Prevention and Gansu Grassland Regulations to formulate the basic grassland protection system, grass and livestock balance system.

At the same time, strictly implement the Measures for the Management of Network Fence of Grazing Returning Project, further implement the management and protection responsibilities of the degraded grassland and its fence facilities to townships, villages and households, sign management and protection responsibility letters at all levels, and clarify responsibilities and obligations. The grassland supervision department shall strengthen grassland law enforcement, and timely stop, investigate and deal with illegal acts such as unauthorized grazing, destruction of grassland vegetation and its fence facilities during the rest period.

According to Grassland Law of People's Republic of China, the ownership of grassland belongs to the state and the collectives. After the implementation of the project, Grassland Station of local Zhangye animal husbandry and Veterinary Bureau (before 2019) and Forestry and Grassland Bureau (after 2019) help with the sustainable grassland management, see Section 2.5.1 for detail. To make sure the successful development of the relevant carbon credits of the project, with support of Zhangye animal husbandry and Veterinary Bureau in early stage, the landowners all agreed with Zhangye Academy of Forestry Sciences as the project proponent and authorize they the rights of land usage and to take care of the maintenance and overall management of the grassland during the whole crediting period, including conducting baseline survey, signing consultant agreement for development of carbon credits.. The carbon revenue will be used to pay the salaries of the grassland guardians, which is conducive to the sustainable development of the project.

The Grassland Station of County Forestry and Grassland Bureau will be responsible for the implementation and management of the project during the project lifetime. And Zhangye Forestry and Grassland Bureau will take over of the responsibility beyond the project lifetime. The technicians from local forestry and grassland bureau will measure the grass yield regularly in the project area and guide the herders to graze reasonably. In addition, approximately 952 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.

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

## 2.3 Stakeholder Engagement

### 2.3.1 Stakeholder Access to Project Documents (G3.1)

The full project documentation has been published on VCS and CCB website for public comments from 07-January-2022 to 06-February-2022, as well as the project summary in Chinese version, and the local communities and other stakeholders can easily download from the website. The

project owner noticed local stakeholders through the routine villager assembly regarding every milestone of the project development, including monitoring and listing.

Before starting the monitoring of this monitoring period, the project owner published the monitoring plan and monitoring manual on the local bulletin boards for the villages around the project area from 01-September-2020 to 15-September-2020 and invited local stakeholders to discuss them and give their advises.

After the monitoring activity completed, the draft monitoring results was also be published in the CCB and VCS website<sup>20</sup> as part of the monitoring report which could be download by anyone who is interested, and any public comments received will be seriously considered during the following verification process.

### 2.3.2 Dissemination of Summary Project Documents (G3.1)

After the monitoring activities finished, the project proponent prepared a draft monitoring report along with a short version of MR summary in Chinese. During the VVB site visit, the project proponent arranged a stakeholder meeting in Zhangye Forestry and Grassland Bureau on 24-January-2022, several representatives of local communities and stakeholders have been invited to attend the meeting. The monitoring results of this monitoring period was distributed to local stakeholder representatives during the meeting.

After the stakeholder meeting, the summary of monitoring results was disseminated to local communities by local forestry and grassland bureau and stakeholder representatives and the contact information of monitoring staff from project proponent has also been provided in case the local communities have any questions regarding the monitoring procedures and results.



Figure 2-3 Stakeholder meeting on 24-January-2022

<sup>20</sup> <https://registry.verra.org/app/projectDetail/VCS/2748>

### 2.3.3 Informational Meetings with Stakeholders (G3.1)

To ensure the continued effectiveness of the participation mechanisms, investigation team conducted a Participatory Rural Appraisal (PRA) in the 4 counties, a district and Shandan Racecourse where project located prior to project initiation (from 01-November-2016 to 15-November-2016), in order to obtain basic information, data and information of socio-economic situation on the project area and the surrounding, understand the major socio-economic and environmental issues from the stakeholders, collect their willingness to participate and take advantage of the demands of the proposed project activity and analysis the potential socio-economic and environmental impacts of the proposed project activity.

During the PRA survey, the project owner also held a stakeholder meeting in Forest operations in Zhangye Academy of Forestry Sciences on 01-November-2016 to collect the direct feedback and suggestions. During the meeting, questionnaires were distributed to attendees to collect their feedback.

For this monitoring period, firstly, a meeting of stakeholder representatives has held in Forestry and Grass Bureau of Zhangye city on 29-March-2021 to inform relevant stakeholders of progress of carbon sequestration project and PRA process. The meeting notice was publicized on the village collective bulletin board. Local herders, local residents around project area, local Yugur nationality, local women, grassland guardians outside the project area directly impacted by the project were invited through their most convenient way: the routine villager assembly. The representatives of grassland guardians, village collectives, Zhangye Forestry and Grass Bureau, County Forestry and Grass Bureau, Zhangye Finance department were invited to attend the meeting by telephone/Email. During the meeting, questionnaires were distributed to attendees by semi-structured interview to collect their feedback. In addition, the contents of the meeting were publicized on the village collective bulletin board.

Secondly, the survey team came from the Zhangye Forestry and Grassland Bureau who went to the villages where the project located and took the household interviews with local residents to collect the basic information of the villagers and characteristics of local communities from 16-September-2021 to 01-October-2021.

During this time. there are totally 8,668 households from 863 village collectives 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 80.

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

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 Zhangye Academy of Forestry Sciences.
- 1.645 = Represents the 90% confidence required
- 0.1 = Represents the 10% relative precision

As N is 8,668 as determined of total number of households, P is determined as 80% based on the empirical value provided by Zhangye Academy of Forestry Sciences, and taking 90% level of confidence, n is therefore calculated as  $1.6452 \times 8,668 \times 0.8 \times (1 - 0.8) / \{(8,668 - 1) \times 0.12 \times 0.82 + 1.6452 \times 0.8 \times (1 - 0.8)\} = 68$ .

During the VVB site visit, the project proponent arranged a stakeholder meeting in Zhangye Forestry and Grassland Bureau on 24-January-2022, several representatives of local communities and stakeholders have been invited to attend the meeting. At this meeting, the project proponent reported the accomplished monitoring activities and draft monitoring results during this monitoring period, some of the representatives thought it was too complicated to calculate the emission removals which was time consuming and costly. The project owner explained the general concept of VCS and CCB standard regarding the requirement for monitoring and calculation in a simple and straightforward way, so that the representatives finally understood the importance of all the necessary procedures to guarantee the real and measurable benefits of the project.

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

During the PRA survey and stakeholder meeting in November 2016, 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. According to the analysis of Theory of Change, the community benefits of the project include income improvement, job creation, training opportunities and capability establishment, and all the relevant communities are aware of the design concept of the project and have willingness to participate in the project.

Local Forestry and Grassland Bureau and project proponent are responsible to explain the potential costs, risks and benefits to relevant communities and stakeholders, then asked them to give their feedback and collected their willingness to participate. The analysis based on results chain is quite clear and understandable using a form as followed.

| Benefits  | Costs and Risks  | Mitigations   |
|---|--|---|
| income improvement, job creation, training opportunities, capability establishment, higher ecological aesthetic value | The grazing frequency will be reduced, from annual grazing to semi-annual grazing or rest grazing for 90 days or fence enclosure for 2 years after reseeding grasses. After that, under the premise of | The local government issued subsidies to the herders in the project area who implemented the rest grazing and rotational grazing. 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. Also, the project provides job opportunities for local herders, which will increase their income in long term. |

|  |  |  |
|--|--|--|
|  | <p>not affecting the normal growth of the improved grassland, the grassland should be used reasonably and sustainably according to the local approved livestock carrying capacity.</p> |  |
|--|--|--|

During this monitoring period, to mitigate the impact of project implementation on local herders, the project proponent and local County Forestry and Grassland Bureau measured the grass yield of the surrounding grasslands in the project area and guide herders to graze within the acceptable area, so the project will not reduce their grazing productivity. And the project will not affect herdsman's grazing time and reduce herdsman's grazing income.

During the project implementation, about 11,727 local herders (6,039 are women) participated in grass seeding and fence building, of which 952 local herders (493 are women) were employed as guardians. Grassland Guardian were paid around 2,000 RMB (313.2 USD) /year, which increased the family income of them. What's more, the project proponent and local Forestry and Grassland Bureau explained that the project could restore their degraded grassland, and if they agreed to restore the degraded grassland and implemented grazing prohibition of project activities, they would receive corresponding subsidies, and they did not need to participate in the implementation and management of the grassland. According to the Implementation Plan of the new round of grassland ecological protection subsidy and reward policy (2016-2020) in Zhangye City, due to the sustainable management of grazing, herders in the project area can receive corresponding subsidies. The subsidy standards for project activities vary from county to county, ranging from 2.17 RMB/mu to 3.35 RMB/mu. According to the subsidy record, in this monitoring period, the herders in project zone all received corresponding subsidies based on implementation area every year recorded from county Forestry and Grassland Bureau.

The implementation of the project has restored the grassland ecological environment and strengthened the communication between different ethnic minorities, which is conducive to promoting rural tourism<sup>21</sup>. Through the annual tourism and Cultural Festival<sup>22</sup> in restored grassland of the project, it has attracted a large number of tourists and spread the local traditional culture of ethnic minorities especially the traditional marriage custom culture of Yugur nationality. And the restored grassland ecological landscape will increase local tourism income.

The community impacts have been monitored through interviews and questionnaires from 16-September-2021 to 01-October-2021, and the monitoring results showed there were net community benefits achieved from the implementation of the project just as anticipated. As stated in Section 2.3.7, after fully communicating with the representatives of stakeholder, 95% of them think the impact of the project activities on them has been mitigated and improve their family income.

<sup>21</sup> [http://www.zhangye.gov.cn/dzdt/xqdt/snx\\_2548/201908/t20190823\\_312724.html](http://www.zhangye.gov.cn/dzdt/xqdt/snx_2548/201908/t20190823_312724.html)

<sup>22</sup> [http://www.zhangye.gov.cn/njy/dzdt/gzdt/201807/t20180720\\_32378.html](http://www.zhangye.gov.cn/njy/dzdt/gzdt/201807/t20180720_32378.html)

**2.3.5 Information to Stakeholder on 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 have been 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 has informed 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.

During the VVB site visit, the project proponent arranged a stakeholder meeting in Zhangye Forestry and Grassland Bureau on 24-January-2022. The project proponent and the local forestry and grassland bureau notified the stakeholders of the meeting time one week in advance, and several representatives of local communities and stakeholders have been invited to attend the meeting. At the meeting, the VVB introduced the purpose and procedures of the on-site audit, the project proponent and Zhangye Forestry and Grassland Bureau introduced the project, and all representatives thought that the project had restored the degraded grassland and improved the ecological environment. And from 24-January-2022 to 27-January-2022, the VVB visited the project area and interviewed herders around the project area, and all herders thought that the project improved their living conditions.



Figure 2-4 The VVB on-site visit

**2.3.7 Stakeholder Consultation (G3.4)**

As mentioned above, the stakeholder consultation includes PRA and meetings. During the PRA survey and stakeholder meeting prior to start of the project, the local stakeholders were asked to raise their opinions of the project design and their willingness to participate the following implementation, and all the stakeholders agreed with the project design and willing to participate the implementation and follow-up management of the project activity.



Figure 2-5 Stakeholder questionnaire survey

During this monitoring period, the project owner collects the comments and feedback regarding the following implementation of the project. The project staff-maintained communicated with the community groups and other stakeholders through in-person meetings and made a questionnaire survey from 16-September-2021 to 01-October-2021 to directly collect relevant feedback. The survey team came from Zhangye Forestry and Grassland Bureau who went to the villages where the project located and took the household interviews with local residents to collect the basic information of the villagers and characteristics of local communities. There are totally 8,668 households from 863 village collectives 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 Section 2.3.3 for details), and the final number has been adjusted into 80 to make sure the household interview could represent the different stakeholders. The questionnaires were distributed to 66 households from surrounding villages, covering different community groups

of local herders, local residents around project area, local Yugur nationality, local women, grassland guardians. The other 14 questionnaires were distributed to representatives of village collectives, Zhangye Forestry and Grassland Bureau, County Forestry and Grassland Bureau and local government. Totally 80 copies were collected with valid answers. And the representatives covered different ages, different occupations and different education levels which were summarized as follows. Please refer to Table 2-3 and 2-4 for the details..

Table 2-3 The representatives' information

|           |                                    |        |
|-----------|------------------------------------|--------|
|           | number                             | 80     |
| Gender    | Male                               | 45.00% |
|           | female                             | 55.00% |
| Age       | 20--30                             | 12.50% |
|           | 30--50                             | 40.00% |
|           | above 50                           | 47.50% |
| Education | Junior high school and below       | 68.75% |
|           | senior middle school               | 15.00% |
|           | junior college education and above | 16.25% |

In this monitoring period, in order to better understand the opinions of the grassland guardians and herders who are direct participants in the project implementation on the process of sustainable management of the project, the questionnaires of these two stakeholders' group were increased.

Table 2-4 The stakeholders' information

| Stakeholders Group                    | Number of questionnaires | Participation rate |
|---------------------------------------|--------------------------|--------------------|
| Village collectives                   | 5                        | 6.25%              |
| Zhangye Forestry and Grassland Bureau | 3                        | 3.75%              |
| County Forestry and Grassland Bureau  | 3                        | 3.75%              |
| Local government                      | 3                        | 3.75%              |
| Local herders                         | 15                       | 18.75%             |
| Local residents around project area   | 12                       | 15.00%             |
| Local Yugur nationality               | 12                       | 15.00%             |
| Local women                           | 12                       | 15.00%             |
| Grassland guardians                   | 15                       | 18.75%             |

Table 2-5 The survey results

|  |     |        |
|--|-----|--------|
|  | Yes | 93.75% |
|--|-----|--------|

|  |  |        |
|--|--|--------|
| 1. Whether to participate in this project activity?                              | No   | 6.25%  |
| 2. How does the project affect family income?                                    | Increase income  | 95.00% |
|  | No effect  | 5.00%  |
| 3. Does the project have an impact on local women's living standards and skills? | Improve living standards and skills                      | 87.50% |
|  | No effect  | 12.50% |
| 4. Does the project activity affect your lifestyle?                              | Improved the knowledge and skills of sustainable grazing | 86.25% |
|  | No   | 13.75% |
| 5. Has the project improved your relevant skills?                                | Yes  | 85.00% |
|  | No   | 15.00% |
| 6. What are your suggestions for this project?                                   | Expand the project area                                  | 72.50% |
|  | No suggestion  | 27.50% |

The questionnaire survey results show that:

- Most stakeholders understand the benefits of the project, which can restore degraded grassland ecosystems and increased the grassland biodiversity. They also feel strongly that the project has improved the level of social activities.
- Local stakeholders think the project can 1) create employment opportunities; 2) increase biodiversity; 3) improve local environment.
- Most of the stakeholders have participated the implementation and follow-up management of the project activity, and they felt they have benefit from the project economically.

Along with the questionnaire survey, the stakeholders were informed that they have been invited to attend the stakeholder meeting during the site visit of the VVB for the verification, and the confirmed meeting date will be notified to them about one week prior to the meeting.



Figure 2-6 VVB site visit questionnaire survey

During the VVB site visit, the project proponent arranged a stakeholder meeting in Zhangye Forestry and Grassland Bureau on 24-January-2022, Some representatives of local communities and stakeholders have been invited to attend the meeting. Some of the representatives thought it was too complicated to calculate the emission removals which was time consuming and costly. The project owner explained the general concept of VCS and CCB standard regarding the requirement for monitoring and calculation in a simple and straightforward way, so that the representatives finally understood the importance of all the necessary procedures to guarantee the real and measurable benefits of the project. And all representatives thought that the project had restored the degraded grassland and improved their living standards. Hence, project design has not been affected by stakeholder input.

### **2.3.8 Continued Consultation and Adaptive Management (G3.4)**

The Project Design Report was completed by Dahua Engineering Management (Group) Co., Ltd, the stakeholders have been consulted before the implementation of the project and they all agreed and supported the project. Through the consultation, most of the stakeholder were willing to participate the project in rodent control, grass seeding, grassland sustainable management and fire prevention, therefore the project provided all the job opportunities to local communities, including temporary job (rodent control, grass reseeding, fence and shed building) and permanent job (grassland guardian).

Throughout the lifetime of the project, the project owner will visit village collectives, local forestry and grassland bureau, local government regularly. 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 stalking. 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.

In addition, to maximize the involvement of local residents, besides the job opportunities offered during project implementation, the local residents are also invited to conduct the field work in collecting soil samples and the questionnaire among local communities, local involvement in monitoring can empower communities by helping instill a greater sense of ownership of and responsibility for the community and biodiversity objectives of the project.

**2.3.9 Stakeholder Consultation Channels (G3.5)**

Local villagers directly impacted by the project were invited through their most convenient way: the routine villager assembly, in addition, 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. Local policy makers and grassland experts were also invited by phone calls.

As mentioned before, the project staff from local Forestry and Grassland Bureau maintained communications with the community groups and other stakeholders through in-person meetings and made a questionnaire survey from 16-September-2021 to 01-October-2021 to directly collect relevant feedback during this monitoring period. As described in Section 2.3.3 and 2.3.7, the survey team came from Zhangye Forestry and Grassland Bureau took the household interviews with local residents to collect the basic information of the villagers and characteristics of local communities to make sure the household interview could represent the different stakeholders. All the stakeholders have been informed directly or through their representatives.

Table 2-6 Stakeholder information

| Stakeholders Group                    | Way of invitation                   | Investigation approach    |
|---------------------------------------|-------------------------------------|---------------------------|
| Village collectives                   | Oral                                | Semi structured interview |
| Zhangye Forestry and Grassland Bureau | Email/ Telephone                    | Semi structured interview |
| County Forestry and Grassland Bureau  | Email/ Telephone                    | Semi structured interview |
| Local government                      | Email/ Telephone                    | Semi structured interview |
| Local herders                         | Routine villager assembly + notices | Household interview       |

|                                     |                                     |                     |
|-------------------------------------|-------------------------------------|---------------------|
| Local residents around project area | Routine villager assembly + notices | Household interview |
| Local Yugur nationality             | Routine villager assembly + notices | Household interview |
| Local women                         | Routine villager assembly + notices | Household interview |
| Grassland guardians                 | Routine villager assembly + notices | Household interview |

In addition, the stakeholder representatives have been invited to attend the stakeholder meeting, which was held on 24-January-2022 during VVB site visit, and the project proponent reported the project status regarding the implementation and the process of VCS & CCB validation and verification in the meeting, also reported the accomplished monitoring activities and draft monitoring results during this monitoring period.

All of these measures provide justification that adequate levels of information sharing have occurred.

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

In the project planning phase, stakeholders were fully involved in the land selection, planting seeds selection, etc., through villagers meeting and PRA methods. As mentioned above in Section 2.3.7, during this monitoring period, 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 11,727 local herders (6,039 are women) participated in grass seeding, fence building and rodent control, of which 952 local herders (493 are women) were employed as guardians. As described in PD, there are 2.15% population of minorities, including Yughur, Hui, Tibetan, Manchu, Mongolian and Monguor, Yi Nationality.

And the project proponent plays as coordinator who is in-charge of the overall management. All the critical information regarding decision-making should be published to local stakeholders, and the decision should be revised according to further discussion in case there is any feedback from stakeholders.

When started the first monitoring activities, the project proponent invited 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.

According to the feedback received during this monitoring period, all of the representatives of stakeholders represented their satisfaction regarding the implementation of 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 providing equal job opportunities for any qualified workers regardless their gender, race, nation or religion, no extra requirement for women or minorities, and equal pay for equal work, etc. 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 MR, in case of any discrimination occurred, anyone could report to the project proponent follow the relevant procedure.

During the project implementation, about 11,727 local herders (6,039 are women) participated in grass seeding, fence building and rodent control, of which 952 local herders (493 are women) were employed as guardians. Besides, most of them coming from the poorest households.

No discrimination complaint received during this monitoring period.

### **2.3.12 Grievances (G3.8)**

The project proponent has nominated a specific staff in charge of recording and collecting conflicts and grievances of local communities and individual residents. Grassland guardians in each project site will play an important role dealing with conflicts and grievances. All of the grassland guardians are coming from local communities whose name and contact number were published through villager assembly. In case of any conflicts and grievances, the stakeholders will contact the grassland guardian in the certain project site, and the grassland guardian will collect all the necessary information and then report to the specific staff. Also, the contact number of local forestry and grassland bureau has been publicized at the village assembly, all other stakeholders can easily give their feedback in case of any grievance.

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.

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.

No grievances received during this monitoring period.

### **2.3.13 Worker Training (G3.9)**

There is a working manual 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, rodent control and grassland scientific grazing and protection method. These technical manuals will be distributed to each household in the local villages, including the villagers who haven't participated in the planting project. The members of local communities will be trained equally as long as they lived around the project area and willing to participate the training process, so that the local capacity won't be lost through staff turnover.

Besides the training on technical skills of seeding grass, fence building and grassland management, local workers will also be trained on relevant skills for their future livelihood, such as reasonable grazing. These skills will benefit the long-term development of the local communities who participate in the project. There were routine training courses arranged in from 2018 to May 2021 during the monitoring period by providing fence building, seeding skills and subsequent management skills such as grassland fire prevention, rodent and pest control for workers.

In June 2018, training was conducted on the responsibilities and scope of authority of grassland guardians, grassland grazing prohibition and grassland distribution map "software technology".

In July 10-11, 2019, leaders of the municipal procuratorate and the municipal grassland supervision station carried out the training of grassland law enforcement and grassland guardians' management technology in Zhangye City.

In July 2020, systematic and detailed training was conducted on grassland rodent and insect destruction' investigation technology, prevention and control technology of grassland rodent and insect destruction, etc

In July 2021, Gansu Provincial Technology Promotion Station organized systematic and detailed lectures on the field investigation and application system of grassland monitoring and evaluation, grassland patch zoning method, grassland plant identification technology, application method of grassland monitoring and evaluation App and detailed rules of grassland monitoring and evaluation technology.

In December 2018 and July 2021, training on grassland fire prevention knowledge were organized respectively for county Forestry and Grassland Bureau.

In addition, prior to the monitoring activities for this monitoring period, technical staff from project proponent and local forestry and grassland bureau also took a special training from 28-July-2021 to 31-July-2021 for the project monitoring by explaining the monitoring plan and measurement method to local herders in Zhangye Forestry and Grassland Bureau. Some of the local herders

were invited to offer support during monitoring activities from 16-September-2021 to 01-October-2021.



Figure2-7 Grassland monitoring technology training

#### 2.3.14 Community Employment Opportunities (G3.10)

The project mobilized the whole community, including women, minority groups and least privileged group. All people from the communities have been given an equal opportunity to fill in the work positions if they meet the job requirements. Women and vulnerable people who come from the poorest local households will not only be provided with equal opportunities but also consciously ensure that they can be part of the project.

During the project implementation, about 11,727 local herders (6,039 are women) participated in grass seeding, fence building, rodent control and fire prevention, of which 952 local herders (493 are women) were employed as guardians. Besides, most of them coming from the poorest households. All the employees will be provided related skill training periodically. Grassland guardians are paid around 2,000 RMB (313.2 USD) / year.

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

The local people were under the protection of Labor Law of the People's Republic of China<sup>23</sup> and no forced labor is allowed, and they are free to establish and join any labor organizations as they wish. There was regular training provided to workers before they start the job, which will clearly indicate their rights and mechanism for grievance appeal, and the worker's rights are guaranteed in the labor contracts for each worker. The new employee training was in accordance with the Labor Law of People's Republic of China which guarantees the protection of employee's rights and benefits.

<sup>23</sup> [http://www.mohrss.gov.cn/SYrlzyhshbzb/zcfg/flfg/fl/201605/t20160509\\_239643.html](http://www.mohrss.gov.cn/SYrlzyhshbzb/zcfg/flfg/fl/201605/t20160509_239643.html)

### 2.3.16 Occupational Safety Assessment (G3.12)

The project owner 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 the village committee.

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

To minimize the potential risk, all the workers have been provided new staff training before they start to work. The training includes all necessary risk control measures during the work, as well as the health and safety policy mentioned before.

In 2018 and 2021, Zhangye Forestry and Grassland Bureau provided skill training for local herders, including fire emergency drills, field emergency rescue, and safe driving training to further ensure the safety of workers.



Figure 2-8 Grassland fire emergency drills training

After these training, the grassland guardians master relevant skills and patrol the management and protection area regularly, once every 15 days, record and report the grassland fire to the county Forestry and Grass Bureau in daily duties. Then special personnel of Forestry and Grass Bureau will be organized to conduct grassland fire prevention supervision to avoid fire on the grassland according to the report records of grass guardians.

## 2.4 Management Capacity

### 2.4.1 Required Technical Skills (G4.2)

The project requires technical skills of community engagement, biodiversity assessment and carbon measurement and monitoring in order to implement the project activities. Table below outlines the skills required per project activity.

Table 2-7 Key skills required to implement the project activities

| Project Activity                         | Specific measures  | Key Skills Required   |
|--|--|---|
| Reseeding grass and fence building       | Project community division, grass seed and sowing method selection, fence design   | Construction capacity, Supplementary sowing techniques, GIS for 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 and bulk density test, GIS/ remote sensing, grazing record, diesel and gasoline consumption records, rodent control 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   | Fence building, reseeded grass, rotational grazing, biodiversity survey, field investigation, Infrared camera technology, global positioning system (GPS) tracking technology |

#### 2.4.2 Management Team Experience (G4.2)

As described in 2.4.1, the Management Team of the project include Zhangye Academy of Forestry Sciences, Zhangye Forestry and Grassland Bureau, Gansu Heihe Electric Power Sales Co. Ltd and County Forestry and Grassland Bureau.

The project proponent Zhangye Academy of Forestry Sciences is in rich experience in sustainable grassland management in Zhangye city, including rodent control, grassland protection and management, technical training, carbon measurement and monitoring and biodiversity assessment.

Zhangye Forestry and Grassland Bureau, who is in rich experience in grassland management in Zhangye city, including grassland protection and management and technical training.

County 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. The Forestry and Grassland Bureau is also good at sustainable grassland management, including grass planting, rodent control and technical training.

Gansu Heihe Electric Power Sales Co. Ltd. as a state-owned holding enterprise, is in rich experience in carbon credits sales in Gansu Province, has the ability of coordinate various issues in the project development and sales process in the whole project lifetime. Meanwhile, it receives regular training on the development of carbon emission reduction programs from the shareholder

Gansu Heihe Hydropower Industrial Investment Co. LTD. who has rich experience in the development of CDM, CCER (Chinese Certified Emission Reduction) and VCS programs.

#### **2.4.3 Project Management Partnerships/Team Development (G4.2)**

As mentioned above, the management team of the project is experience in grassland management and carbon project development.

The project proponent, Zhangye Academy of Forestry Sciences is experienced in sustainable grassland management, carbon measurement and monitoring and biodiversity assessment. The management team of the project includes experts from Zhangye Forestry and Grassland Bureau and Gansu Heihe Electric Power Sales Co. Ltd who is experienced in development of carbon projects at the similar scale of this project and sustainable grassland management, community engagement.

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

#### **2.4.4 Financial Health of Implementing Organization(s) (G4.3)**

Zhangye Forestry and Grassland Bureau are government agencies, financially supported by local government, which could guarantee the financial health over the project lifetime. In addition, Zhangye Academy of Forestry Sciences and Heihe Electric Power Sales Co. Ltd. are legally registered government-affiliated institutions and company in China. According to the public information listed in National Enterprise Credit Information Publicity System<sup>24</sup>. At the same time, according to the financial statements, the business license of Heihe Electric Power Sales Co. Ltd passed the annual inspection.

So, the project participants don't involve in nor complicit in any form of corruption such as bribery, embezzlement, fraud, favouritism, cronyism, nepotism, extortion, and collusion.

#### **2.4.5 Avoidance of Corruption and Other Unethical Behavior (G4.3)**

As legally registered companies, the project proponent and other involved entities have the obligation to comply with relevant regulations, including anti-corruption law. The annual audit by the government makes sure that it operates with full compliance with China law and regulations. According to the "National enterprise credit information publicity system", none of them were involved in nor complicit in any form of corruption such as bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion.

#### **2.4.6 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.

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<sup>24</sup> <http://www.gsxt.gov.cn/index.html>

## **2.5 Legal Status and Property Rights**

### **2.5.1 Recognition of Property Rights (G5.1)**

As described in Section 2.2.7, according to the grassland use certificate, the land of each county (district) of our project is collectively owned by each village, and the grassland of Shandan Racecourse is owned by the state. Considering the widely dispersed distribution of the project land, it is difficult for any of the landowner to raise enough right and fund and effectively maintain the implementation of the project during such a long period. Therefore, after seriously considered the carbon revenue and thought the revenue could help to mitigate the investment barrier, Zhangye animal husbandry and Veterinary Bureau has organized and managed the project implementation during the early phase and raise initial fund from Zhangye Finance Department for reseeded, fence building and maintenance expenses for the three years. At the same time, in order to develop carbon credits of the project, with support of Zhangye animal husbandry and Veterinary Bureau, Zhangye Academy of Forestry Sciences signed the Entrusted Development Agreement of Carbon Sequestration Project with the village collectives in the project area on 15-October-2016. The decision was made by the villagers' representatives in the routine villager assembly where all the villagers collectively voted to authorize the land ownership to Zhangye Academy of Forestry Sciences and entrust it as the project proponent to develop grassland carbon sequestration project.

In this agreement, they all agreed with Zhangye Academy of Forestry Sciences as the project proponent and authorize they the rights of land usage and to take care of the maintenance and overall management of the grassland during the whole crediting period, including conducting baseline survey, signing consultant agreement for development of carbon credits. Since the Zhangye animal husbandry and Veterinary Bureau Department has been dismissed in 2019 due to the reform of government function, and some functional departments related to grassland management have been transferred to Zhangye Forestry and Grassland Bureau.

Following which, in order to continue to get the support from Zhangye Forestry and Grass Bureau to ensure the implementation and management of the project, the project proponent Zhangye Academy of Forestry Sciences also got the approval of Zhangye Forestry and Grass Bureau and confirm the rights of land usage to take care of the maintenance and overall management of the grassland and get carbon credits of the project during the whole crediting period. The project proponent Zhangye Academy of Forestry Sciences is responsible for the research and development, introduction, test demonstration and promotion of new technologies, varieties and products for grassland and artificial grass planting in the city; Responsible for grassland resources investigation, technical training and grassland dynamic monitoring in the city, including rodent control, grassland protection and management, technical training, carbon measurement and monitoring and biodiversity assessment. 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, all property rights involved in the project are recognized, respected, and supported.

### 2.5.2 Free, Prior and Informed Consent (G5.2)

As described above, the Zhangye Academy of Forestry Sciences has been authorized the rights of lands and 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 sure all the stakeholders to be aware of the potential impact of the project on their life, an investigation team of the Grassland Station has conducted a Participatory Rural Appraisal (PRA) in the counties where project located in November 2016, in order to obtain basic information, data and information of socio-economic situation on the surrounding area, understand the major socioeconomic and environmental issues from the stakeholders, collect their willingness to participate and take advantage of the demands of the proposed project activity and analysis the potential socio-economic and environmental impacts of the proposed project activity.

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 Project Design Report and informed stakeholders of the project's impact.

Some herders may be affected by the project, due to sustainable grazing patterns like the rotational and rest grazing. Rotational grazing requires that the grazing time shall be halved, and rest grazing requires that grazing shall not be carried out within 90 days in every year. Reseeding grass requires that fence enclosure for 2 years. 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 approved livestock carrying capacity.

To mitigate the impact of project implementation, the project proponent and the County Forestry and Grassland Bureau measures the grass yield of the surrounding grasslands in the project area in July and August every year, calculates the reasonable grazing quantity according to the carrying capacity standard of Gansu Province, and guides herders to graze within the acceptable area to make sure their grazing productivity could be maintained. So, the project will not reduce the grazing productivity, 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 meeting interviews and questionnaire surveys, all stakeholders know the impact of the project and they though that the implementation of the project can restore degraded grasslands and increase grazing areas in long term, and the project provides job opportunities for local herders, which will increase their income. In July and August each year, the County Forestry and Grassland Bureau measures the grass yield of the surrounding grasslands in the project area, and calculates the reasonable grazing quantity according to the carrying capacity standard of Gansu Province, and guides herders to graze in a reasonable area, so the project will not reduce the production of the grazing activities.

In addition, according to the Implementation Plan of the new round of grassland ecological protection subsidy and reward policy (2016-2020) in Zhangye City<sup>25</sup>, due to the sustainable management of grazing like rotational grazing and rest grazing, herders in the project area can receive corresponding subsidies. The subsidy standards for project activities vary from county to county, ranging from 2.17 RMB/mu to 3.35 RMB/mu. Every year, the project proponent and the County Forestry and Grassland Bureau will visit all project participants to investigate the completion

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<sup>25</sup> Official gazette of Zhangye Municipal People's Government

of the grazing prohibition and report it to the financial department, which will issue subsidy funds. All of the stakeholders are satisfied with this subsidy policy and agree to the implementation of the project. During this monitoring period, all herders participating in the project were grazing under the guidance of the County Forestry and Grassland Bureau. They all received subsidies and were satisfied with the subsidy policy.

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

### **2.5.3 Property Right Protection (G5.3)**

Prior to the project implementation, the project area is mostly degraded grassland with no residents, and Zhangye Forestry and Grassland Bureau has confirmed the right of grassland management to the project proponent during the project crediting period. 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. In addition, due to the sustainable management like rest grazing, rotational grazing and reseeding grass for enclosure for 2 years, herders in the project area can receive corresponding subsidies. According to the Implementation Plan of the new round of grassland ecological protection subsidy and reward policy (2016-2020) in Zhangye City, due to the sustainable management of grazing, herders in the project area can receive corresponding subsidies. The subsidy standards for sub vary from county to county, ranging from 2.17 RMB/mu to 3.35 RMB/mu. According to this policy, the local government will grant subsidies according to the area of herdsman's pasture in the project. As stated in Section 2.3.7 of the PD, project proponent has conducted full consultation with herders. Finally, these herders all agreed to the grassland ecological subsidy policy and were satisfied with the subsidy results. Also, the project provides job opportunities for local herders, which will increase their income in long term.

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.

### **2.5.4 Identification of Illegal Activity (G5.4)**

Currently all project lands are defined as grassland by local government. According to Chinese grassland law, grassland vegetation should be strictly protected, mining and construction are prohibited. The project aims to restore degraded grassland, all the benefits are gained from legal activities. Therefore, the project's climate, community and biodiversity impacts will not be affected by the illegal activities. Therefore, the project's climate, community and biodiversity impacts will not be affected by the illegal activities.

### **2.5.5 Ongoing Disputes (G5.5)**

At the project start, some of the project lands are state-owned, rest of them are collective-owned. The local residents lived by grazing, and there were not much other job opportunities offered, and most of the local women has no income.

The project will not change the ownership of the project land, but some herders are affected by the project, due to grazing was strictly controlled due to the management measures like rotational

grazing and rest grazing. In order not to affect the normal grazing of herders, 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 the project will not reduce the production of the grazing activities. Also, the project provides job opportunities for local herders, which will increase their income in long term. In addition, due to the control grazing, herders in the project area can receive corresponding subsidies.

The healthy grassland ecosystem is an attractive landscape which could attract more tourists and promote the local economy. After the implementation of the project, local residents have more opportunities to work together or communicate with outsiders, which is conducive to carrying forward traditional culture.

So, there is no ongoing or unresolved conflicts or disputes over rights to lands, territories and resources exist.

### 2.5.6 National and Local Laws (G5.6)

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

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

Parameters for degradation, sandification and salification of rangelands;

Technical regulation of reseeding on sandy grassland;

Technical Specification for Natural Grassland Improvement;

Technical Specification for Artificial Grassland Construction;

Technical Rule for Fences Construction of Rangeland;

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.

## 3 CLIMATE

### 3.1 Monitoring GHG Emission Reductions and Removals

#### 3.1.1 Data and Parameters Available at Validation

|                  |   |
|------------------|---|
| Data / Parameter | $GWP_{N_2O}$                                  |
| Data unit        | t CO <sub>2</sub> e/t N <sub>2</sub> O        |
| Description      | Global-warming potential for N <sub>2</sub> O |
| Source of data   | VCS Standard (Version 4.2)                    |
| 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<br>Calculation of project emissions<br>Calculation of Leakage emissions |
| Comments   | N/A   |

|  |   |
|--|---|
| Data / Parameter   | $EF_{4,MD}$   |
| Data unit  | kg N <sub>2</sub> O-N/(kg NH <sub>3</sub> -N + NO <sub>x</sub> -N volatilized)  |
| Description  | N <sub>2</sub> O 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<br>Calculation of project emissions<br>Calculation of Leakage emissions   |
| Comments   | N/A   |

|  |  |
|--|--|
| Data / Parameter   | $GWP_{CH_4}$                                 |
| Data unit  | t CO <sub>2</sub> e/t CH <sub>4</sub>        |
| Description  | Global-warming potential for CH <sub>4</sub> |
| Source of data   | VCS Standard (Version 4.2)                   |
| 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<br>Calculation of project emissions |
| Comments        | N/A   |

|  |  |
|--|--|
| Data / Parameter   | $P_{l,b}$  |
| Data unit  | Head   |
| Description  | Population of grazing livestock type l, in baseline year b   |
| Source of data   | Grazing Displacement Management Plan   |
| Value applied  | Cattle: 183,540<br>Sheep: 641,788  |
| Justification of choice of data or description of measurement methods and procedures applied | The animal population were obtained based on a sample survey of the animal population grazing in the project area year prior to the project start date during the baseline period. |
| Purpose of data  | Calculation of baseline emissions  |
| Comments   | N/A  |

|  |  |
|--|--|
| Data / Parameter   | $EF_l$   |
| Data unit  | kg CH <sub>4</sub> / (head * year)   |
| Description  | Enteric CH <sub>4</sub> emission factor per head of livestock type l per year  |
| Source of data   | 2006 IPCC Guidelines for National Greenhouse Gas Inventories   |
| Value applied  | Dairy cattle: 68<br>Cattle: 56<br>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<br>Calculation of project emissions<br>Calculation of Leakage emissions  |
| Comments   | N/A  |

|                  |                   |
|------------------|-------------------|
| Data / Parameter | $EF_{3,PRP, CPP}$ |
|------------------|-------------------|

|  |   |
|--|---|
| Data unit  | kg N <sub>2</sub> O-N/kg N input  |
| Description  | N <sub>2</sub> O 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<br>Calculation of project emissions   |
| Comments   | N/A   |

|  |   |
|--|---|
| Data / Parameter   | $EF_{3,PRP,SO}$   |
| Data unit  | kg N <sub>2</sub> O-N/kg N input  |
| Description  | N <sub>2</sub> O 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<br>Calculation of project emissions<br>Calculation of Leakage emissions   |
| Comments   | N/A   |

|                  |   |
|------------------|---|
| Data / Parameter | $Nex_l$   |
| 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<br>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 10.19, Chapter 10, Volume 4) |
| Purpose of data  | Calculation of baseline emissions<br>Calculation of project emissions<br>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<br>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   | $Days_{l,b}$   |
| 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:138  |
| 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 herdsmen 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 herdsmen 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<br>Calculation of project emissions<br>Calculation of leakage emissions   |
| Comments   | N/A   |

|                  |            |
|------------------|------------|
| Data / Parameter | $EF_{l,M}$ |
|------------------|------------|

|  |  |
|--|--|
| Data unit  | kg CH <sub>4</sub> / (head * year)   |
| Description  | CH <sub>4</sub> emission factor from manure of livestock type I  |
| 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<br>Calculation of project emissions<br>Calculation of leakage emissions  |
| Comments   | N/A  |

|  |   |
|--|---|
| Data / Parameter   | $EF_{CO_2,k}$   |
| Data unit  | t CO <sub>2</sub> /GJ   |
| Description  | CO <sub>2</sub> 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 baseline emissions<br>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 | <p>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.</p> <p>The <math>SOC_{S,Baseline}</math> was tested in 2016, which less than two years prior to the project start time. From September 16 to October 28, 2016, 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 117 soil samples were measured by Shandong Huasheng Tiantong Standard Technical Service Co., Ltd., which was registered in Jinan City, Shandong Province in 27-August-2015. Soil sampling followed Guidelines for Sampling and Surveys for CDM Project Activities and Programmes of Activities (v 04.0).</p> <p>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.</p> |
| 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   | <p>National standards</p> <p>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</p> |
| Value applied    | <p>Sheep: 1.8</p> <p>Cattle: 8.1</p>  |

|  |                                  |
|--|----------------------------------|
| 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   | $ANPP_{GUI,REF}$  |
| 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   | Peer-reviewed studies<br>Wang jie.(2017) The Relationship between Biodiversity and Aboveground Biomass with Soil Properties in North Slope of Qilian Mountains Meadow Steppe. (Master's thesis, Northwest Normal University)<br><a href="https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201901&amp;filename=1017199627.nh">https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201901&amp;filename=1017199627.nh</a> |
| Value applied  | 1.38  |
| 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 based on the results of survey of Grazing Displacement (2017-2021) from September to October conducted by the project proponent and county forestry and grassland bureau. |
| 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  |

### 3.1.2 Data and Parameters Monitored

|   |   |         |         |         |         |         |
|---|---|---------|---------|---------|---------|---------|
| Data / Parameter  | $P_{l,t}$   |         |         |         |         |         |
| Data unit   | Head  |         |         |         |         |         |
| Description   | Population of livestock type l under project in year t  |         |         |         |         |         |
| Source of data  | Project grazing records   |         |         |         |         |         |
| Description of measurement methods and procedures to be applied | <p>The project proponent and the County Forestry and Grassland Bureau visit all the project participants every year to conduct the Survey of Grazing Displacement (2017-2021) and investigate the grazing situation of the project.</p> <p>Then the population of livestock of herders under the project are counted in Project grazing records.</p>        |         |         |         |         |         |
| Frequency of monitoring/recording                               | Annually  |         |         |         |         |         |
| Value applied   | Livestock type  | 2017    | 2018    | 2019    | 2020    | 2021    |
|   | Cattle  | 151,131 | 99,144  | 53,206  | 53,206  | 53,206  |
|   | Sheep   | 528,465 | 346,680 | 186,046 | 186,046 | 186,046 |
| Monitoring equipment  | N/A   |         |         |         |         |         |
| QA/QC procedures to be applied                                  | <p>Guidance provided in IPCC 2000 chapter 8 is applied. The QA/QC procedures adopted is general QC procedures:</p> <p>In this monitoring period:</p> <ul style="list-style-type: none"> <li>The records of population of the livestock were cross-checked by original data records and the results showed that the data are accurately recorded.</li> </ul> |         |         |         |         |         |

|                    |   |
|--------------------|---|
|                    | <ul style="list-style-type: none"> <li>There is no significant difference between the population of the livestock of the project and previous estimates. Therefore, the monitoring results are reasonable.</li> </ul> |
| Purpose of data    | Calculation of project emissions  |
| Calculation method | N/A   |
| Comments           | N/A   |

|   |   |
|---|---|
| Data / Parameter  | $H_{i,t}$   |
| Data unit   | Hours   |
| Description   | Average grazing hours per day of livestock type I during grazing season in year t   |
| Source of data  | Project grazing records   |
| Description of measurement methods and procedures to be applied | <p>The project proponent and the County Forestry and Grassland Bureau visit all the project participants every year to conduct the Survey of Grazing Displacement (2017-2021) and investigate the grazing situation of the project.</p> <p>Then the average grazing hours of herders under the project are counted in Project grazing records.</p>  |
| Frequency of monitoring/recording                               | Annually  |
| Value applied   | 8   |
| Monitoring equipment  | N/A   |
| QA/QC procedures to be applied                                  | <p>Guidance provided in IPCC 2000 chapter 8 is applied. The QA/QC procedures adopted is general QC procedures:</p> <p>In this monitoring period:</p> <ul style="list-style-type: none"> <li>The records of grazing hours were cross-checked by original data records and the results showed that the data are accurately recorded.</li> <li>There is no significant difference between grazing hours of the project and previous estimates.</li> </ul> <p>Therefore, the monitoring results are reasonable.</p> |

|                    |                                  |
|--------------------|----------------------------------|
|                    |                                  |
| 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<br>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 grazing 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 conduct the Survey of Grazing Displacement (2017-2021) and investigate the grazing situation of the project.<br><br>Then the average grazing days of herders under the project are counted in Project grazing records.  |
| Frequency of monitoring/recording                               | Annually  |
| Value applied   | 125   |
| Monitoring equipment  | N/A   |
| QA/QC procedures to be applied                                  | Guidance provided in IPCC 2000 chapter 8 is applied. The QA/QC procedures adopted is general QC procedures:<br><br>In this monitoring period: <ul style="list-style-type: none"> <li>The records of grazing days were cross-checked by original data records and the results showed that the data are accurately recorded.</li> <li>There is no significant difference between the grazing days of the project and previous estimates.</li> </ul> Therefore, the monitoring results are reasonable. |
| 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                         | Diesel statistics   |
| Description of measurement methods and | The county Forestry and Grassland Bureau recorded the diesel consumption of sowing tractors and transport trucks during the implementation of the project |

| procedures to be applied          |  |                                     |                                   |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|-----------------------------------|--|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|------|--------|---|---|---------|--------|-------|------------|--------|-------|-------|---|---|-------|---------|-------|---------|---|---|------|--------|---------|-------|---------|--------|-------|------------|--------|---------|-------|--------|-------|-------|--------|-------|---------|--------|-------|------|--------|--------|---------|---------|-------|-------|------------|--------|---------|-------|-------|------|-------|---------|-------|---------|-------|-------|
| Frequency of monitoring/recording | Record fuel consumption during the implementation of the project.  |                                     |                                   |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
| Value applied                     | <table border="1"> <thead> <tr> <th>Year</th> <th>County</th> <th>Diesel consumption of tractors (Kg)</th> <th>Diesel consumption of trucks (Kg)</th> </tr> </thead> <tbody> <tr> <td rowspan="6">2017</td> <td>Gaotai</td> <td>0</td> <td>0</td> </tr> <tr> <td>Shandan</td> <td>46,920</td> <td>508.2</td> </tr> <tr> <td>Racecourse</td> <td>17,160</td> <td>320.6</td> </tr> <tr> <td>Minle</td> <td>0</td> <td>0</td> </tr> <tr> <td>Sunan</td> <td>359,160</td> <td>5,181</td> </tr> <tr> <td>Ganzhou</td> <td>0</td> <td>0</td> </tr> <tr> <td rowspan="6">2018</td> <td>Gaotai</td> <td>234,720</td> <td>3,182</td> </tr> <tr> <td>Shandan</td> <td>75,120</td> <td>812.7</td> </tr> <tr> <td>Racecourse</td> <td>69,240</td> <td>1,298.5</td> </tr> <tr> <td>Minle</td> <td>72,600</td> <td>858.2</td> </tr> <tr> <td>Sunan</td> <td>36,000</td> <td>518.7</td> </tr> <tr> <td>Ganzhou</td> <td>59,880</td> <td>561.4</td> </tr> <tr> <td rowspan="6">2019</td> <td>Gaotai</td> <td>86,640</td> <td>1,174.6</td> </tr> <tr> <td>Shandan</td> <td>25800</td> <td>278.6</td> </tr> <tr> <td>Racecourse</td> <td>84,240</td> <td>1,579.2</td> </tr> <tr> <td>Minle</td> <td>7,080</td> <td>83.3</td> </tr> <tr> <td>Sunan</td> <td>155,880</td> <td>2,248</td> </tr> <tr> <td>Ganzhou</td> <td>13080</td> <td>123.2</td> </tr> </tbody> </table> | Year                                | County                            | Diesel consumption of tractors (Kg) | Diesel consumption of trucks (Kg) | 2017 | Gaotai | 0 | 0 | Shandan | 46,920 | 508.2 | Racecourse | 17,160 | 320.6 | Minle | 0 | 0 | Sunan | 359,160 | 5,181 | Ganzhou | 0 | 0 | 2018 | Gaotai | 234,720 | 3,182 | Shandan | 75,120 | 812.7 | Racecourse | 69,240 | 1,298.5 | Minle | 72,600 | 858.2 | Sunan | 36,000 | 518.7 | Ganzhou | 59,880 | 561.4 | 2019 | Gaotai | 86,640 | 1,174.6 | Shandan | 25800 | 278.6 | Racecourse | 84,240 | 1,579.2 | Minle | 7,080 | 83.3 | Sunan | 155,880 | 2,248 | Ganzhou | 13080 | 123.2 |
| Year                              | County   | Diesel consumption of tractors (Kg) | Diesel consumption of trucks (Kg) |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
| 2017                              | Gaotai   | 0                                   | 0                                 |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Shandan  | 46,920                              | 508.2                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Racecourse   | 17,160                              | 320.6                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Minle  | 0                                   | 0                                 |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Sunan  | 359,160                             | 5,181                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Ganzhou  | 0                                   | 0                                 |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
| 2018                              | Gaotai   | 234,720                             | 3,182                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Shandan  | 75,120                              | 812.7                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Racecourse   | 69,240                              | 1,298.5                           |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Minle  | 72,600                              | 858.2                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Sunan  | 36,000                              | 518.7                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Ganzhou  | 59,880                              | 561.4                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
| 2019                              | Gaotai   | 86,640                              | 1,174.6                           |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Shandan  | 25800                               | 278.6                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Racecourse   | 84,240                              | 1,579.2                           |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Minle  | 7,080                               | 83.3                              |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Sunan  | 155,880                             | 2,248                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
|                                   | Ganzhou  | 13080                               | 123.2                             |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
| Monitoring equipment              | N/A  |                                     |                                   |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
| QA/QC procedures to be applied    | <p>Guidance provided in IPCC 2000 chapter 8 is applied. The QA/QC procedures adopted is general QC procedures:</p> <p>In this monitoring period:</p> <ul style="list-style-type: none"> <li>The records of fuel consumption parameters were cross-checked by original data records. And the results showed that the data are accurately recorded.</li> </ul> <p>Therefore, the monitoring results are reasonable.</p>  |                                     |                                   |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |
| Purpose of data                   | Calculation of project emissions   |                                     |                                   |                                     |                                   |      |        |   |   |         |        |       |            |        |       |       |   |   |       |         |       |         |   |   |      |        |         |       |         |        |       |            |        |         |       |        |       |       |        |       |         |        |       |      |        |        |         |         |       |       |            |        |         |       |       |      |       |         |       |         |       |       |

|                    |     |
|--------------------|-----|
| Calculation method | N/A |
| Comments           | N/A |

|   |   |                            |                                   |
|---|---|----------------------------|-----------------------------------|
| Data / Parameter  | $PA_{mG,s,i,t}$   |                            |                                   |
| Data unit   | ha  |                            |                                   |
| Description   | Project areas of grassland with management practice mG in stratum s in year t                                     |                            |                                   |
| Source of data  | Project records for grassland management.   |                            |                                   |
| Description of measurement methods and procedures to be applied | The County Forestry and Grassland Bureau recorded the area of grassland with management practice mG in stratum s. |                            |                                   |
| Frequency of monitoring/recording                               | Record the area and management practice just after the management practice has taken place and report annually    |                            |                                   |
| Value applied   | <b>Strata</b>   | <b>Management practice</b> | <b>PA<sub>mG,S,2021</sub>(ha)</b> |
|   | Strata 1  | Rest grazing               | 52,009.90                         |
|   | Strata 2  | Rest grazing               | 26,892.34                         |
|   | Strata 3  | Reseeding grass            | 7,443.17                          |
|   | Strata 4  | Reseeding grass            | 7,803.22                          |
|   | Strata 5  | Rotational grazing         | 3,374.91                          |
|   | Strata 6  | Rotational grazing         | 4,383.18                          |
|   | Strata 7  | Rest grazing               | 11,692.04                         |
|   | Strata 8  | Rest grazing               | 12,576.56                         |
|   | Strata 9  | Reseeding grass            | 14,805.05                         |
|   | Strata 10   | Reseeding grass            | 21,153.68                         |
|   | Strata 11   | Rotational grazing         | 21,374.62                         |
|   | Strata 12   | Rotational grazing         | 26,652.60                         |
|   | Strata 13   | Rest grazing               | 2,083.39                          |
|   | Strata 14   | Rest grazing               | 2,194.31                          |
|   | Strata 15   | Reseeding grass            | 3,034.93                          |
|   | Strata 16   | Reseeding grass            | 22,762.37                         |
|   | Strata 17   | Rotational grazing         | 3,118.59                          |
|   | Strata 18   | Rotational grazing         | 17,704.94                         |
| Monitoring equipment  | GPS and GIS software were applied   |                            |                                   |

|                                |   |
|--------------------------------|---|
| QA/QC procedures to be applied | <p>Guidance provided in IPCC, 2000 chapter 8 is applied. The QA/QC procedures including:</p> <p>In this monitoring period:</p> <ul style="list-style-type: none"> <li>Standard operating procedures (SOPs) from published handbooks, or from the IPCC GPG LULUCF 2003, has been applied.</li> <li>The satellite image cross-check shows that the project area is grassland.</li> <li>There is no significant difference between the implementation area of the project area and previous estimates.</li> </ul> <p>Therefore, the monitoring results are reasonable.</p> |
| Purpose of data                | Calculation of project emissions  |
| Calculation method             | N/A   |
| Comments                       | N/A   |

|   |  |
|---|--|
| 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  | Soil sampling test report  |
| Description of measurement methods and procedures to be applied | <p>From 16-September 2021 to 01-October-2021, the project proponent has conducted a field sampling monitoring for the project actually achieved during the first monitoring period (from 25-July-2017 to 31-December -2021).</p> <p>Soil samples were collected by soil drill, collected 3-4 soil samples in S shape at each sampling site, and finally mixed into one sample, which is put into a ziplock bag and mailed to the laboratory for measuring. The <math>SOC_{mG,s,i,t}</math> were measured by Shandong Huasheng Tiantong Standard Technical Service Co., Ltd., which has the certification of inspection and testing organization.</p> <p>Finally, on 03-November-2021, the testing organization issued a soil testing report.</p> |

|                                   |   |
|-----------------------------------|---|
| 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 according to the requirement of Methodology VM0026 Sustainable Grassland Management, v1.1.   |
| Value applied                     | Please refer ER calculation sheets for details.   |
| Monitoring equipment              | Soil drill, electric furnace, test tube, oil bath pot, wire cage and dropper.   |
| QA/QC procedures to be applied    | <p>The collection of soil samples for measuring SOC were carried by suitably trained staff.</p> <p>Soil sampling based on the nationally-approved standard Soil Quality Guidelines for Soil Sampling Techniques (GB/T 361972018).</p> <p>The <math>SOC_{mG,s,i,t}</math> were measured by Shandong Huasheng Tiantong Standard Technical Service Co., Ltd., which was registered in Jinan City, Shandong Province in 27-August-2015. The laboratory complied with the principles of good laboratory practice outlined in the OECD (1998).</p> <p>The SOC measurement based on the nationally-approved standard Method for Determination of Soil Organic Matter (NY/T 1121.6-2006) was used to.</p> <p>All soil samples need to be backed up. If there is a problem with the testing equipment or the data is abnormal, retest the corresponding soil sample.</p> |
| 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 <sup>3</sup>  |
| 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   | Sampling test report  |

|   |   |
|---|---|
| Description of measurement methods and procedures to be applied | <p>From 16-September-2021 to 01-October-2021, the project proponent has conducted a field sampling monitoring for the project actually achieved during the first monitoring period (from 25-July-2017 to 31-December-2021).</p> <p>The soil is sampled with 100 cm<sup>3</sup> ring knife, wrapped with fresh-keeping film, placed in aluminum box and mailed to the Shandong Huasheng Tiantong Standard Technical Service Co., Ltd., which has the certification of inspection and testing organization. Laboratory.</p> <p>The <math>BD_{mG,s,i,t}</math> were measured from 03-October-2021 to 03-November-2021, and the test report was issued on 03-November-2021.</p> |
| Frequency of monitoring/recording                               | <p>At least once every five years, at the end of growing season in the year measured, until the end of the project crediting period.</p> <p>The soil sampling time was at the end of growing season, and the monitoring frequency meets the requirements of methodology.</p>  |
| Value applied   | Please refer ER calculation sheets for details.   |
| Monitoring equipment  | Ring knife, electronic scale, rubber hammer, oven and dryer.  |
| QA/QC procedures to be applied                                  | <p>The collection of soil samples for measuring soil bulk density were carried by suitably trained staff. The <math>BD_{mG,s,i,t}</math> were measured by Shandong Huasheng Tiantong Standard Technical Service Co., Ltd., which was registered in Jinan City, Shandong Province in 27-August-2015.</p> <p>The laboratory complied with the principles of good laboratory practice outlined in the OECD (1998).</p> <p>All soil samples need to be backed up. If there is a problem with the testing equipment or the data is abnormal, retest the corresponding soil sample.</p>   |
| 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 2mm, 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  | Sampling test report   |
| Description of measurement methods and procedures to be applied | <p>From 16-September 2021 to 01-October-2021, the project proponent has conducted a field sampling monitoring for the project actually achieved during the first monitoring period (from 25-July-2017 to 31-December -2021).</p> <p>The <math>FC_{mG,s,i,t}</math> were collected by soil drill, collected 3-4 soil samples in S shape at each sampling site, and finally mixed into one sample, which is put into a ziplock bag and mailed to the laboratory for measuring. The <math>FC_{mG,s,i,t}</math> were measured by Shandong Huasheng Tiantong Standard Technical Service Co., Ltd., which has the certification of inspection and testing organization.</p> <p>The <math>FC_{mG,s,i,t}</math> were measured by Shandong Huasheng Tiantong Standard Technical Service Co., Ltd. from 3-October-2021 to 3-November-2021, and the test report was issued on 03-November-2021.</p> |
| Frequency of monitoring/recording                               | <p>At least once every five years, at the end of growing season in the year measured, until the end of the project crediting period.</p> <p>The soil sampling time was at the end of growing season, and the monitoring frequency meets the requirements of methodology.</p>   |
| Value applied   | Please refer ER calculation sheets for details.  |
| Monitoring equipment  | Soil drill, electronic scale and sieve.  |
| QA/QC procedures to be applied                                  | <p>The collection of soil samples for measuring <math>FC_{mG,s,i,t}</math> were carried by suitably trained staff.</p> <p>The <math>FC_{mG,s,i,t}</math> were measured by Shandong Huasheng Tiantong Standard Technical Service Co., Ltd., which was registered in Jinan City, Shandong Province in 27-August-2015.</p> <p>The laboratory complied with the principles of good laboratory practice outlined in the OECD (1998).</p> <p>All soil samples need to be backed up. If there is a problem with the testing equipment or the data is abnormal, retest the corresponding soil sample.</p>  |

|                    |                                  |
|--------------------|----------------------------------|
| Purpose of data    | Calculation of project emissions |
| Calculation method | N/A                              |
| Comments           | N/A                              |

|   |   |
|---|---|
| Data / Parameter  | <i>Depth</i>  |
| 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  | Soil sampling record  |
| 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   | 30  |
| Monitoring equipment  | Soil drill with scale.<br>Insert the soil drill into the soil to a scale of 30cm, and then lift it up and transfer the soil to the ziplock bag. |
| QA/QC procedures to be applied                                  | Take a graduated soil drill to ensure that the soil taken is 30 cm deep.  |
| Purpose of data   | Calculation of project emissions.   |
| Calculation method  | N/A   |
| Comments  | N/A   |

|                  |   |
|------------------|---|
| Data / Parameter | $P_{GUI,t}$   |
| Data unit        | Head  |
| Description      | Total population of livestock of each type relocated to unidentified grasslands in year t |

| Source of data  | Project grazing records   |                |         |         |         |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
|---|---|----------------|---------|---------|---------|------|------|--------|--------|--------|---------|---------|---------|-------|---------|---------|---------|---------|---------|
| Description of measurement methods and procedures to be applied | <p>The project proponent and the County 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.</p> <p>Then the population of livestock of herders under the project are summarized in Project grazing records.</p>   |                |         |         |         |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| Frequency of monitoring/recording                               | Annually  |                |         |         |         |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| Value applied   | <table border="1"> <thead> <tr> <th>Livestock type</th> <th>2017</th> <th>2018</th> <th>2019</th> <th>2020</th> <th>2021</th> </tr> </thead> <tbody> <tr> <td>Cattle</td> <td>32,409</td> <td>84,396</td> <td>130,334</td> <td>130,334</td> <td>130,334</td> </tr> <tr> <td>Sheep</td> <td>113,323</td> <td>295,108</td> <td>455,742</td> <td>455,742</td> <td>455,742</td> </tr> </tbody> </table>   | Livestock type | 2017    | 2018    | 2019    | 2020 | 2021 | Cattle | 32,409 | 84,396 | 130,334 | 130,334 | 130,334 | Sheep | 113,323 | 295,108 | 455,742 | 455,742 | 455,742 |
| Livestock type  | 2017  | 2018           | 2019    | 2020    | 2021    |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| Cattle  | 32,409  | 84,396         | 130,334 | 130,334 | 130,334 |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| Sheep   | 113,323   | 295,108        | 455,742 | 455,742 | 455,742 |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| Monitoring equipment  | N/A   |                |         |         |         |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| QA/QC procedures to be applied                                  | <p>Guidance provided in IPCC 2000 chapter 8 is applied. The QA/QC procedures adopted is general QC procedures:</p> <p>In this monitoring period:</p> <ul style="list-style-type: none"> <li>The records of population of the livestock in leakage area were cross-checked by original data records and the results showed that the data are accurately recorded.</li> <li>There is no significant difference between the population of the livestock of the project and previous estimates.</li> </ul> <p>Therefore, the monitoring results are reasonable.</p> |                |         |         |         |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| Purpose of data   | Calculation of project leakage  |                |         |         |         |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| Calculation method  | N/A   |                |         |         |         |      |      |        |        |        |         |         |         |       |         |         |         |         |         |
| Comments  | N/A   |                |         |         |         |      |      |        |        |        |         |         |         |       |         |         |         |         |         |

|                  |  |
|------------------|--|
| Data / Parameter | $Days_{GUI,t}$   |
| 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 | <p>The project proponent and the County Forestry and Grassland Bureau visit all the project participants every year to conduct the Survey of Grazing Displacement (2017-2021) and investigate the grazing situation of the project.</p> <p>Then the average grazing days of herders under the project are counted in Project grazing records.</p>  |
| Frequency of monitoring/recording                               | At the end of grazing season in every year   |
| Value applied   | 125  |
| Monitoring equipment  | N/A  |
| QA/QC procedures to be applied                                  | <p>Guidance provided in IPCC 2000 chapter 8 is applied. The QA/QC procedures adopted is general QC procedures:</p> <p>In this monitoring period:</p> <ul style="list-style-type: none"> <li>• The records of grazing hours in leakage area were cross-checked by original data records and the results showed that the data are accurately recorded.</li> <li>• There is no significant difference between the grazing hours of the livestock of the project and previous estimates.</li> </ul> <p>Therefore, the monitoring results are reasonable.</p> |
| Purpose of data   | Calculation of project leakage   |
| Calculation method  | N/A  |
| Comments  | N/A  |

### 3.1.3 Monitoring Plan

#### 1. Operation and management structure

The project proponent hired local herders and communities (monitoring group and auditing group) for daily supervision and data management during the project implementation while office manager oversee the whole working group. A monitoring group has been established by Zhangye Academy of Forestry Sciences to carry out the monitoring work. The structure of the monitoring group is as follows:

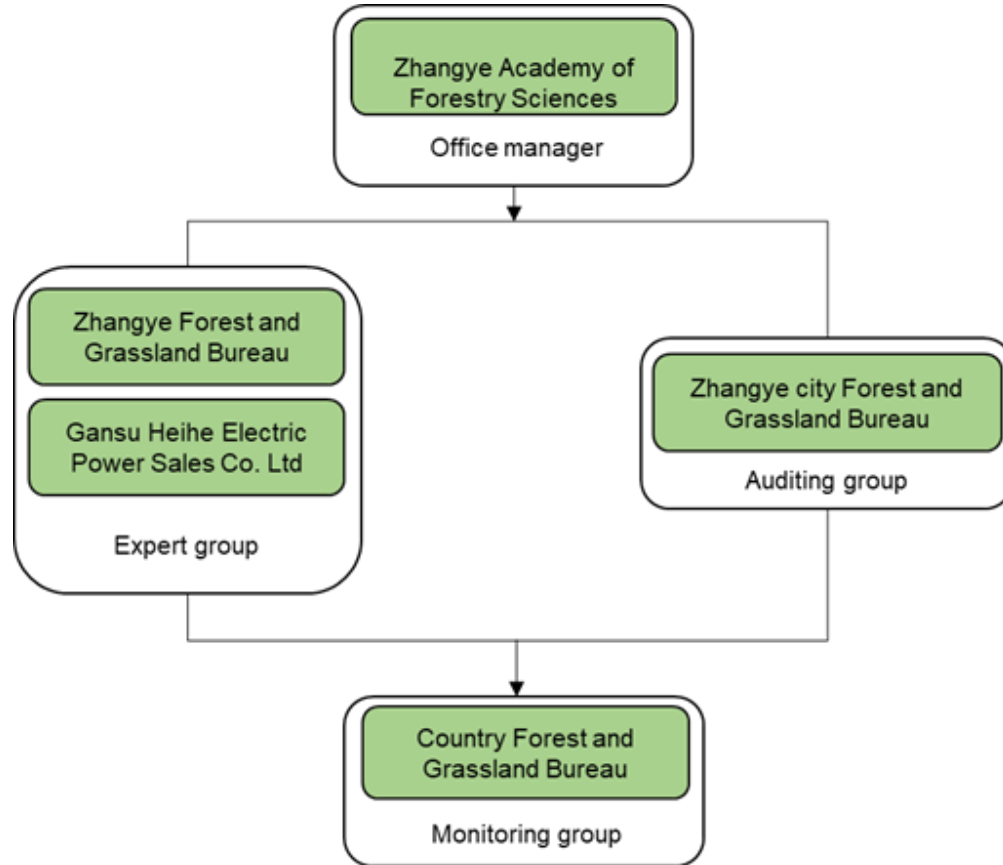


Figure 3-1 Organization structure of the monitoring team

The responsibilities of each role in the team structure are:

- Office manager 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 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 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 was 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.

For this monitoring period, the monitoring task was assigned on 25-June-2021, and the monitoring team started the field work from 16-September-2021 to 01-October-2021.

## **2. Monitoring process**

### **1) Monitor the applicability conditions listed in methodology**

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 CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities (v01) was 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 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 CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities (v01) was 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 Project Description, 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 in GIS files. Boundary information such as original records, needs to store in both electronic and printed archive in the project owner, and participants should keep a backup. Files need to be saved at least two years after the end of the crediting period.

In order to obtain valid and reliable boundary information, 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 (eg satellite imagery).

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

| Index of management practice | Management practice | Description   | Area(ha)   |
|------------------------------|---------------------|---|------------|
| 1                            | Rest grazing        | Grazing is suspended for 90 days when the grass returns to green every year   | 107,448.54 |
| 2                            | Reseeding grass     | Reseeding the grasses under the condition of fencing enclosure for 2 years. 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 approved livestock carrying capacity | 77,002.43  |
| 3                            | Rotational grazing  | The grazing time is halved by rotating grazing between spring pasture and summer pasture every year   | 76,608.83  |

**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.

### Step 3: 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.

During this monitoring period, there is no change of the project boundary, nor any non-conformance of the applicability conditions occurred.

## 2) Monitoring of Project Implementation

A record of the grazing agents (eg, herder households) involved the project.

- The project proponent and County Forestry and Grassland Bureau recorded each household involved in the sustainable grassland management project. Including the current situation of Grassland: area, type, grassland degradation area and degree, existing livestock species and quantity.
- Each household was given a unique ID. Their name, location of their land, and date of entering into the agreement and leaving the agreement was 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) were established, recorded and archived. This was achieved by field survey (eg, using GPS) and by using geo-referenced spatial data (eg, 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 were available for validation and verification.
- Subsidies received by each household in the project area due to sustainable management measures.

During this monitoring period 184,057.38 ha of degraded grassland in Zhangye were managed by rotational and rest grazing, 77,002.43 ha of degraded grassland in Zhangye were planted with *Elymus nutans*, *Elymus sibiricus*, *Poa pratensis*, *Agropyron cristatum*, *Festuca rubra*, *Artemisia sphaerocephala*, and the grazing is controlled in project area where these measures are implemented, The alternative grazing has been allowed in area depending on the growth situation of the forage. In addition, 952 local herders (493 are women) were employed as guardians to patrol the project area to prevent fires, rodents and insects.

## 3) Recording of Data and Parameters Monitored

According to PD, no chemical fertilizer is used in the project area during this monitoring period:

For the estimate of annual CH<sub>4</sub> emissions from enteric fermentation, population of livestock type I ( $P_{i,t}$ ) and grazing days of livestock type I ( $Days_{i,t}$ ) were recorded annually during the monitoring period.

For the estimate of annual CH<sub>4</sub> and N<sub>2</sub>O emissions from manure deposition during grazing, grazing days of livestock of type I ( $Days_{i,t}$ ), and average grazing hours per day of livestock type I ( $H_{i,t}$ ) during the grazing season were recorded in every grazing season, in each year during the monitoring period.

For the estimate of annual CO<sub>2</sub> emissions due to the use of fossil fuels for SGM, the following parameters must be recorded to monitor  $EF_{CO_2,k}$  and  $NCV_K$ , at each time a management practice using machines is adopted and reported annually during the monitoring period:

- Quantity of fuel consumption;
- Fuel type;
- Machine type.

According to the project design report, no fertilizer will be applied in the subsequent management of the project. During the first monitoring period, no fertilizer was applied in the project area.

To estimate project removals due to changes in SOC, the following parameters were monitored during the monitoring 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 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 2mm, 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 (v 4.0) 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 (v 01) due to Implementation of Sustainable Grassland Management Activities must be recorded annually during the project crediting period.

#### 4) Sampling Design and Stratification

According to PD, 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: The Technical Specification for soil Environmental monitoring (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 (ie, all elements of the population must fall into exactly one class).

For the project, classes were determined by each county within project boundary and the two different soil texture (see Table 3-4 for details), 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.

Firstly, because our project has different management practice, such as reseeded grass, rest grazing and rotational grazing. In area of rotational grazing, the grasslands are divided into seasonal grazing land, and then the seasonal grazing land is divided into several small areas by the livestock carrying capacity of the grassland. Then based on specified grazing order, grazing cycle and zoning grazing time, the grassland is grazed area by area and used in turn. Rest grazing means seasonal grazing banning. During the spring rejuvenation period, the plot is required rest grazing for 90 days according to the average growth rate of plants (>10kg/ha) and aboveground dry matter accumulation(100kg/ha). In area of reseeded grass, *Elymus nutans*, *Elymus sibiricus*, *Poa pratensis*, *Agropyron cristatum*, *Festuca rubra*, *Artemisia sphaerocephala* were reseeded on the degraded grassland under the condition of fencing enclosure for 2 years in project area. 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 approved livestock carrying capacity. Therefore, different measures will benefit grassland in different aspect.

Secondly, different grassland types have different vegetation coverage and types, so their effects on soil carbon accumulation are also different.

Thirdly, different soil textures have a significant impact on soil carbon accumulation, such as, sandy soil has poor water and fertility retention, clay soil has strong water and fertility retention, and loam

has moderate water and fertility retention. For the project, based on the management practice, grassland types and soil texture, the project strata are listed in the following table.

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

The locations of sample sites were 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).

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

- Unexpected disturbances occurring during the project crediting period (eg, 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.

During this monitoring period, there is no change of grassland management activities and unexpected disturbances, the carbon stratification of the project does not need to update..

Table 3-2 Post-stratification during this monitoring period

| Strata    | Area(ha)   | Grassland type            | Management practice | Soil texture |
|-----------|------------|---------------------------|---------------------|--------------|
| Strata-1  | 52,009.90  | Desertification Grassland | Rest grazing        | Sandy        |
| Strata-2  | 26,892.34  | Desertification Grassland | Rest grazing        | Sandy loam   |
| Strata-3  | 7,443.17   | Desertification Grassland | Reseeding grass     | Sandy        |
| Strata-4  | 7,803.22   | Desertification Grassland | Reseeding grass     | Sandy loam   |
| Strata-5  | 3,374.91   | Desertification Grassland | Rotational grazing  | Sandy        |
| Strata-6  | 4,383.18   | Desertification Grassland | Rotational grazing  | Sandy loam   |
| Strata-7  | 11,692.04  | Temperate grassland       | Rest grazing        | Sandy loam   |
| Strata-8  | 12,576.56  | Temperate grassland       | Rest grazing        | Loam         |
| Strata-9  | 14,805.05  | Temperate grassland       | Reseeding grass     | Sandy loam   |
| Strata-10 | 21,153.68  | Temperate grassland       | Reseeding grass     | Loam         |
| Strata-11 | 21,374.62  | Temperate grassland       | Rotational grazing  | Sandy loam   |
| Strata-12 | 26,652.60  | Temperate grassland       | Rotational grazing  | Loam         |
| Strata-13 | 2,083.39   | Meadow grassland          | Rest grazing        | Sandy loam   |
| Strata-14 | 2,194.31   | Meadow grassland          | Rest grazing        | Loam         |
| Strata-15 | 3,034.93   | Meadow grassland          | Reseeding grass     | Sandy loam   |
| Strata-16 | 22,762.37  | Meadow grassland          | Reseeding grass     | Loam         |
| Strata-17 | 3,118.59   | Meadow grassland          | Rotational grazing  | Sandy loam   |
| Strata-18 | 17,704.94  | Meadow grassland          | Rotational grazing  | Loam         |
| Total     | 261,059.80 |                           |                     |              |

### Sampling framework

According to the methodology, Guidelines for Sampling and Surveys for CDM project Activities and Programmes of Activities (version 4.0) was 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<sup>26</sup>. See Sample Size Calculator Table for detail.

The mean SOC with the project boundary and the standard deviation of SOC in each strata 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 strata which were used to calculate the final number of sample sites based on the Sample Size Calculator Table as mentioned above.

The calculated sample size was 54 originally by using a precision of 15 percent at the 95 percent confidence level, considering the large area of the project boundary, the actual sample size has been increased into 117, by tripling the individual sample size of each strata with a minimum number of 6. Please refer to Sample Size Calculator Table for details.

Table 3-3 Number of the sample plots

| Stratum number | Expected mean, m | Expected standard deviation, s | Population area, g (project area) | Calculation sample size | Actual sample size |
|----------------|------------------|--------------------------------|-----------------------------------|-------------------------|--------------------|
| 1              | 52.39            | 12.65                          | 52,009.90                         | 3                       | 6                  |
| 2              | 67.76            | 11.42                          | 26,892.34                         | 3                       | 6                  |
| 3              | 39.55            | 15.20                          | 7,443.17                          | 3                       | 6                  |
| 4              | 50.54            | 24.81                          | 7,803.22                          | 3                       | 6                  |
| 5              | 36.56            | 19.46                          | 3,374.91                          | 3                       | 6                  |
| 6              | 58.89            | 22.84                          | 4,383.18                          | 3                       | 6                  |
| 7              | 42.90            | 20.33                          | 11,692.04                         | 3                       | 6                  |
| 8              | 71.04            | 49.77                          | 12,576.56                         | 3                       | 9                  |
| 9              | 67.26            | 19.82                          | 14,805.05                         | 3                       | 6                  |
| 10             | 83.45            | 35.57                          | 21,153.68                         | 3                       | 9                  |
| 11             | 76.77            | 13.29                          | 21,374.62                         | 3                       | 6                  |
| 12             | 71.30            | 33.60                          | 26,652.60                         | 3                       | 9                  |
| 13             | 61.28            | 23.27                          | 2,083.39                          | 3                       | 6                  |
| 14             | 74.69            | 21.83                          | 2,194.31                          | 3                       | 6                  |
| 15             | 71.36            | 25.46                          | 3,034.93                          | 3                       | 6                  |
| 16             | 75.18            | 20.01                          | 22,762.37                         | 3                       | 6                  |
| 17             | 58.52            | 16.29                          | 3,118.59                          | 3                       | 6                  |
| 18             | 70.01            | 13.88                          | 17,704.94                         | 3                       | 6                  |
| Total          | /                | /                              | 261,059.80                        | 54                      | 117                |

<sup>26</sup> <https://cdm.unfccc.int/Reference/Guidclarif/index.html>

Table 3-4 Location of the sample sites

| NO.      | Sample site | Longitude   | Latitude    | Soil texture | Grassland type            |
|----------|-------------|-------------|-------------|--------------|---------------------------|
| GTB-19   | S-1         | 99.51381667 | 39.29737778 | sandy        | Desertification Grassland |
| GTB-21   | S-2         | 99.60247278 | 39.70758611 | sandy        | Desertification Grassland |
| GTB-22   | S-3         | 99.61783944 | 39.71794667 | sandy        | Desertification Grassland |
| GTB-23   | S-4         | 99.63092917 | 39.69296889 | sandy        | Desertification Grassland |
| GTB-24   | S-5         | 99.63608694 | 39.69289694 | sandy        | Desertification Grassland |
| GTB-25   | S-6         | 99.77443694 | 39.67504556 | sandy        | Desertification Grassland |
| GTB-11   | S-1         | 99.46308056 | 39.16722778 | sandy loam   | Desertification Grassland |
| GTB-12   | S-2         | 99.45103056 | 39.13139167 | sandy loam   | Desertification Grassland |
| GTB-15   | S-3         | 99.46223333 | 39.17971111 | sandy loam   | Desertification Grassland |
| GZB-01   | S-4         | 100.7782244 | 39.10341833 | sandy loam   | Desertification Grassland |
| GZB-02   | S-5         | 100.7537525 | 39.09053444 | sandy loam   | Desertification Grassland |
| GZB-03   | S-6         | 100.8035153 | 39.092215   | sandy loam   | Desertification Grassland |
| GTB-02   | S-1         | 99.19229981 | 39.16214441 | sandy        | Desertification Grassland |
| GTB-09   | S-2         | 99.3944204  | 39.23739778 | sandy        | Desertification Grassland |
| GTB-10   | S-3         | 99.27930635 | 39.28301713 | sandy        | Desertification Grassland |
| GTB-20   | S-4         | 99.74848889 | 39.50160833 | sandy        | Desertification Grassland |
| SNB-13   | S-5         | 99.42327943 | 39.05858148 | sandy        | Desertification Grassland |
| SNB-14   | S-6         | 99.37521376 | 39.04664749 | sandy        | Desertification Grassland |
| GTB-01   | S-1         | 99.19167524 | 39.16240072 | sandy loam   | Desertification Grassland |
| GTB-07   | S-2         | 99.33451171 | 39.08077567 | sandy loam   | Desertification Grassland |
| MLB-01   | S-3         | 100.6231333 | 38.73726472 | sandy loam   | Desertification Grassland |
| MLB-03   | S-4         | 100.5265944 | 38.68363378 | sandy loam   | Desertification Grassland |
| SDB-05   | S-5         | 101.3375056 | 38.70332778 | sandy loam   | Desertification Grassland |
| SDB-06   | S-6         | 101.3328917 | 38.67540833 | sandy loam   | Desertification Grassland |
| GTB-17   | S-1         | 99.41422778 | 39.09978611 | sandy        | Desertification Grassland |
| MLB-02   | S-2         | 100.5815766 | 38.68047317 | sandy        | Desertification Grassland |
| SDMCB-06 | S-3         | 101.358866  | 38.17372692 | sandy        | Desertification Grassland |
| SNB-07   | S-4         | 102.1291619 | 37.88070117 | sandy        | Desertification Grassland |
| SNB-08   | S-5         | 102.1381766 | 37.88418968 | sandy        | Desertification Grassland |
| SNB-11   | S-6         | 101.9389006 | 37.87680949 | sandy        | Desertification Grassland |
| GTB-08   | S-1         | 99.41522886 | 39.2332414  | sandy loam   | Desertification Grassland |
| GTB-13   | S-2         | 99.51699167 | 39.19394722 | sandy loam   | Desertification Grassland |
| GTB-14   | S-3         | 99.50268056 | 39.25005278 | sandy loam   | Desertification Grassland |
| GTB-16   | S-4         | 99.49815278 | 39.16973056 | sandy loam   | Desertification Grassland |
| SNB-09   | S-5         | 102.0021541 | 37.8135039  | sandy loam   | Desertification Grassland |
| SNB-10   | S-6         | 102.0023363 | 37.83911537 | sandy loam   | Desertification Grassland |
| GTB-03   | S-1         | 99.32310422 | 39.13867113 | sandy loam   | Temperate grassland       |
| GTB-04   | S-2         | 99.33549636 | 39.14069724 | sandy loam   | Temperate grassland       |
| GTB-06   | S-3         | 99.35793777 | 39.09576119 | sandy loam   | Temperate grassland       |
| SDMCB-07 | S-4         | 101.3809122 | 38.21915486 | sandy loam   | Temperate grassland       |
| SDMCB-17 | S-5         | 101.3195222 | 38.14247222 | sandy loam   | Temperate grassland       |
| SDMCB-24 | S-6         | 101.3594105 | 38.2813197  | sandy loam   | Temperate grassland       |
| GTB-05   | S-1         | 99.33979359 | 39.11913085 | loam         | Temperate grassland       |
| GTB-18   | S-2         | 99.39987778 | 39.12473333 | loam         | Temperate grassland       |

|          |     |             |             |            |                     |
|----------|-----|-------------|-------------|------------|---------------------|
| MLB-08   | S-3 | 100.9182722 | 38.55944722 | loam       | Temperate grassland |
| MLB-09   | S-4 | 100.9755667 | 38.46915    | loam       | Temperate grassland |
| SDMCB-04 | S-5 | 101.3071208 | 38.14579807 | loam       | Temperate grassland |
| SDMCB-05 | S-6 | 101.319427  | 38.15414016 | loam       | Temperate grassland |
| SDB-01   | S-7 | 100.9687972 | 38.70536667 | loam       | Temperate grassland |
| SDB-04   | S-8 | 101.5023639 | 38.43268056 | loam       | Temperate grassland |
| SDB-07   | S-9 | 101.1343944 | 38.79932778 | loam       | Temperate grassland |
| SDMCB-01 | S-1 | 100.9739489 | 38.23008051 | sandy loam | Temperate grassland |
| SDMCB-20 | S-2 | 101.2661619 | 38.22779609 | sandy loam | Temperate grassland |
| SDMCB-22 | S-3 | 101.2893409 | 38.29107661 | sandy loam | Temperate grassland |
| SDMCB-23 | S-4 | 101.3182052 | 38.28630504 | sandy loam | Temperate grassland |
| SNB-32   | S-5 | 99.41890343 | 38.95760514 | sandy loam | Temperate grassland |
| SNB-35   | S-6 | 99.88692222 | 38.89697778 | sandy loam | Temperate grassland |
| MLB-07   | S-1 | 100.9198944 | 38.65052778 | loam       | Temperate grassland |
| MLB-10   | S-2 | 100.8324472 | 38.72727222 | loam       | Temperate grassland |
| SDMCB-10 | S-3 | 101.0488667 | 38.26205    | loam       | Temperate grassland |
| SDMCB-11 | S-4 | 101.0461972 | 38.27394444 | loam       | Temperate grassland |
| SDMCB-12 | S-5 | 101.0574806 | 38.24219167 | loam       | Temperate grassland |
| SDMCB-19 | S-6 | 101.2712401 | 38.20364793 | loam       | Temperate grassland |
| SDMCB-21 | S-7 | 101.2600053 | 38.28070031 | loam       | Temperate grassland |
| SDB-08   | S-8 | 101.2232917 | 38.82918611 | loam       | Temperate grassland |
| SNB-15   | S-9 | 99.41261233 | 38.99072182 | loam       | Temperate grassland |
| SDMCB-26 | S-1 | 101.3935129 | 38.04654659 | sandy loam | Temperate grassland |
| SDB-02   | S-2 | 101.4824944 | 38.44043056 | sandy loam | Temperate grassland |
| SDB-09   | S-3 | 101.1609944 | 38.90486111 | sandy loam | Temperate grassland |
| SNB-01   | S-4 | 99.49455164 | 39.002593   | sandy loam | Temperate grassland |
| SNB-31   | S-5 | 101.5610278 | 38.05689444 | sandy loam | Temperate grassland |
| SNB-33   | S-6 | 99.470785   | 38.98082514 | sandy loam | Temperate grassland |
| MLB-05   | S-1 | 100.7358476 | 38.43092368 | loam       | Temperate grassland |
| SDMCB-02 | S-2 | 101.0515998 | 38.22489346 | loam       | Temperate grassland |
| SDMCB-09 | S-3 | 101.3473361 | 38.09553091 | loam       | Temperate grassland |
| SDMCB-13 | S-4 | 101.0561889 | 38.23929167 | loam       | Temperate grassland |
| SDMCB-16 | S-5 | 101.3978861 | 38.19313333 | loam       | Temperate grassland |
| SDMCB-25 | S-6 | 101.3784927 | 38.05850653 | loam       | Temperate grassland |
| SDMCB-27 | S-7 | 101.3521554 | 38.04266286 | loam       | Temperate grassland |
| SNB-02   | S-8 | 99.47997437 | 39.061551   | loam       | Temperate grassland |
| SNB-36   | S-9 | 99.86615278 | 38.88538889 | loam       | Temperate grassland |
| SDMCB-03 | S-1 | 101.0452011 | 38.18235146 | sandy loam | Meadow grassland    |
| SDMCB-14 | S-2 | 101.4199444 | 38.16449167 | sandy loam | Meadow grassland    |
| SNB-04   | S-3 | 99.75760316 | 38.81606597 | sandy loam | Meadow grassland    |
| SNB-34   | S-4 | 99.70965752 | 38.78944638 | sandy loam | Meadow grassland    |
| SNB-41   | S-5 | 99.95751944 | 38.78777778 | sandy loam | Meadow grassland    |
| SNB-43   | S-6 | 99.93166111 | 38.79036111 | sandy loam | Meadow grassland    |
| SNB-12   | S-1 | 101.6041144 | 38.05116283 | loam       | Meadow grassland    |
| SNB-16   | S-2 | 99.32069833 | 38.82743139 | loam       | Meadow grassland    |
| SNB-17   | S-3 | 99.29838417 | 38.85348861 | loam       | Meadow grassland    |
| SNB-29   | S-4 | 101.8173417 | 37.85716944 | loam       | Meadow grassland    |

|          |     |             |             |            |                  |
|----------|-----|-------------|-------------|------------|------------------|
| SNB-39   | S-5 | 99.89256667 | 38.81249167 | loam       | Meadow grassland |
| SNB-42   | S-6 | 99.98378333 | 38.758625   | loam       | Meadow grassland |
| MLB-06   | S-1 | 100.9361955 | 38.22074371 | sandy loam | Meadow grassland |
| SDMCB-15 | S-2 | 101.3766083 | 38.156475   | sandy loam | Meadow grassland |
| SDB-03   | S-3 | 101.4985861 | 38.44691667 | sandy loam | Meadow grassland |
| SNB-06   | S-4 | 101.4846779 | 37.95843563 | sandy loam | Meadow grassland |
| SNB-23   | S-5 | 101.8984833 | 37.86360556 | sandy loam | Meadow grassland |
| SNB-25   | S-6 | 101.8868194 | 37.82015833 | sandy loam | Meadow grassland |
| MLB-04   | S-1 | 100.6183124 | 38.43218947 | loam       | Meadow grassland |
| SDMCB-08 | S-2 | 101.3403027 | 38.07660465 | loam       | Meadow grassland |
| SNB-05   | S-3 | 101.4814478 | 37.96444874 | loam       | Meadow grassland |
| SNB-21   | S-4 | 101.5347    | 37.97769444 | loam       | Meadow grassland |
| SNB-22   | S-5 | 101.6726306 | 37.98882222 | loam       | Meadow grassland |
| SNB-27   | S-6 | 101.8291    | 37.78699722 | loam       | Meadow grassland |
| SNB-03   | S-1 | 99.75890556 | 38.85296111 | sandy loam | Meadow grassland |
| SNB-24   | S-2 | 101.9036444 | 37.85901389 | sandy loam | Meadow grassland |
| SNB-26   | S-3 | 101.8664361 | 37.80693611 | sandy loam | Meadow grassland |
| SNB-28   | S-4 | 101.8346778 | 37.81534444 | sandy loam | Meadow grassland |
| SNB-30   | S-5 | 101.8058389 | 37.87443056 | sandy loam | Meadow grassland |
| SNB-40   | S-6 | 99.94303333 | 38.81354722 | sandy loam | Meadow grassland |
| SDMCB-18 | S-1 | 101.3966    | 38.14735    | loam       | Meadow grassland |
| SNB-18   | S-2 | 99.4271275  | 38.76811611 | loam       | Meadow grassland |
| SNB-19   | S-3 | 99.52335028 | 38.63858917 | loam       | Meadow grassland |
| SNB-20   | S-4 | 101.5477778 | 37.99391667 | loam       | Meadow grassland |
| SNB-37   | S-5 | 99.88709444 | 38.86316944 | loam       | Meadow grassland |
| SNB-38   | S-6 | 99.90464722 | 38.81724167 | loam       | Meadow grassland |

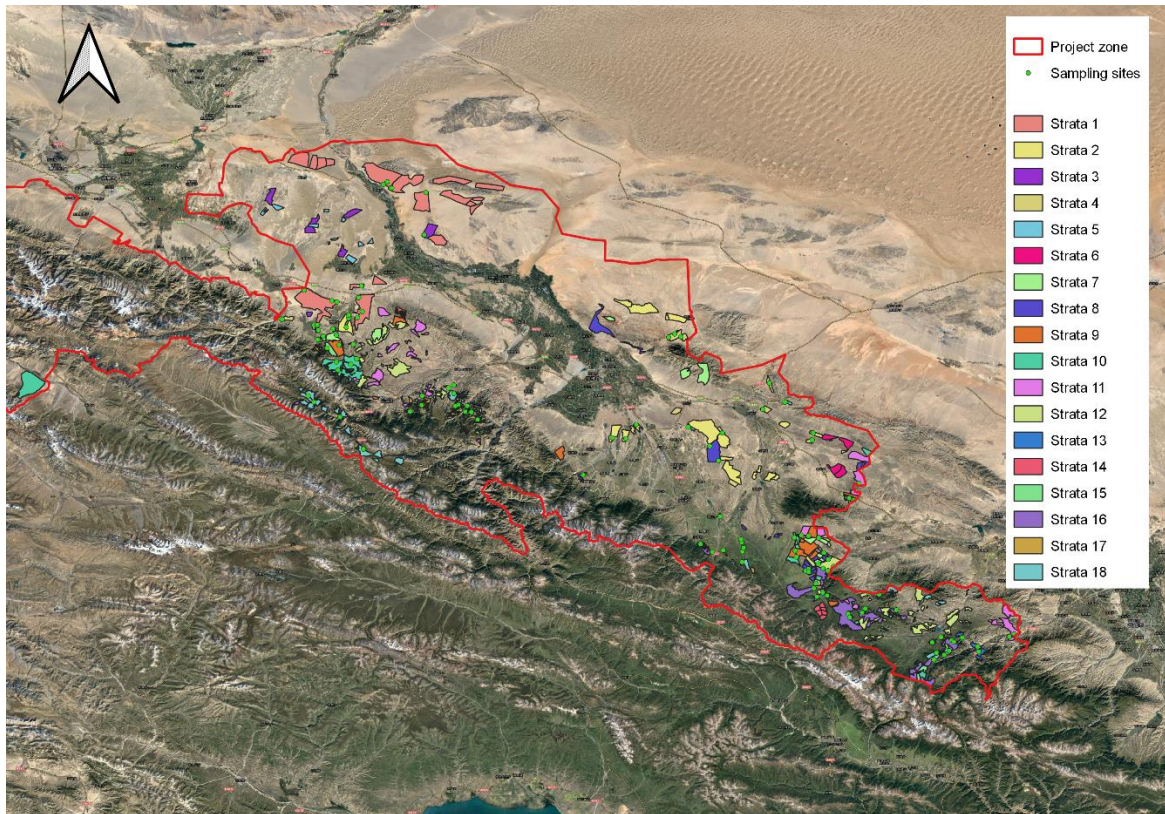


Figure 3-2 Location of the sample sites

From 16-September-2021 to 01- October-2021, two monitoring teams collected soil samples in the project area.

Soil samples were collected by soil drill, 3-4 soil samples collected in S shape at each sampling site were finally mixed into one sample and then packed into a Ziplock bag with a label before sent to lab for the measurement of soil organic carbon content ( $SOC_{mG,s,i,t}$ ) and percentage of rocks ( $FC_{mG,s,i,t}$ ). Another soil sample was also collected at each sampling point with a ring knife and packed into an aluminium box with plastic wrap for the measurement of the bulk density ( $BD_{mG,s,i,t}$ )

In this monitoring period, soil samples (117 soil samples with ziplock and 117 soil samples with aluminum box) were collected and mailed to the laboratory for measuring, while all samples are backed up. The parameters ( $SOC_{mG,s,i,t}$ ,  $FC_{mG,s,i,t}$  and  $BD_{mG,s,i,t}$ ) were measured by Shandong Huasheng Tiantong Standard Technical Service Co., Ltd., which has the certification of inspection and testing organization.

As mentioned in section 3.1.2, 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.

The nationally-approved standard Method for determination of soil bulk density (NY/T 1121.4-2006) was used to measure bulk density of the soil samples.

Due to there is no nationally recognized standard for measuring the percentage of rocks larger than 2mm, roots, and other dead residues, so previous research standard are used<sup>27</sup>.

Finally, on 3 November 2021, the testing organization issued a soil testing report. See SOC table and laboratory testing report for measuring results.



Figure 3-3 Soil sampling

## 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.

Due to 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. The project managed the grazing by rotational grazing and rest grazing by fence or reseeding grass enclosure just 2 years. which does not reduce the number of cattle and sheep grazed by herders, but only manages the time of grazing in the project area. Therefore, during the monitoring period, the same batch of cattle and sheep were actually grazing in the project area and the leakage area, but these cattle and sheep was grazed in the project area for some time and grazed in leakage area (reasonable place planned by the local Forestry and Grassland Bureau, and the specific plot location is not identified) at other times.

Based on the above, the County Forestry and Grassland Bureau visited all the project participants every year to investigate the situation of the project. At the same time, they have conducted the survey of Grazing Displacement from September to October for the herders in the project zone and

<sup>27</sup> Xie yingge, Li xia. Research progress on determination methods of gravel content in soil[J]. Soils, 2012,44(1):17-22.

outside the project area each year to monitor the grazing activities from 2017-2021, which including the grazing days ( $Days_{GUI,l,t}$ ) in the grazing area and the leakage area and the population of cattle and sheep rotating back and forth in the two areas ( $P_{GUI,l,t}$ ).

### **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.
- 4) All soil samples need to be backed up. If there is a problem with the testing equipment or the data is abnormal, retest the corresponding soil sample.

#### **3.1.4 Dissemination of Monitoring Plan and Results (CL4.2)**

Before the beginning of this monitoring period, the project owner published the monitoring plan and monitoring manual on the local bulletin boards for the villages around the project area from 16-September-2021 to 01-October -2021 and invited local stakeholders to discuss them and give their advises.

Besides, as part of the draft PD, the monitoring plan has been published on VCS and CCB website which can be easily download by stakeholders, and after the monitoring activity completed, the monitoring results were also published on the website as part of the draft monitoring report. Hard copies of the monitoring plan and monitoring manual have been distributed among local stakeholders by project proponent and the grassland guardians. At the same time, public notice boards in each village were used to publicize information regarding how to access to the monitoring

plan and results through internet. Technical staff from project proponent also explained the monitoring plan to local herders. In addition, a contact person with phone numbers was published in case any stakeholders want to directly contact the project proponent and raise opinions.

For each verification, 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.

During this monitoring period, no comments on the monitoring plan and results received.

### 3.2 Quantification of GHG Emission Reductions and Removals

#### 3.2.1 Baseline Emissions

According to PD, baseline emissions including CH<sub>4</sub> emissions due to enteric fermentation and N<sub>2</sub>O and CH<sub>4</sub> emissions due to manure management.

$$BE_b = BE_{CH_4EF,b} + BE_{GHGMD,b} \quad (2)$$

##### 1. Baseline CH<sub>4</sub> emissions due to enteric fermentation

Baseline CH<sub>4</sub> emissions from enteric fermentation are calculated using the following:

$$BE_{CH_4EF,t} = \frac{GWP_{CH_4} \times \sum_{l=1}^L P_{l,b} \times EF_l \times Days_{l,b}}{1000 \times 365} \quad (3)$$

Where:

- $BE_{CH_4EF,b}$  = Baseline CH<sub>4</sub> emissions from enteric fermentation
- $GWP_{CH_4}$  = Global-warming potential for CH<sub>4</sub> (t CO<sub>2</sub>e/t CH<sub>4</sub>)
- $P_{l,b}$  = Population of grazing livestock type l, in baseline year b (head)
- $l$  = Index of livestock type
- $EF_l$  = Enteric CH<sub>4</sub> emission factor per head of livestock type l per year (kg CH<sub>4</sub> 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<sub>4</sub> to kg CH<sub>4</sub>
- 365 = Conversion factor for years to days

According to the Grazing Displacement Management Plan, the population of cattle  $P_{cattle,2016}$  is 183,540 and the population of sheep  $P_{sheep,2016}$  is 641,788 in baseline year 2016. Grazing days of cattle and sheep inside the project area  $Days_{l,2016}$  is 138 days.  $GWP_{CH_4}$  is 28 t CO<sub>2</sub>e/t CH<sub>4</sub>,

derived from VCS Standard (Version 4.2).  $EF_{cattle}$  is 56 kg CH<sub>4</sub>/ (head \* year) and 5 kg CH<sub>4</sub>/ (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 CH<sub>4</sub> emissions from enteric fermentation was calculated and the value is 142,779 tCO<sub>2</sub>e.

## 2. Baseline N<sub>2</sub>O and CH<sub>4</sub> emissions due to manure management

Baseline emissions from manure management include N<sub>2</sub>O and CH<sub>4</sub> emissions from manure and urine deposited on grassland soil during the grazing season.

$$BE_{GHG_{MD},b} = BE_{N_2O_{MD},b} + BE_{CH_4_{MD},b} \quad (4)$$

Where:

$BE_{GHG_{MD},b}$  = Baseline N<sub>2</sub>O and CH<sub>4</sub> emissions due to manure management

$BE_{N_2O_{MD},t}$  = Baseline N<sub>2</sub>O emissions from manure and urine deposited on grassland soil in baseline year b (t CO<sub>2</sub>e)

$BE_{CH_4_{MD},t}$  = Baseline CH<sub>4</sub> emissions from manure and urine deposited on grassland soil in baseline year b (t CO<sub>2</sub>e)

1) **Baseline N<sub>2</sub>O emissions from manure management** are calculated using the following:

$$BE_{N_2O_{MD},b} = GWP_{N_2O} \times (BE_{D,N_2O_{MD},b} + BE_{ID,N_2O_{MD},b}) \quad (5)$$

Where:

$GWP_{N_2O}$  = Global warming potential for N<sub>2</sub>O (t CO<sub>2</sub>e/t N<sub>2</sub>O)

$BE_{D,N_2O_{MD},t}$  = Direct N<sub>2</sub>O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N<sub>2</sub>O)

$BE_{ID,N_2O_{MD},t}$  = Indirect N<sub>2</sub>O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N<sub>2</sub>O)

2) **Baseline direct N<sub>2</sub>O emissions from manure and urine deposited on grassland soil** are calculated using the following:

$$BE_{D,N_2O_{MD},b} = \sum_{l1=1}^{L1} F_{MD,l1,b} \times EF_{3,PRP, CPP} \times 44/28 \quad (6)$$

And/or

$$BE_{D,N_2O_{MD},b} = \sum_{l2=1}^{L2} F_{MD,l2,b} \times EF_{3,PRP,SO} \times 44/28 \quad (7)$$

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

$$F_{MD,l1,b} = \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000_a \times 24 \times 1000_b} \quad (8)$$

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<sub>3</sub> and NO<sub>x</sub> (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<sub>3</sub> and NO<sub>x</sub> (t N)

$EF_{3,PRP,CPP}$  = N<sub>2</sub>O emission factor for cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season (kg N<sub>2</sub>O-N/kg N input)

$EF_{3,PRP,SO}$  = N<sub>2</sub>O emission factor for sheep and other animals manure and urine deposited on grassland soil during the grazing season (kg N<sub>2</sub>O-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))

$1000_a$  = 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)

$1000_b$  = Conversion factor for t N to kg N

$Frac_{GAS,MD}$  = Fraction of volatilization from manure and urine deposited by grazing animals as NH<sub>3</sub> and NO<sub>x</sub> (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<sub>2</sub>O-N/kg N input, 0.003 kg N<sub>2</sub>O-N/kg N input, 0.212 kg N volatilized/kg of N deposited respectively.  $Nex_{cattle}$  is

0.38 kg N deposited/(t livestock mass \* day) and  $N_{ex, sheep}$  is 0.32 kg N deposited/(t livestock mass \* day). Average grazing hours per day for cattle and sheep in baseline year 2016  $Days_{l, 2016}$  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<sub>2</sub>O emissions from manure and urine deposited on grassland soil during the grazing season in 2016 is 4 t N<sub>2</sub>O. Please see the ER table for the detail.

### 3) Baseline indirect N<sub>2</sub>O emissions from urine and manure N deposited on grassland soils

According to the methodology (VM0026/Version 1.1) and baseline survey report, the annual precipitation of the project area is less than annual potential evapotranspiration, so, indirect N<sub>2</sub>O emissions from leaching and runoff can be excluded.

The indirect N<sub>2</sub>O emissions from the atmospheric deposition of N volatilized as NH<sub>3</sub> and NO<sub>x</sub> after urine and manure N is deposited on grassland soils in baseline year b, are calculated using the following:

$$BE_{ID, N_2O, MD, b} = \sum_{l=1}^L F_{MD, l, b} \times Frac_{GAS, MD} \times EF_{4, MD} \times 44/28 \quad (9)$$

Where:

- $BE_{ID, N_2O, MD, b}$  = Indirect N<sub>2</sub>O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N<sub>2</sub>O)
- $F_{MD, l, b}$  = 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<sub>3</sub> and NO<sub>x</sub> (t N)
- $Frac_{GAS, MD}$  = Fraction of volatilization from manure and urine deposited by grazing animals as NH<sub>3</sub> and NO<sub>x</sub> (kg N volatilized/kg of N deposited)
- $EF_{4, MD}$  = N<sub>2</sub>O emission factor for atmospheric deposition of urine and manure N on soils and water surfaces, (kg N<sub>2</sub>O-N/(kg NH<sub>3</sub>-N + NO<sub>x</sub>-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<sub>4</sub>/ (head \* year) respectively. The indirect N<sub>2</sub>O emissions from manure and urine deposited on grassland soil during the grazing season in 2016 is 2 tN<sub>2</sub>O.

Finally, baseline N<sub>2</sub>O emissions from manure and urine deposited on grassland soil in 2016 is 1,533 tCO<sub>2</sub>e. Please see the ER table for the detail.

### 4) Baseline CH<sub>4</sub> emissions from manure management

Baseline CH<sub>4</sub> emissions from manure management are calculated using the following:

$$BE_{CH_4MD,b} = \frac{GWP_{CH_4} \times \sum_{l=1}^L EF_{lM} \times P_{l,b} \times H_{l,b} \times Days_{l,b}}{1000 \times 365 \times 24} \quad (10)$$

Where:

- $P_{l,b}$  = Population of grazing livestock type l, in baseline year b, head
- $EF_{lM}$  = CH<sub>4</sub> emission factor from manure of livestock type l (kg CH<sub>4</sub>/(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<sub>4</sub> to kg CH<sub>4</sub>
- 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<sub>4</sub> emissions from manure management is 1,747 tCO<sub>2</sub>e.

### Baseline emissions and removals

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

$$BE_b = BE_{N_2O_{SN},b} + BE_{BBb} + BE_{CH_4EF,b} + BE_{GHGMD,b} + BE_{FC,b} - BRWP_b \quad (11)$$

Where:

- $BE_b$  = Baseline emissions and removals in year b (t CO<sub>2</sub>e)
- $BE_{N_2O_{SN},b}$  = Baseline N<sub>2</sub>O emissions due to fertilizer use in baseline year b (t CO<sub>2</sub>e)
- $BE_{BBb}$  = Baseline GHG emissions from biomass burning in baseline year b (t CO<sub>2</sub>e)
- $BE_{CH_4EF,b}$  = Baseline CH<sub>4</sub> emissions from enteric fermentation in baseline year b (t CO<sub>2</sub>e)
- $BE_{GHGMD,b}$  = Baseline GHG emissions from manure management in baseline year b (t CO<sub>2</sub>e)
- $BE_{FC,b}$  = Baseline CO<sub>2</sub> emissions from farming machine fossil fuel consumption in baseline year b, (t CO<sub>2</sub>)
- $BRWP_b$  = Baseline removals from existing woody perennials in baseline year b (t CO<sub>2</sub>)

According to PD, for the project:

$$BE_b = BE_{CH_4EF,b} + BE_{GHGMD,b}$$

$$= BE_{CH_4EF,b} + BE_{N_2O_{MD},b} + BE_{CH_4MD,b}$$

$$= \frac{GWP_{CH_4} \times \sum_{l=1}^L P_{l,b} \times EF_l \times Days_{l,b}}{1000 \times 365} + GWP_{N_2O} \times \left( \sum_{l=1}^{L1} \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \right) \times EF_{3,PRP, CPP} \times \frac{44}{28} + \sum_{l=2}^{L2} \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP, SO} \times \frac{44}{28} + \frac{GWP_{CH_4} \times \sum_{l=1}^L EF_{lM} \times P_{l,b} \times H_{l,b} \times Days_{l,b}}{1000 \times 24 \times 365}$$

(12)

According to PD, the annual baseline emission is calculated as 146,059 tCO<sub>2</sub>e, for this monitoring period from 25-July-2017 to 01-September-2021 (1,500 days), the total baseline emissions is 648,663 tCO<sub>2</sub>e. Please refer to ER calculation sheets for details.

Table 3-5 The estimation of baseline emission during the monitoring period

| Crediting period                    | $BE_{CH_4EF,b}$    | $BE_{N_2O_{MD},b}$ | $BE_{CH_4MD,b}$    | $BE_b$             |
|-------------------------------------|--------------------|--------------------|--------------------|--------------------|
|                                     | tCO <sub>2</sub> e | tCO <sub>2</sub> e | tCO <sub>2</sub> e | tCO <sub>2</sub> e |
|                                     | A                  | B                  | C                  | D=A+B+C            |
| 25-July-2017 to 31-December-2017    | 62,588             | 672                | 766                | 64,026             |
| 01-January-2018 to 31-December-2018 | 142,779            | 1,533              | 1,747              | 146,059            |
| 01-January-2019 to 31-December-2019 | 142,779            | 1,533              | 1,747              | 146,059            |
| 01-January-2020 to 31-December-2020 | 143,170            | 1,537              | 1,752              | 146,460            |
| 01-January-2021 to 31-December-2021 | 142,779            | 1,533              | 1,747              | 146,059            |
| <b>Total</b>                        | <b>634,096</b>     | <b>6,808</b>       | <b>7,759</b>       | <b>648,663</b>     |

### 3.2.2 Project Emissions

#### 1. Project CH<sub>4</sub> emissions due to enteric fermentation

Project CH<sub>4</sub> emissions from enteric fermentation in different management practices are calculated using the following respectively:

$$PE_{CH_4EF,t} = \frac{GWP_{CH_4} \times \sum_{l=1}^L P_{l,t} \times EF_l \times Days_{l,t}}{1000 \times 365} \quad (13)$$

Where:

- $GWP_{CH_4}$  = Global-warming potential for CH<sub>4</sub> (t CO<sub>2</sub>e/t CH<sub>4</sub>)
- $P_{l,t}$  = Population of grazing livestock type l in year t under project (head)
- $L$  = Index of livestock type
- $EF_l$  = Enteric CH<sub>4</sub> emission factor per head of livestock type l per year (kg CH<sub>4</sub> head\*year)

|              |   |   |
|--------------|---|---|
| $Days_{l,t}$ | = | Grazing days inside the project area for each livestock type l in the project year t (days) |
| 1000         | = | Conversion factor for t CH <sub>4</sub> to kg CH <sub>4</sub>                               |
| 365          | = | Conversion factor for years to days   |

Please refer to section 3.1.2 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<sub>4</sub> emissions from enteric fermentation. Please see the ER table for the detail.

## 2. Project N<sub>2</sub>O and CH<sub>4</sub> emissions due to manure management

The project emissions from manure management include N<sub>2</sub>O and CH<sub>4</sub> emissions from manure and urine deposited on grassland soil during the grazing season.

Project N<sub>2</sub>O and CH<sub>4</sub> emissions in different management practices are calculated using the following respectively:

$$PE_{GHG_{MD},t} = PE_{N_2O_{MD},t} + PE_{CH_4_{MD},t} \quad (14)$$

Where:

|                    |   |  |
|--------------------|---|--|
| $PE_{GHG_{MD},t}$  | = | Project GHG emissions from manure management in year t (t CO <sub>2</sub> e)   |
| $PE_{N_2O_{MD},t}$ | = | Project N <sub>2</sub> O emissions from manure and urine deposited on grassland soil in year t (t CO <sub>2</sub> e) |
| $PE_{CH_4_{MD},t}$ | = | Project CH <sub>4</sub> emissions from manure and urine deposited on grassland soil in year t (t CO <sub>2</sub> e)  |

### 1) Project N<sub>2</sub>O emissions from manure management

$$PE_{N_2O_{MD},t} = GWP_{N_2O} \times (PE_{D,N_2O_{MD},t} + PE_{ID,N_2O_{MD},t}) \quad (15)$$

Where:

|                       |   |  |
|-----------------------|---|--|
| $GWP_{N_2O}$          | = | Global warming potential for N <sub>2</sub> O (t CO <sub>2</sub> e/t N <sub>2</sub> O)   |
| $PE_{D,N_2O_{MD},t}$  | = | Project direct N <sub>2</sub> O emissions from manure and urine deposited on grassland soil during the grazing season in year t (t N <sub>2</sub> O)   |
| $PE_{ID,N_2O_{MD},t}$ | = | Project indirect N <sub>2</sub> O emissions from manure and urine deposited on grassland soil during the grazing season in year t (t N <sub>2</sub> O) |

### 2) Project direct N<sub>2</sub>O emissions from manure and urine deposited on grassland soil

$$PE_{D,N_2O_{MD},t} = \sum_{l1=1}^{L1} F_{MD,l1,t} \times EF_{3,PRP,CPP} \times 44/28 \quad (16)$$

And/or

$$PE_{D,N_2O_{MD},t} = \sum_{l2=1}^{l2} F_{MD,l2,t} \times EF_{3,PRP,SO} \times 44/28 \quad (17)$$

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

$$F_{MD,l1,t} = \frac{P_{l,t} \times W_{l,p} \times Nex_l \times H_{l,t} \times Days_{l,t} \times (1 - Frac_{GAS,MD})}{1000_a \times 24 \times 1000_b} \quad (18)$$

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<sub>3</sub> and NO<sub>x</sub> (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<sub>3</sub> and NO<sub>x</sub> (t N)

$EF_{3,PRP,CPP}$  = N<sub>2</sub>O emission factor for cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season (kg N<sub>2</sub>O-N/kg N input)

$EF_{3,PRP,SO}$  = N<sub>2</sub>O emission factor for sheep and other animals manure and urine deposited on grassland soil during the grazing season (kg N<sub>2</sub>O-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 grazing livestock type I in year t (head)

$W_{l,p}$  = Average weight of livestock I under project (kg livestock mass/head)

$Nex_l$  = Nitrogen excretion of livestock type I (kg N deposited / (t livestock mass\*day))

$1000_a$  = Conversion factor for t livestock mass to kg livestock mass

$H_{l,t}$  = Average grazing hours per day during grazing season in year t (hours)

24 = Conversion factor for days to hours

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

$1000_b$  = Conversion factor for t N to kg N

$Frac_{GAS,MD}$  = Fraction of volatilization from manure and urine deposited by grazing animals as NH<sub>3</sub> and NO<sub>x</sub> (kg N volatilized/kg of N deposited)

I = Index of grazing livestock types

### 3) Project indirect N<sub>2</sub>O emissions from urine and manure N deposited on grassland soils

According to the methodology (VM0026/Version 1.1) and Project Design Report, the annual evapotranspiration is greater than annual precipitation in Zhangye generally. What's more, the annual evaporation is 10 times of the annual precipitation in Gao tai country. The annual precipitation of the project area is less than annual potential evapotranspiration, so, indirect N<sub>2</sub>O emissions from leaching and runoff can be excluded.

Indirect N<sub>2</sub>O emissions from the atmospheric deposition of N volatilized as NH<sub>3</sub> and NO<sub>x</sub> after urine and manure N is deposited on grassland soils under the project, are calculated using the following:

$$PE_{ID,N_2O,MD,t} = \sum_{l=1}^L F_{MD,l,t} \times Frac_{GAS,MD} \times EF_{4,MD} \times 44/28 \quad (19)$$

Where:

$PE_{ID,N_2O,MD,t}$  = Project indirect N<sub>2</sub>O emissions from manure and urine deposited on grassland soil during the grazing season in year t (t N<sub>2</sub>O)

$F_{MD,l,t}$  = Annual amount of manure and urine deposited on grassland soil from livestock type l during the grazing season in year t, adjusted for volatilization as NH<sub>3</sub> and NO<sub>x</sub> (t N)

$Frac_{GAS,MD}$  = Fraction of volatilization from manure and urine deposited by grazing animals as NH<sub>3</sub> and NO<sub>x</sub> (kg N volatilized/kg of N deposited)

$EF_{4,MD}$  = N<sub>2</sub>O emission factor for atmospheric deposition of urine and manure N on soils and water surfaces, (kg N<sub>2</sub>O-N/(kg NH<sub>3</sub>-N + NO<sub>x</sub>-N volatilized))

Please refer to section 3.1.2 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 N<sub>2</sub>O emissions from enteric fermentation. Please see the ER table for the detail.

4) CH<sub>4</sub> emissions from manure management are calculated using the following:

$$PE_{CH_4,MD,t} = \frac{GWP_{CH_4} \times \sum_{l=1}^L EF_{lM} \times P_{l,t} \times H_{l,t} \times Days_{l,t}}{1000 \times 365 \times 24} \quad (20)$$

Where:

$P_{l,t}$  = Population of livestock type l in year t (head)

$EF_{lM}$  = CH<sub>4</sub> emission factor from manure of livestock type l (kg CH<sub>4</sub>/(head\*year))

$H_{l,t}$  = Average grazing hours per day during grazing season in year t (hours)

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

|      |   |   |
|------|---|---|
| 1000 | = | Conversion factor for t CH <sub>4</sub> to kg CH <sub>4</sub> |
| 365  | = | Conversion factor for years to days                           |
| 24   | = | Conversion factor for days to hours                           |

Please refer to section 3.1.2 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<sub>4</sub> emissions from manure management. Please see the ER table for the detail.

### 3. Project CO<sub>2</sub> emissions due to the use of fossil fuels

Project CO<sub>2</sub> emissions due to the use of fossil fuels are calculated using the following:

$$PE_{FC,t} = \frac{\sum_{p=1}^P \sum_{j=1}^J \sum_{k=1}^K FC_{p,j,k,t} \times EF_{CO_2,k} \times NCV_k}{1000} \quad (21)$$

Where:

|                |   |   |
|----------------|---|---|
| $FC_{p,j,k,t}$ | = | 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 <sub>2</sub> emission factor by fuel type k (t CO <sub>2</sub> /GJ).                             |
| $NCV_k$        | = | Thermal value of fuel type k (GJ/t fuel)  |
| 1000           | = | Conversion factor for tonnes fuel to kg fuel  |
| K              | = | Index of fuel type  |
| J              | = | Index of machine type   |
| P              | = | Index of grassland parcel   |

The county Forestry and Grassland Bureau recorded the diesel consumption of sowing tractors and transport trucks during the implementation of the project. Please refer to section 3.3.2 for relevant parameter references and values. The project CO<sub>2</sub> emissions due to the use of fossil fuels is 1,368, 1,768, 1,205 t CO<sub>2</sub>e in year 2017, 2018 and 2019 respectively. Please see the ER table for the detail.

### 4. Project removals due to changes in soil organic carbon

Estimate of project removals due to changes in SOC using a measurement approach.

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

$$P_{SOC_{mG,s,i,t}} = SOC_{mG,s,i,t} \times BD_{mG,s,i,t} \times Depth \times (1 - FC_{mG,s,i,t}) \times 0.1 \quad (22)$$

Where:

|                    |   |   |
|--------------------|---|---|
| $P_{SOC_{mG,s,t}}$ | = | 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)   |
| $SOC_{mG,s,i,t}$   | = | 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 $t$ (g C/kg soil)  |
| $BD_{mG,s,i,t}$    | = | 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 $t$ (g soil/cm <sup>3</sup> )  |
| $Depth$            | = | 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 $t$ (percent) |
| 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:

$$P_{SOC_{mG,s,t}} = \frac{\sum_{i=1}^I P_{SOC_{mG,s,i,t}}}{I} \quad (23)$$

Where:

|                    |   |  |
|--------------------|---|--|
| $P_{SOC_{mG,s,t}}$ | = | Average carbon stock in stratum $s$ under project (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.

$$P_{mG,t} = \sum_{s=1}^S (P_{SOC_{mG,s,t}} - SOC_{s,Baseline}) \times PA_{mG,s,t} \quad (24)$$

Where:

|                    |   |  |
|--------------------|---|--|
| $P_{mG,t}$         | = | Difference in the carbon stock between the project in year t and the baseline scenario (t C)           |
| $PA_{mG,s,t}$      | = | 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.

$$P_t = \sum_{mG=1}^M P_{mG,t} \quad (25)$$

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:

$$PR_t = \frac{(P_t)}{n} \times \frac{44}{12} \quad (26)$$

Where:

|        |   |  |
|--------|---|--|
| $PR_t$ | = | Project removals due to changes in SOC in year t (t CO <sub>2</sub> e) |
| $n$    | = | Number of years from the project start date to year t (years)          |

All parameters are selected according to section 9.1 and 9.2 of the methodology (VM0026, Version 1.1), and soil organic matter data are obtained by laboratory tests. So the parameters are conservative, and the uncertainty is considered to be 0.

## 5. 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 survey of Grazing Displacement 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 county forestry and grassland bureau recorded all the diesel oil consumed by the project. So, 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. For the ex-post calculation during this monitoring period, the SOC changes in project scenario is based on the sample measurement undertaken within the project area, and the sample size is 117, larger than 30, 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 percent confidence interval (sample mean - 1.96 x standard error). Please refer to ER spreadsheet for detailed calculation.

### Project net GHG emissions by sources and removals by sinks

According to the PD, project net GHG emissions by sources and removals by sinks are calculated as follows:

$$PE_t = PE_{CH_4EF,t} + PE_{GHGMD,t} + PE_{FC,t} - PR_t \quad (27)$$

$$= PE_{CH_4EF,t} + PE_{N_2O_{MD},t} + PE_{CH_4MD,t} + PE_{FC,t} - PR_t$$

Where:

|                    |   |   |
|--------------------|---|---|
| $PE_t$             | = | Project net GHG emissions by sources and removals by sinks in year t (t CO <sub>2</sub> e)                          |
| $PE_{N_2O_{SN},t}$ | = | Project N <sub>2</sub> O emissions due to fertilizer use in year t (t CO <sub>2</sub> e)                            |
| $PE_{CH_4EF,t}$    | = | Project CH <sub>4</sub> emissions from enteric fermentation in year t (t CO <sub>2</sub> e)                         |
| $PE_{CH_4MD,t}$    | = | Project CH <sub>4</sub> emissions from manure and urine deposited on grassland soil in year t (t CO <sub>2</sub> e) |
| $PE_{GHGMD,t}$     | = | Project GHG emissions from manure management in year t (t CO <sub>2</sub> e)  |
| $PE_{FC,t}$        | = | Project CO <sub>2</sub> emissions from farming machine fossil fuel consumption in year t (t CO <sub>2</sub> )       |
| $PR_t$             | = | Project removals due to changes in SOC in year t (t CO <sub>2</sub> e)  |

During this monitoring period, 261,059.80 ha of *degraded grassland* in Zhangye were under grazing management and control like rotational grazing and rest grazing or planted with *Elymus nutans*, *Elymus sibiricus*, *Poa pratensis*, *Agropyron cristatum*, *Festuca rubra*, *Artemisia sphaerocephala* in project area, which could increase the soil carbon stocks. Also, tractors and trucks were used in the project to transport seeds and build fences which consumes diesel oil. So, project CO<sub>2</sub>

emissions due to the use of fossil fuels and project removals due to changes in soil organic carbon should be calculated.

And grazing is control after the implementation of the project like rotational grazing and rest grazing. Therefore, in the project area, although the grazing days are strictly managed, reasonable grazing is still allowed. So, project CH<sub>4</sub> emissions from enteric fermentation and project GHG emissions from manure management ( $PE_{CH_4EF,t}$  and  $PE_{GHGMD,t}$ ) should be calculated during this monitoring period.

Therefore,

$$PE_t = PE_{CH_4EF,t} + PE_{N_2O_{MD},t} + PE_{CH_4MD,t} + PE_{FC,t} - PR_t \quad (28)$$

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

Table 3-6 The estimation of project net GHG emissions during the monitoring period

| Crediting period                    | $PE_{FC,t}$         | $PE_{CH_4EF,t}$     | $PE_{N_2O_{MD},t}$  | $PE_{CH_4MD,t}$     | $PR_t$             | $PE_t$             |
|-------------------------------------|---------------------|---------------------|---------------------|---------------------|--------------------|--------------------|
| Year                                | t CO <sub>2</sub> e | t CO <sub>2</sub> e | t CO <sub>2</sub> e | t CO <sub>2</sub> e | tCO <sub>2</sub> e | tCO <sub>2</sub> e |
|                                     | A                   | B                   | C                   | D                   | E                  | A+B+C+D-E          |
| 25-July-2017 to 31-December-2017    | 1,368               | 51,116              | 549                 | 626                 | 263,969            | -210,310           |
| 01-January-2018 to 31-December-2018 | 1,768               | 69,861              | 750                 | 855                 | 602,179            | -528,945           |
| 01-January-2019 to 31-December-2019 | 1,205               | 37,491              | 402                 | 459                 | 602,179            | -562,622           |
| 01-January-2020 to 31-December-2020 | 0                   | 37,491              | 402                 | 459                 | 603,828            | -565,476           |
| 01-January-2021 to 31-December-2021 | 0                   | 37,491              | 402                 | 459                 | 602,179            | -563,827           |
| <b>Total</b>                        | <b>4,341</b>        | <b>233,450</b>      | <b>2,505</b>        | <b>2,858</b>        | <b>2,674,334</b>   | <b>-2,431,180</b>  |

### 3.2.3 Leakage

According the Tool of Estimation of emissions from market leakage (VMD0033, Version 1.0), the main production in the project area is cattle and sheep for the project. Though grazing frequency was strictly managed during the implementation of the project, and the controlled grazing will be allowed depending on the growth situation of the forage, but 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. According to the annual statistical yearbook of Zhangye City (2017-2020)<sup>28</sup>, the annual output of cattle and sheep in Zhangye City has not decreased. The project would not lead to reductions in the production of cattle and sheep; therefore, the market leakage is considered to be 0 tCO<sub>2</sub>e.

<sup>28</sup> <http://www.zhangye.gov.cn/tjj/ztlz/tjsj/>

According to the PD, leakage from displacement of grazing activities to outside the project boundary should be calculated.

During this monitoring period, grazing is control like rotational grazing and rest grazing through building grassland fences, to achieve fixed-point grazing and grazing by hurdles. According to the Project Design Report, the grasslands is divided into seasonal grazing land, and then the seasonal grazing land is divided into several small areas by the livestock. carrying capacity of the grassland, and then controlled grazing will be allowed depending on the growth situation of the forage, and the County Forestry and Grassland Bureau measured the grass yield of the surrounding grasslands in the project area, and guides herders to graze in a reasonable area.

So, leakage from displacement of grazing activities should be calculated.

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.

### **1) Assess whether Grazing Displacement Takes Place**

According to the Baseline Survey Report and Project Design Report, local herders graze in the project area under the baseline scenario, but grazing frequency will be controlled during project implementation. Since the grazing demand of herdsmen will not decline in a short time, there is likely to be displacement of grazing activity, then proceed to the next step.

### **2) Survey of Grazing Displacement and Relocation Plans**

According to (VMD0040, Version 1.0), the project proponent conducted a survey from 2017-2021 of all grazing agents (Survey of Grazing Displacement) whose livestock grazed in the project area prior to the project start date (1-November-2016 to 15- November -2016), 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.

- For the project, the survey of all grazing agents whose livestock grazed in the project area prior to the project start date conducted by project proponent (01-May-2015 to 19-June-2016). 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 average value of the survey, under the baseline scenario, the project participants stocked 183,540 cattle and 641,788 sheep in the project area, grazing for about 138 days every year and 8 hours every day. And project non-participants would not graze in the project area under the project scenario.
- In 2016, the County Forestry and Grassland Bureau measured the grass yield of the grassland around the project area, and calculated the reasonable grazing quantity, designated a grazing area of 1,102,293.33 hectares. And the project participants grazed in the designated area under the guidance of the County Forestry and Grassland Bureau and grassland guardians. 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.

### **3) Prepare a Grazing Displacement Management Plan**

A grazing displacement management plan was prepared on the basis of the survey of grazing displacement and relocation plans. The grazing displacement management plan recorded planned grazing activities for all livestock that are to be relocated to lands outside the project area and that are under the control of project participants. According to the survey, project non-participants would not graze in the project area both under the baseline scenario and the project scenario. The grazing displacement management plan was completed in September 2017. The specific plan was implemented by grassland guardians. They patrol the management and protection area every 15 days, record and report the situation about grazing displacement to the county Forestry and Grass Bureau. The Forestry and Grass Bureau collected the grazing displacement management data every year according to the report records of grass guardians. including the following data:

- The identity of each grazing agent;
- The number and type of livestock to be relocated;
- 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 (eg, 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.

Since grazing plans for project non-participants are not available, the future location of grazing was listed as unidentified grassland. Therefore, the location and area in hectares of each land parcel to which grazing will be relocated and the unique identifier code (where applicable) for each land parcel to which grazing will be relocated has not been recorded.

In July and August each year, the County Forestry and Grassland Bureau measured the grass yield of the grassland around the project area and calculated the reasonable grazing quantity. And the project participants grazed in the designated area under the guidance of the County Forestry and Grassland Bureau and grassland guardians. 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.

From September to October in 2016, the county Forestry and Grassland Bureaus interviewed all grazing agents (8,668 in total) and conducted a survey of Grazing Displacement to record and collected the information of the number and type of livestock to be relocated. As mentioned in Section 2.5, due to the prohibition of grazing, project participants would receive subsidies. Therefore, from September to October (2017-2021), the project proponent and the County Forestry and Grassland Bureau has been visited all project participants to investigate the project situation and has been issued subsidies based on this.

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

The grazing displacement management plan did 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 was 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**

Zhangye city covers an area of 4,087,400 square kilometers, and the available grassland area is 2,150,046 ha, accounting for 52.6% of the total area, and the area of forest land and cropland are small. In 2016, the County Forestry and Grassland Bureau designated a grazing area of 1,102,293 hectares, all of the specific land parcels are grassland. And the project participants grazed in the designated area under the guidance of the County Forestry and Grassland Bureau and grassland guardians. 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 unidentified lands should be categorized as unidentified grassland.

**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:

$$Area_{GUI,t} = \frac{DMI_{GUI,t}}{ANPP_{GUI,REF}} \quad (29)$$

$$DMI_{GUI,t} = \sum_{l=1}^L \left( \frac{DMI_{day,l} \times P_{GUI,t}}{1000} \right) \times Days_{GUI,t} \quad (30)$$

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) |
| $DMI_{day,l}$    | = | Daily dry matter intake requirement of each type of livestock l (kg dm/(head*day))   |
| $P_{GUI,t}$      | = | Population of livestock of each type relocated to unidentified grasslands in year t (head)   |
| $Days_{GUI,t}$   | = | Days that the population of each type of relocated livestock of type l graze in unidentified grassland in year t (days)  |

According to the Agricultural Industry Standard of the People's Republic of China (NY/T635-2015)<sup>29</sup>, 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 Wang jie (2017) investigated that the value is 1.38 tdm/ha. For other parameters, please refer to section 3.1.2 for relevant parameter references and values and the final result were listed in ER table.

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

The calculation result of step 1 shows that, the area of unidentified grassland required to sustain the population of livestock relocated to unidentified grassland from 2017 to 2021 is 42,255, 110,036, 169,931, 169,931 and 169,931 ha respectively (See ER sheet for detail). So, the total area of unidentified grassland required to sustain the population of livestock relocated to unidentified grassland is at least 169,931 ha. And according to the PRA Report, the available grassland area is 2.15 million ha in Zhangye city, which is much higher than the displacement area.

According to the grassland livestock balance management measures of Zhangye City and the Agricultural standards of the people's Republic of China: Calculation of ranged carrying capacity, the grassland utilization rate of the grassland type in our project is no more than 50%. So, the grazing

<sup>29</sup> NY/T 635-2015 Calculation of rangeland carrying capacity.

displacement will not lead to consumption exceeding 50 percent 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

According to the Project Design Report, the leakage caused by different grassland management practices are different. Therefore, the leakage from different management practices is calculated respectively. Please refer to the ER table for the detail.

#### 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:

$$LE_{GUI,CH_4EF,t} = \frac{\sum_{l=1}^L P_{GUI,l,t} \times EF_l \times Days_{GUI,l,t} \times GWP_{CH_4}}{1000 \times 365} \quad (31)$$

Where:

|                     |   |   |
|---------------------|---|---|
| $LE_{GUI,CH_4EF,t}$ | = | Leakage emissions in year t from enteric fermentation by livestock displaced to unidentified grasslands (t CO <sub>2</sub> e) |
| $P_{GUI,l,t}$       | = | 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 <sub>4</sub> (t CO <sub>2</sub> e/t CH <sub>4</sub> )  |
| $EF_l$              | = | Enteric CH <sub>4</sub> emission factor per head of livestock type l per year (kg CH <sub>4</sub> /(ha*year))                 |
| $l$                 | = | Index of grazing livestock types  |

#### Step 3b: Estimate GHG emissions from manure management

Calculate the N<sub>2</sub>O and CH<sub>4</sub> leakage emissions due to manure deposition on grassland caused by relocating the livestock to unidentified grasslands outside the project area using:

$$LE_{GUI,MD,t} = LE_{GUI,N_2O,MD,t} + LE_{GUI,CH_4,MD,t} \quad (32)$$

Where:

|                 |   |   |
|-----------------|---|---|
| $LE_{GUI,MD,t}$ | = | Leakage emissions from manure and urine deposited on unidentified grassland in year t (t CO <sub>2</sub> e) |
|-----------------|---|---|

$LE_{GUI,N_2O_{MD},t}$  = Leakage N<sub>2</sub>O emissions from manure and urine deposited on unidentified grasslands in year t (t CO<sub>2</sub>e)

$LE_{GUI,CH_4_{MD},t}$  = Leakage CH<sub>4</sub> emissions from manure and urine deposited on unidentified grasslands in year t (t CO<sub>2</sub>e)

$LE_{GUI,N_2O_{MD},t}$  is calculated as the sum of direct N<sub>2</sub>O emissions and indirect N<sub>2</sub>O emissions using:

$$LE_{GUI,N_2O_{MD},t} = GWP_{N_2O} \times (LE_{GUI_D,N_2O_{MD},t} + LE_{GUI_{ID},N_2O_{MD},t}) \quad (33)$$

Where:

$LE_{GUI,N_2O_{MD},t}$  = Leakage N<sub>2</sub>O emission from manure and urine deposited on unidentified grasslands in year t (t CO<sub>2</sub>e)

$GWP_{N_2O}$  = Global-warming potential of N<sub>2</sub>O (t CO<sub>2</sub>e/t N<sub>2</sub>O)

$LE_{GUI_D,N_2O_{MD},t}$  = Leakage direct N<sub>2</sub>O emissions from manure and urine deposited on unidentified grasslands in year t (t N<sub>2</sub>O)

$LE_{GUI_{ID},N_2O_{MD},t}$  = Leakage indirect N<sub>2</sub>O emissions from manure and urine deposited on unidentified grasslands in year t (t N<sub>2</sub>O)

Leakage direct N<sub>2</sub>O emission from manure and urine deposited on unidentified grasslands ( $LE_{GUI_D,N_2O_{MD},t}$ ) is calculated using:

$$LE_{GUI_D,N_2O_{MD},t} = \sum_{l1=1}^{L1} F_{MD,GUI,t,l1} \times EF_{3,PRP,CPP} \times \frac{44}{28} \quad (34)$$

And/or

$$LE_{GUI_D,N_2O_{MD},t} = \sum_{l2=1}^{L2} F_{MD,GUI,t,l2} \times EF_{3,PRP,SO} \times \frac{44}{28} \quad (35)$$

Where:

$LE_{GUI_D,N_2O_{MD},t}$  = Leakage direct N<sub>2</sub>O emissions from manure and urine deposited on unidentified grasslands in year t (t N<sub>2</sub>O)

$F_{MD,GUI,t,l1}$  = Annual amount of nitrogen in cattle, poultry and pig manure and urine deposited on unidentified grasslands in year t, adjusted for volatilization as NH<sub>3</sub> and NO<sub>x</sub> (t N)

$F_{MD,GUI,t,l2}$  = Annual amount of nitrogen in sheep and other animal manure and urine deposited on unidentified grasslands in year t, adjusted for volatilization as NH<sub>3</sub> and NO<sub>x</sub> (t N)

$EF_{3,PRP,CPP}$  = N<sub>2</sub>O emission factor for cattle (dairy, non-dairy and buffalo), poultry and pigs manure and urine deposited on grasslands (kg N<sub>2</sub>O-N/kg N input)

$EF_{3,PRP,SO}$  = N<sub>2</sub>O emission factor for sheep and other animals manure and urine deposited on grasslands (kg N<sub>2</sub>O-N/kg N input)

$$F_{MD,GUI,t,l} = \frac{P_{GUI,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,t} \times (1 - Frac_{GAS,MD,l})}{1000_a \times 24 \times 1000_b} \quad (36)$$

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<sub>3</sub> and NO<sub>x</sub> (t N)

$P_{GUI,t}$  = 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))

$1000_a$  = 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

$Days_{GUI,t}$  = Grazing days in year t for livestock type l displaced to unidentified grasslands (days)

$1000_b$  = Conversion factor for kg to t

$Frac_{GAS,MD,l}$  = Fraction of volatilization from manure and urine deposited by grazing animals as NH<sub>3</sub> and NO<sub>x</sub> (kg N volatilized/kg of N deposited)

$t$  = Year

$l$  = Index of grazing livestock types

CH<sub>4</sub> emission from manure management due to displacement of livestock to unidentified grasslands is calculated using:

$$LE_{GUI,CH_4,MD,t} = \frac{GWP_{CH_4} \times \sum_{l=1}^L EF_{l,m} \times P_{GUI,t} \times H_{GUI,t} \times Days_{GUI,t}}{24 \times 365 \times 1000} \quad (37)$$

Where:

|                     |   |  |
|---------------------|---|--|
| $LE_{GUI,CH_4MD,t}$ | = | Leakage CH <sub>4</sub> emissions from manure and urine deposited on unidentified grasslands in year t (t CO <sub>2</sub> e)           |
| $GWP_{CH_4}$        | = | Global-warming potential of CH <sub>4</sub> (t CO <sub>2</sub> e/t CH <sub>4</sub> )   |
| $EF_{l,m}$          | = | CH <sub>4</sub> emission factor per head of livestock type l in manure management system m (kg CH <sub>4</sub> /(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 3.1.2 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:

$$LE_{GUI,t} = LE_{OG,GUI,t} + LE_{GUI,CH_4EF,t} + LE_{GUIMD,t} \quad (38)$$

Where:

|                     |   |   |
|---------------------|---|---|
| $LE_{GUI,t}$        | = | Leakage due to displacement of livestock to unidentified grasslands in year t (t CO <sub>2</sub> e)   |
| $LE_{OG,GUI,t}$     | = | Leakage due to soil carbon loss resulting from overgrazing due to displacement of livestock to unidentified grasslands in year t (t CO <sub>2</sub> e)                                      |
| $LE_{GUI,CH_4EF,t}$ | = | Leakage due to enteric fermentation by livestock displaced to unidentified grasslands in year t (t CO <sub>2</sub> e)   |
| $LE_{GUIMD,t}$      | = | Leakage due to N <sub>2</sub> O and CH <sub>4</sub> emissions in manure and urine deposited on grasslands by livestock displaced to unidentified grasslands in year t (t CO <sub>2</sub> e) |

As described above, the grazing displacement in this monitoring time did not lead to consumption exceeding 50 percent of available biomass, and leakage due to soil carbon loss does not need to be accounted for.

$$\begin{aligned}
 LE_t &= LE_{GD,t} = LE_{GUI,t} = LE_{GUI,CH_4EF,t} + LE_{GUI,MD,t} \\
 &= LE_{GUI,CH_4EF,t} + LE_{GUI,N_2O_{MD},t} + LE_{GUI,CH_4MD,t} \\
 &= \frac{\sum_{l=1}^L P_{GUI,l,t} \times Days_{GUI,l,t} \times GWP_{CH_4} \times EF_l}{1000 \times 365} + GWP_{N_2O} \times \left( \sum_{l=1}^{L1} \frac{P_{GUI,l,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \right) \times \\
 &EF_{3,PRP,CPP} \times \frac{44}{28} + \sum_{l=2}^{L2} \frac{P_{GUI,l,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,SO} \times \frac{44}{28} + \\
 &\sum_{l=1}^L F_{MD,GUI,t,l} \times Frac_{GAS,MD} \times EF_4 \times \frac{44}{28} + \frac{GWP_{CH_4} \times \sum_{l=1}^L EF_{lm} \times P_{GUI,l,t} \times H_{GUI,t} \times Days_{GUI,l,t}}{1000 \times 24 \times 365} \quad (39) \\
 &= 345,893 \text{ tCO}_2\text{e}
 \end{aligned}$$

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

Table 3-7 The Estimation of leakage emissions from relocation of grazing

| Crediting period                    | $LE_{GUI,CH_4EF,t}$ | $LE_{GUI,N_2O_{MD},t}$ | $LE_{GUI,CH_4MD,t}$ | $LE_t$             |
|-------------------------------------|---------------------|------------------------|---------------------|--------------------|
| Year                                | tCO <sub>2</sub> e  | tCO <sub>2</sub> e     | tCO <sub>2</sub> e  | tCO <sub>2</sub> e |
|                                     | A                   | B                      | C                   | D=A+B+C            |
| 25-July-2017 to 31-December-2017    | 10,962              | 118                    | 134                 | 11,214             |
| 01-January-2018 to 31-December-2018 | 59,469              | 638                    | 728                 | 60,835             |
| 01-January-2019 to 31-December-2019 | 91,838              | 986                    | 1,124               | 93,948             |
| 01-January-2020 to 31-December-2020 | 91,838              | 986                    | 1,124               | 93,948             |
| 01-January-2021 to 31-December-2021 | 91,838              | 986                    | 1,124               | 93,948             |
| <b>Total</b>                        | <b>345,945</b>      | <b>3,714</b>           | <b>4,234</b>        | <b>353,893</b>     |

### 3.2.4 Net GHG Emission Reductions and Removals

According to the methodology (VM0026/Version 1.1), the amount of emission reductions that can be issued as credits during the monitoring period should be calculated using the following equations:

$$ER_t = BE_b - PE_t - LE_t \quad (40)$$

$$VCU_t = ER_t - BC_t \quad (41)$$

$$BC_t = RR_t * (PRWP_t + PR_t - PRWP_b) \quad (42)$$

Where:

$ER_t$  = Emission reductions in year t (t CO<sub>2</sub>e)

$BE_b$  = Baseline emissions and removals in year b (t CO<sub>2</sub>e)

$PE_t$  = Project emissions and removals in year t (t CO<sub>2</sub>e)

$LE_t$  = Leakage emissions in year t (t CO<sub>2</sub>e)

- $VCU_t$  = Emission reductions eligible to be issued as VCUs in year t (t CO<sub>2</sub>e)
- $BC_t$  = AFOLU buffer credits in year tm (t CO<sub>2</sub>e)
- $RR_t$  = Non-permanence risk rating in year t (percent)
- $PRWP_t$  = Project average net change in carbon stocks of existing woody biomass for species j, in year t (t CO<sub>2</sub>e)
- $PR_t$  = Project removals due to changes in SOC in year t (t CO<sub>2</sub>e)
- $PRWP_b$  = Baseline removals from existing woody perennials in baseline year b (t CO<sub>2</sub>e)

According to the Non-permanence Risk Report of the project, the non-permanence risk rating is determined as 10%. There is no woody biomass in this project, so the Project average net change in carbon stocks of existing woody biomass  $PRWP_t$  and Baseline removals from existing woody perennials  $PRWP_b$  are considered to be 0 tCO<sub>2</sub>e.

So, during this monitoring period,  $ER_t$  is 2,725,950 tCO<sub>2</sub>e, and  $VCU_t$  is 2,458,517 tCO<sub>2</sub>e. Please refer to ER spreadsheet for detailed calculation.

| Year                                | Baseline emissions (tCO <sub>2</sub> e) | Project emissions <sup>30</sup> (tCO <sub>2</sub> e) | Leakage emissions (tCO <sub>2</sub> e) | Project removals (t CO <sub>2</sub> e) | Net GHG emission removals (tCO <sub>2</sub> e) | Buffer (tCO <sub>2</sub> e) | Net VCUs (tCO <sub>2</sub> e) |
|-------------------------------------|---|--|--|--|--|-----------------------------|-------------------------------|
|                                     | A                                       | B  | C                                      | D                                      | E=A-B-C  | F=D*10%                     | G=E-F                         |
| 25-July-2017 to 31-December-2017    | 64,026                                  | 53,659   | 11,214                                 | 263,969                                | 263,122  | 26,397                      | 236,725                       |
| 01-January-2018 to 31-December-2018 | 146,059                                 | 73,234   | 60,835                                 | 602,179                                | 614,169  | 60,218                      | 553,951                       |
| 01-January-2019 to 31-December-2019 | 146,059                                 | 39,557   | 93,948                                 | 602,179                                | 614,733  | 60,218                      | 554,515                       |
| 01-January-2020 to 31-December-2020 | 146,460                                 | 38,352   | 93,948                                 | 603,828                                | 617,988  | 60,382                      | 557,606                       |

<sup>30</sup> Project emissions here is emissions excluding the project removals.

|                                     |                |                |                |                  |                  |                |                  |
|-------------------------------------|----------------|----------------|----------------|------------------|------------------|----------------|------------------|
| 01-January-2021 to 31-December-2021 | 146,059        | 38,352         | 93,948         | 602,179          | 615,938          | 60,218         | 555,720          |
| <b>Total</b>                        | <b>648,663</b> | <b>243,154</b> | <b>353,893</b> | <b>2,674,334</b> | <b>2,725,950</b> | <b>267,433</b> | <b>2,458,517</b> |

**3.3 Optional Criterion: Climate Change Adaptation Benefits**

Not applicable.

**3.3.1 Activities and/or processes implemented for Adaptation (GL1.3)**

Not applicable.

**4 COMMUNITY**

**4.1 Net Positive Community Impacts**

**4.1.1 Community Impacts (CM2.1)**

To assess the actual changes in well-being resulting from the project activities for community groups during this monitoring period, the project owner established a monitoring team to conduct interviews for local communities affected by the project, all the affected groups as identified in the PD have been distributed with the questionnaires accordingly. Please refer to Section 4.3.1 for detailed results of the questionnaires.

The Community impacts for each group are summarized as follow:

|                           |   |
|---------------------------|---|
| Community Group           | Local residents around project area   |
| Impact(s)                 | Create 11,727 job opportunities (952 permanent jobs and 10,775 temporary jobs of which 6,039 are women. These job opportunities were equally offered to local women and men, empowering women and build community capacity in gender equity, providing work training and improving living environment.  |
| Type of Benefit/Cost/Risk | Predicted direct benefits   |
| Change in Well-being      | Approximately 952 local herders were employed as grassland guardians, with an annual salary of 2,000 RMB (313.2 USD) /year per person, which will increase their household income. Also,10,775 temporary jobs were provided for local Yugur nationality and women. The local government issued subsidies (ranging from 2.17 RMB/mu to 3.35 RMB/mu) to the herders in the project area who implemented the prohibition of grazing. The project restored the degraded grassland and is beneficial to rebuild local pleasant and beautiful ecological system which has |

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|--|--|
|  | higher ecological aesthetic value of tour and sightseeing which improve their income and living environment. |
|--|--|

|                           |  |
|---------------------------|--|
| Community Group           | Local women  |
| Impact(s)                 | Create 11,727 job opportunities (952 permanent jobs and 10,775 temporary jobs) of which 6,039 are women, which is equally offered to local women and men<br>Empower women and build community capacity in gender equity.   |
| Type of Benefit/Cost/Risk | Predicted direct benefits  |
| Change in Well-being      | Without this project, local women mainly do housework at home and have no income. During the project implementation, 6,039 local women participated in the project. This will contribute to empower women and build community capacity in gender and sustainable grassland management. By being trained with the sustainable grassland management skills and participating the community activities together with other employees, women may gain more happiness compares to doing housework only, thus positive welfare outcomes for local households are more likely to be expected. |

|                           |   |
|---------------------------|---|
| Community Group           | Local herders, Yugur nationality and grassland guardians  |
| Impact(s)                 | Enhance capabilities of local herders, Yugur nationality and grassland guardians and increase their household income<br>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, due to grazing was managed. Approximately 952 local herders were employed as grassland guardians, with an annual salary of 2,000 RMB (313.2 USD) /year per person, which will increase their household income. Also,10,775 temporary jobs were provided for local Yugur nationality and herders. The local government issued subsidies (ranging from 2.17 RMB/mu to 3.35 RMB/mu) to the herders in the project area who implemented the prohibition of grazing.<br><br>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 income and living environment. |
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|                           |  |
|---------------------------|--|
| Community Group           | Village collectives  |
| Impact(s)                 | Restore grassland productivity of village collectives; Provides more opportunities for village collectives from Yugur 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 grassland belongs to the state and the collectives. The project restored the degraded grassland and improved the grassland productivity. The project organizes special village collectives' cultural activities and increase the connection between local Yugur nationality herders and other members which could indirectly promote the diffusion of traditional culture |

|                           |   |
|---------------------------|---|
| Community Group           | Zhangye Forestry and Grassland Bureau<br>County Forestry and Grassland Bureau |
| Impact(s)                 | Increase grassland productivity and protect local ecological environment.     |
| Type of Benefit/Cost/Risk | Predicted indirect benefits   |
| Change in Well-being      | Improve local economic and environmental situations.                          |

|                           |   |
|---------------------------|---|
| Community Group           | Local government  |
| Impact(s)                 | Provided the initial fund, restore the grassland ecosystem and solve employment issues.   |
| Type of Benefit/Cost/Risk | Predicted direct benefits   |
| Change in Well-being      | Restore the degraded grassland and alleviated the grassland ecological crisis. Create 11,727 job opportunities (952 permanent jobs and 10,775 temporary jobs which solve employment issues. |

#### **4.1.2 Negative Community Impact Mitigation (CM2.2)**

For the herders who think the implementation of project influenced their livelihood result of the controlled grazing, the local project proponent and County Forestry and Grassland Bureau measured the grass yield of the surrounding grasslands in the project area and guide herders to graze within the acceptable area and ensure the project will not reduce their grazing productivity and the project will not affect herder's grazing time and reduce herder's grazing income.

Meanwhile, the project proponent and local Forestry and Grassland Bureau explained that the project could restore their degraded grassland, and if they agreed to restore the degraded grassland and implemented grazing prohibition of project activities, they would receive corresponding subsidies, and they did not need to participate in the implementation and management of the grassland. According to the Implementation Plan of the new round of grassland ecological protection subsidy and reward policy (2016-2020) in Zhangye City, due to the sustainable management of grazing, herders in the project area received corresponding subsidies. The subsidy standards for sub vary from county to county, ranging from 2.17 RMB/mu to 3.35 RMB/mu. According to the Subsidy payment record, about 8,668 herders received government subsidies.

Finally, these representatives of stakeholder think the impact of the project activities on them has been mitigated and they are all 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.

#### **4.1.3 Net Positive Community Well-Being (CM2.3, GL1.4)**

As summarized in Section 4.1.1, 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 living environment of local residents**

The implementation of the project will restore 261,059.80 ha of degraded grassland of Zhangye city, and prevented continued degradation of grassland, which is beneficial to rebuild local pleasant and beautiful ecological system and improve their living environment of local residents.

##### **Improve the family income of local residents**

As described in section 4.1.1, at the project start, grazing was the traditional livelihood for local residents, and there were not much other job opportunities offered. 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. Approximately 11,727 local herders were employed as grassland guardians, with an annual salary of 2,000 RMB (313.2 USD)/year per person, which will increase their household income. In addition, the development of local tourism due to the higher ecological aesthetic value and the government's additional subsidies to residents in the project area can increase their income.

**Maintain gender equality**

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 and small trees, 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, more than half of the local residents directly involved in the project are women. which makes women gain more professional identity and higher happiness.

**Promote the exchange and collision of traditional culture**

Since ancient times, Zhangye has been the important town and throat of merchants on the silk road. It is the main way for Buddhist culture to be introduced into the Central Plains (comprising the middle and lower reaches of the Huanghe River). The local residents participated in the project are Yugur nationality, who are an ancient nomadic people unique to Gansu Province. They believe in Gelugpa (Yellow Sect of Tibetan Lamaism, founded by Zongkaba or Tsongkhapa in the 15th century) in silk culture zone.

Among them, Yugur marriage custom is an important local intangible cultural heritage. It contains rich contents such as Yugur ancient language, folk songs, myths and legends, proverbs and stories, traditional etiquette and so on. It also contains traditional cultural contents inherited for thousands of years, such as Shamanism, primitive worship, Buddhist belief and so on. At the same time, Yugur marriage customs contain a lot of information about the evolution and development of nomadic culture in the north, which also has high protection and research value.

Before the implementation of the project, the channels for Yugur nationality here to communicate with the outside world were limited. Since the lack of communication among community members, it is not conducive to the diffusion of these traditional culture. The implementation of the project requires full communication among stakeholders on a regular basis. At the same time, it also attracts tourists from all parties, which greatly promotes the dissemination of important intangible heritage of nomads, that is Yugur marriage custom culture.



Figure 4-1 Grassland Tourism Culture Festival

**Promote technical capability of local herders.**

There is a Grassland monitoring technical manual 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.

**4.1.4 Protection of High Conservation Values (CM2.4)**

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

**4.2 Other Stakeholder Impacts**

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

There are no negative well-being impacts on other stakeholders during this monitoring period.

#### **4.2.2 Net Impacts on Other Stakeholders (CM3.3)**

The project provides 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.

#### **4.3 Community Impact Monitoring**

##### **4.3.1 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 local 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 has been conducted after initial monitoring, as described below.

##### **Procedures:**

- a) Establishing PRA team: The team sets 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 Forestry and Grassland Bureau;
- b) Developing SOPs for the field PRA process;
- c) Training: A training workshop has been 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 village collectives, towns/townships and local NGOs and informing them PRA plan.
- e) PRA survey: conducting PRA survey following SOPs.



Figure 4-2 Training of PRA teams

**Methods:**

a) Stakeholder meeting: A meeting of stakeholder representatives has held in Forestry and Grassland Bureau of Zhangye city on 29-March-2021. 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.



Figure 4-3 Stakeholder meeting

b) Semi-structured interviews: This includes representatives' interview, famers/herders' interview and group interview

(i) Interviewing of representatives: including villager leaders, distinguished villagers, elder villagers and head of ethnic minority.

(ii) Interviewing of household: Some farmer households have been 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 have been developed and distributed among different stakeholders, including farmer households, village committees, herders, township governments and forestry and grassland bureau.

d) Evidence document collection: Collect evidence document from local forestry and grassland bureaus, herders and other stakeholders, such as contracts, payment certificates and training records, etc.



Figure 4-4 Household questionnaire survey

To assess the actual changes in well-being resulting from the project activities for community groups during this monitoring period, the project owner established a monitoring team to conduct interviews and questionnaires for local communities affected by the project.

The operation and management structure of the monitoring team has been shown in Figure 3-1 in Section 3.1.3 above, and the responsibilities of each role in the team structure are:

- Monitoring manager 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;
- Monitoring group conducts the interview and questionnaires for communities particularly, and collects all the original evidences and data and make relevant records;
- Auditing group performs internal verification of the measurement, reviews all the monitoring records and documents, crosschecks evidence and make summary statistics during each verification period.
- Expert group provide advises to monitoring manager to make sure the monitoring activities are in line with relevant requirement, and the expert group also review the monitoring results before each verification, in case any non-conformances founded, expert group will ask the monitoring team to take necessary compensation measures (redo some of the monitoring activities or statistics) until all the non-conformances been corrected.

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.

From 16-September-2021 to 01-October-2021, the monitoring team has distributed 80 questionnaires for the representatives of local residents which is within the project zone and collect all the relevant information by simple interview with the representatives in person when distributing the questionnaires. Totally 80 of the questionnaires were collected with valid answers. The representatives covered different villages and different community groups, such as local herders, rural cooperatives, and especially rural women.

The following key variables has been 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<br>Questionnaire and interview  |
| Frequency of monitoring/recording | Before every verification event  |

|                           |  |
|---------------------------|--|
| Affected community groups | Local residents, local herders, local Yugur nationality, grassland guardians, local government.  |
| Purpose of monitoring     | Evaluate the technical improvement resulting from the project  |
| Results of monitoring     | During this monitoring period, the project proponent and the Zhangye Forestry and Grassland Bureau provided training on rodent control, fire prevention and sustainable grassland management for 11,727 local herders from 2018 to 2021.<br>90% of the representatives thought there was an improvement of their capability and technical skills |
| Change in well-being      | Improve technical skills of grassland sustainable management   |

|                                   |  |
|-----------------------------------|--|
| 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<br>Questionnaire and interview  |
| Frequency of monitoring/recording | Before every verification event  |
| Affected community groups         | Local residents, local herders, local women, local Yugur nationality, grassland guardians, village collectives, local government   |
| Purpose of monitoring             | Evaluate the technical improvement resulting from the project  |
| Results of monitoring             | During this monitoring period, the project proponent and the Zhangye City Forestry and Grassland Bureau provided training on rodent control, fire prevention and sustainable grassland management for 6,039 local women from 2018 to 2021.<br>90% of the representatives thought there was an improvement of their capability and technical skills |
| Change in well-being              | Improve technical skills of grassland sustainable management   |

|                                   |  |
|-----------------------------------|--|
| 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  |
| Frequency of monitoring/recording | Before every verification event  |

|                           |  |
|---------------------------|--|
| Affected community groups | Local herders, local Yugur nationality, grassland guardians  |
| Purpose of monitoring     | Evaluate the community benefit resulting from the project  |
| Results of monitoring     | According to the working contracts and payment records, the working hours of local resident was 1,904,000 hours per year during this monitoring period, and the legal working hours is 2,000 hours per year according to Labour Law of China. Therefore, total number of people employed in the project expressed as number of full-time employees is 952 ( $1,904,000/2,000 = 952$ ). |
| Change in well-being      | Increase living level  |

|                                   |  |
|-----------------------------------|--|
| 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  |
| Frequency of monitoring/recording | Before every verification event  |
| Affected community groups         | Local women, local herders, local Yugur nationality, grassland guardians   |
| Purpose of monitoring             | Evaluate the community benefit resulting from the project  |
| Results of monitoring             | According to the working contracts and payment records, the working hours of local women was 986,000 hours per year during this monitoring period, and the legal working hours is 2,000 hours per year according to Labour Law of China. Therefore, total number of women employed in the project expressed as number of full-time employees is 493 ( $986,000/2,000 = 493$ ). |
| Change in well-being              | Increase living level  |

|                                   |  |
|-----------------------------------|--|
| 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<br>Questionnaire and interview<br>Training records                           |
| Frequency of monitoring/recording | Before every verification event  |

|                           |   |
|---------------------------|---|
| Affected community groups | Local women, local herders, local Yugur nationality, grassland guardians  |
| Purpose of monitoring     | Evaluate the change of livelihoods due to the implementation of the project   |
| Results of monitoring     | Working contracts and payment records showed that the project provided 11,727 local residents with training and job opportunities. The results of questionnaire and interview showed that the project guided herders to graze reasonably, which improved grazing productivity and increased their household incomes, and improved their livelihoods.<br>Training records showed that their skills to graze reasonably was improved. |
| Change in well-being      | Improved their abilities and household income   |

|                                   |  |
|-----------------------------------|--|
| 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<br>Questionnaire and interview<br>Training records   |
| Frequency of monitoring/recording | Before every verification event  |
| Affected community groups         | Local women, village collectives, local government   |
| Purpose of monitoring             | Evaluate the change of livelihoods due to the implementation of the project  |
| Results of monitoring             | Working contracts and payment records showed that the project provided 6,039 women with training and job opportunities, which is equally offered to local women and men. The results of questionnaire and interview showed that the project guided herders to graze reasonably, which improved grazing productivity and increased women's household incomes, and improved their livelihoods.<br>Training records showed that women's skills to graze reasonably was improved, which empower women and build community capacity in gender equity. |
| Change in well-being              | Improved their abilities and household income  |

|                                   |   |
|-----------------------------------|---|
| Variable                          | The number of herders subsidized by the government due to the implementation of the project and the amount of subsidy.  |
| Monitoring methods to be applied  | Questionnaire and interview<br>Government subsidy records   |
| Frequency of monitoring/recording | Before every verification event   |
| Affected community groups         | Local women, local herders, local Yugur nationality, grassland guardians  |
| Purpose of monitoring             | Evaluate the change of income due to the implementation of the project  |
| Results of monitoring             | The results of questionnaire and interview showed that the herders under grazing control received corresponding subsidies.<br><br>Government subsidy records showed that subsidies (ranging from 2.17 RMB/mu to 3.35 RMB/mu) were funnelled into herders (both men and women) in the project area who implemented the prohibition of grazing. |
| Change in well-being              | Improved household income   |

|                                   |   |
|-----------------------------------|---|
| Variable                          | Number of tourists received in the project area each year   |
| Monitoring methods to be applied  | Records of Zhangye Year statistics (2017-2020)  |
| Frequency of monitoring/recording | Annually  |
| Affected community groups         | Local residents, Village collectives  |
| Purpose of monitoring             | Evaluate the change of landscape value due to the implementation of the project   |
| Results of monitoring             | According to data of Zhangye Year statistics (2017-2020) from 2017 to 2019 <sup>31</sup> , the number of tourists increased significantly, nearly doubled from 20.30 million to 42.40 million. In 2020, affected by the COVID-19, |

<sup>31</sup> <http://www.zhangye.gov.cn/tjj/ztlz/tjsj/>

|                      |  |
|----------------------|--|
|                      | the number of tourists began to decline significantly. Totally from 2017 to 2020, there an increase of 46.94% of tourists in project zone. |
| Change in well-being | Improved household income <sup>32</sup>  |

|                                   |  |
|-----------------------------------|--|
| Variable                          | Area of restored grassland from different management practices   |
| Monitoring methods to be applied  | Project records from county Forestry and Grassland Bureau  |
| Frequency of monitoring/recording | Before every verification event  |
| Affected community groups         | Zhangye Forestry and Grassland Bureau<br>County Forestry and Grassland Bureau<br>Local government  |
| Purpose of monitoring             | Evaluate the environmental improvement resulting from the project  |
| Results of monitoring             | During this monitoring period, totally 261,059.80 ha of degraded grasslands in Zhangye city were managed by rotational grazing, rest grazing or planted with native grass species, the local ecological environment was improved.  |
| Change in well-being              | 261,059.80 ha of degraded grasslands has been restored and protect the grassland ecological environment. It is conducive to the local government and Forestry and Grassland Bureau to achieve the green and sustainable development goal of "green water and green mountains are golden mountains and silver mountains". |

|                                   |   |
|-----------------------------------|---|
| Variable                          | Number of Yugur nationality benefiting from project activities                  |
| Monitoring methods to be applied  | Working contracts and payment records<br>Questionnaire and interview            |
| Frequency of monitoring/recording | Before every verification event   |
| Affected community groups         | Local residents, Village collectives, local government, local Yugur nationality |

<sup>32</sup> [http://www.zhangye.gov.cn/dzdt/xqdt/snx\\_2548/201908/t20190823\\_312724.html](http://www.zhangye.gov.cn/dzdt/xqdt/snx_2548/201908/t20190823_312724.html)

|                       |  |
|-----------------------|--|
| Purpose of monitoring | Evaluate the conservation of minority cultural resulting from the project  |
| Results of monitoring | <p>Working contracts and payment records showed that the project provided 11,727 local residents with training and job opportunities, and 6,333 (over 54%) of the employed local residents are minorities, which improve the living hood of local Yugur nationality.</p> <p>The results of questionnaire and interview showed that the community groups were barely active before the project started, and the project provided opportunities for local Yugur nationality (About 9,832 people) in different communities to work together and organize special community cultural activities during their traditional holidays, while the other members of the community are also invited. According to the questionnaire, all local Yugur nationality thought the project increased community interaction, and their social connection with other community members could indirectly promoted the conservation of Gelugpa (Yellow Sect of Tibetan Lamaism) culture in Silk Road region of Zhangye.</p> |
| Change in well-being  | Benefit to conservation of local traditional and silk culture  |

According to the results of the above monitoring variables, the project provided [11,727 job opportunities \(952 permanent jobs and 10,775 temporary jobs\)](#) for local residents which is equally offered to local women and men (including 6,333 Yugur nationality and 6,039 women), which would improve their family income, increase the interaction between communities and accelerate the cultural collision between ethnic minorities. 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. At the same time, the project provided technical skills and training of sustainable grazing method for 952 grassland guardians, it could enhance their skills and get a sense of achievement.

All of these measures above could guarantee that the local residents will get long-term community well-being.

#### 4.3.2 Monitoring Plan Dissemination (CM4.3)

The community monitoring plan and results have been published on VCS and CCB website which can be easily download by stakeholders. Hard copies of the community monitoring plan have been distributed among local stakeholders by project proponent and grassland guardians. At the same time, public notice boards have been used to publicize information regarding how to access to the community monitoring plan through internet. Technical staff from project proponent have also explained the community monitoring plan to local herders. Also, a contact person with phone number was published in case any stakeholders want to directly contact the project proponent and raise opinions.

For each verification, the monitoring team will summarize all the comments received from stakeholders and corresponding responses regarding the community monitoring plan and results, which will be published on VCS and CCB website along with the monitoring report for each monitoring period.

During this monitoring period, no comments on the community monitoring plan and results received yet.

**4.4 Optional Criterion: Exceptional Community Benefits**

Not applicable.

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

Not applicable.

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

Not applicable.

**4.4.3 Net Impacts on Women (GL2.5)**

Not applicable.

**4.4.4 Benefit Sharing Mechanisms (GL2.6)**

Not applicable.

**4.4.5 Governance and Implementation Structures (GL2.8)**

Not applicable.

**4.4.6 Smallholders/Community Members Capacity Development (GL2.9)**

Not applicable.

**5 BIODIVERSITY**

**5.1 Net Positive Biodiversity Impacts**

**5.1.1 Biodiversity Changes (B2.1)**

|                         |   |
|-------------------------|---|
| Change in Biodiversity  | Grassland productivity of the project area  |
| Monitored Change        | Actual direct increase  |
| Justification of Change | The behaviour of reseeded grass and building fence could restore vegetation of the degraded grassland. The restored grassland was more suitable for the survival of animals and I increased the biodiversity of the project area. |

|                         |  |
|-------------------------|--|
| Biodiversity Element    | Grassland coverage of the project area   |
| Estimated Change        | Positive, the productivity is estimated to be increased  |
| Justification of Change | The behaviour of reseeded grass and controlled grazing (rest and rotational grazing) could restore vegetation of the degraded grassland. |

|                         |   |
|-------------------------|---|
| Change in Biodiversity  | Number of grass species in the project area   |
| Monitored Change        | Actual direct increase  |
| Justification of Change | Six native grass species (see Project Design Report) have been planted in project area which was maintained under long-term management. |

|                         |   |
|-------------------------|---|
| Change in Biodiversity  | Threats to endangered animals   |
| Monitored Change        | Predicted indirect positive impact  |
| Justification of Change | The loss of wildlife habitat due to grassland degradation is a major threat to wildlife survival. The project can effectively restore grassland vegetation, alleviate grassland degradation, and restore wildlife habitat, thereby reducing the threat of wildlife by reseeded grass. |

### 5.1.2 Mitigation Actions (B2.3)

The main measure of the project is rotational grazing and rest grazing through building grassland fences and planted grass seeds on the degraded grassland. 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. The management team are experienced with sustainable grassland management as mentioned in Section 2.4.2 and has established an integrated management system for implementation of the project, including rodent control, fire prevention and technical training of employees, which will minimize the intensity and periodicity of required interventions. Also, the implementation of the project has improved the ecological environment of the Eastern Qilian Mountain, increased the biodiversity and provided more habitats for threatened species. In addition, all grass species are native species, and no invasive species will be introduced.

During this monitoring period, implementation of this project will not decrease biodiversity of project sites, thus no mitigation measures are required.

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

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 and fence building, therefore the net with-project change of biodiversity is positive.

First, there are 6 native species of grass planted in this project and the mix planting of the species will have more positive impacts on biodiversity according to relevant research. In addition, the management measures of rotational grazing and rest grazing will alleviate the grazing pressure, which is conducive to the restoration of grassland vegetation.

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 compared 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.

According to the project Biodiversity Survey Report conducted by Gansu Province Academy of Qilian Water Resource Conservation Forests Research Institute in November 2021, there are 21 national protected species identified in the project zone as followed, including 2 of first level and 19 of secondary level. 7 of them are globally endangered species according to IUCN.

Table 5-1 List of rare and endangered animals

| No. | Species                  | national protected level | CITES appendix | IUCN level |
|-----|--------------------------|--------------------------|----------------|------------|
| 1   | Tibetan Snowcock         | II                       | I              | LC         |
| 2   | Himalayan Snowcock       | II                       |                | LC         |
| 3   | White-eyed Pochard       |                          |                | NT         |
| 4   | Red-crested Pochard      |                          |                | LC         |
| 5   | Great Crested Grebe      |                          |                | LC         |
| 6   | Black-winged Stilt       |                          |                | LC         |
| 7   | Kentish Plover           |                          |                | LC         |
| 8   | Pacific Golden Plover    |                          |                | LC         |
| 9   | Northern Lapwing         |                          |                | NT         |
| 10  | Green Sandpiper          |                          |                | LC         |
| 11  | Spotted Redshank         |                          |                | LC         |
| 12  | Common Sandpiper         |                          |                | LC         |
| 13  | Common Greenshank        |                          |                | LC         |
| 14  | Eurasian Curlew          |                          |                | NT         |
| 15  | Ruddy Turnstone          |                          |                | LC         |
| 16  | Temminck's Stint         |                          |                | LC         |
| 17  | Black-tailed Godwit      |                          |                | NT         |
| 18  | Common Black-headed Gull |                          |                | LC         |
| 19  | Pallas's Gull            |                          |                | LC         |
| 20  | Common Tern              |                          |                | LC         |

|    |                             |    |    |    |
|----|-----------------------------|----|----|----|
| 21 | Black Stork                 | I  | II | LC |
| 22 | Northern Harrier            | II | II | LC |
| 23 | Steppe Eagle                | II | II | LC |
| 24 | Golden Eagle                | I  | II | LC |
| 25 | Upland Buzzard              | II | II | LC |
| 26 | Common Buzzard              | II | II | LC |
| 27 | Long-legged Buzzard         | II | II | LC |
| 28 | Himalayan Griffon           | II | II | NT |
| 29 | Black-eared Kite            | II | II | LC |
| 30 | Lesser Kestrel              | II | II | LC |
| 31 | Saker                       | II | II | EN |
| 32 | Saker Falcon                | II | II | LC |
| 33 | Eurasian Hobby              | II | II | LC |
| 34 | Chinese Grey Shrike         |    |    | LC |
| 35 | Large-billed Crow           |    |    | LC |
| 36 | Red-billed Chough           |    |    | LC |
| 37 | White-throated Dipper       |    |    | LC |
| 38 | Kessler's Thrush            |    |    | LC |
| 39 | White-capped Water-Redstart |    |    | LC |
| 40 | Desert Wheatear             |    |    | LC |
| 41 | Black Redstart              |    |    | LC |
| 42 | Daurian Redstart            |    |    | LC |
| 43 | Rufous-breasted Accentor    |    |    | LC |
| 44 | Eurasian Tree Sparrow       |    |    | LC |
| 45 | White-rumped Snowfinch      |    |    | LC |
| 46 | White Wagtail               |    |    | LC |
| 47 | Yellow Wagtail              |    |    | LC |
| 48 | Meadow Pipit                |    |    | NT |
| 49 | Water Pipit                 |    |    | LC |
| 50 | Tawny Pipit                 |    |    | LC |
| 51 | White-browed Rosefinch      |    |    | LC |
| 52 | Streaked Rosefinch          |    |    | LC |
| 53 | Pallas's Bunting            |    |    | LC |

Due to the implementation of the project, the grassland guardians patrolled the management and protection area regularly, once every 15 days, supervised and prevented wildlife theft and reported it to the county Forestry and Grass Bureau. These measures reduced the threat of poaching to wildlife. In addition, according to peer-review study<sup>33</sup>, the biggest threat to the survival of wildlife in the project area is the loss of habitat caused by overgrazing. The project implementation would protect and restore the grassland ecological environment, and reduce the threat to the wildlife in the project zone. During this period, these 7 threatened wild animals were protected result of the reduced threats.

<sup>33</sup> Zhang chao. (2020). The investigation and analysis of biodiversity and natural ecosystem characteristics in Qilian Mountain National Park. *Forestry science and technology information* (3),12-14.

**5.1.4 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.

**5.1.5 Invasive Species (B2.5)**

All the grass are native species and no invasive species were introduced into any area affected by the project.

**5.1.6 Impacts of Non-native Species (B2.6)**

No non-native species were used in the project zone.

**5.1.7 GMO Exclusion (B2.7)**

No GMOs were used to generate GHG emissions reductions or removals.

**5.1.8 Inputs Justification (B2.8)**

|                      |   |
|----------------------|---|
| Name                 | Chemical pesticides   |
| Justification of Use | The chemical pesticides are allowed to be used only if there is a serious disease problem erupted in the project area, and the pesticides will be used in accordance with the National Pesticides Policy. |
| Adverse Effect       | During this monitoring period, no serious disease disaster occurred, thus no chemical pesticides were used.   |

|                      |  |
|----------------------|--|
| Name                 | Biological control agents  |
| Justification of Use | Upon routine overseeing, the pest would be treated by biological control (building eagle's nest to Prevent Rodent) according to local Pest Control and Prevention Policy.  |
| Adverse Effect       | The biological control agents are natural enemy of pest which are native species and have no adverse effect on local environment and communities.<br>During this monitoring period, eagle's nests were built in the project area for rodent control. |

**5.2 Offsite Biodiversity Impacts**

**5.2.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Actions (B3.2)**

The project activities increased the area of the habitat, and improve the habitats' quality, only positive biodiversity impacts can be identified. Therefore, there are no potential negative offsite impacts on biodiversity.

### 5.2.2 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.

## 5.3 Biodiversity Impact Monitoring

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

As shown in Figure 3-1, the project owner established a monitoring team. In order to monitor biodiversity in the project area more professionally, an expert team of Gansu Province Academy of Qilian Water Resource Conservation Forests Research Institute was hired to conduct biodiversity monitoring and write a Project Biodiversity Survey Report. In these monitoring period, the responsibilities of each role in the team structure are:

- Office manager 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 including the Gansu Province Academy of Qilian Water Resource Conservation Forests Research Institute provides professional technique related to monitoring activities to make sure all the monitoring activities meet the requirement of VCS and CCB standards.
- 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 of PD, the main measure of the project is rotational grazing and rest grazing through building grassland fences, and reseeding the grass the grassland is grazed area by area and used in turn. The other measures are reseeding *Elymus nutans*, *Elymus sibiricus*, *Poa pratensis*, *Agropyron cristatum*, *Festuca rubra*, *Artemisia sphaerocephala* on the degraded grassland. And based on the analysis in Section 2.1.18 of PD, the risks of fire, rodents, pests, overgrazing and frost might threat the aim of the project and need to be intervened.

According to 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<sup>34</sup>. So-called “community-based monitoring” would appear to be a good fit for many carbon projects, its focus on practical issues of sustainability, such

<sup>34</sup> Gardner, T. 2010. Monitoring forest biodiversity: Improving conservation through ecologically responsible management. Earthscan Ltd., London. 360 pages.

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 instill 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 productivity 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 were 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 "threats to endangered animals" and as indicator to monitor the project's impact on animals which should be appropriate for an sustainable grassland management project. Also, the indicator "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 productivity" and "species of vegetation"), therefore the general population of local biodiversity could be reflected by the overall monitoring results of the multiple indicators.

During this monitoring period, the State Variables of the biodiversity have been monitored by Gansu Province Academy of Qilian Water Resource Conservation Forests Research Institute and monitoring team in both winter (03-November-2020 to 07-December-2020) and summer (25-May-2021 to 20-June-2021) season, and the Pressure Variables and Response Variables of the biodiversity have been monitored annually.

The detailed monitoring results for biodiversity are listed in the following table:

Table 5-2 Monitoring results for biodiversity during this monitoring period

| Indicator type  | Description   | Monitoring indicator   | Indicator unit      | Monitoring method   | Monitoring frequency      | Monitoring results   |
|-----------------|---|------------------------|---------------------|---|---------------------------|--|
| State variables | The quantity and quality of grassland in the project area | Grassland productivity | Kg/Mu <sup>35</sup> | <p>For each strata, 3 sample sites are installed located different counties or district (18×3=54 total) to monitor the productivity. In every sample site, pull a sample line along the slope direction, and set a sampling quadrat every 10m and total 3 quadrats are selected. Quadrat size is set to be a rectangle land with 1m×1m (1m<sup>2</sup>). In each sample quadrat, measure the fresh weight of aboveground biomass of all aboveground grasses. Then put the fresh weight sample into the envelope and mark it, put it in the oven at 80 °C for 48 hours to get dry weight. The productivity of each sample sites was calculated as mean of three quadrats.</p> <p>The final grassland productivity in each strata is calculated as mean of three sample sites.</p> <p>The monitoring activities are carried out by the County Forestry and Grassland bureau every year.</p> | Before every verification | The grassland productivity increased by 10 kg per Mu on average through fence building; Grassland productivity increased by 25 kg per Mu on average through reseeding grass. |
|                 |   | Grassland coverage in  | ha                  | Grassland vegetation coverage monitoring is carried out together with   | Before every verification | 261,059.80 ha of degraded grasslands were restored by fence building and reseeding   |

<sup>35</sup> 1 ha =15 Mu

|                                    | the project area                   |            | productivity monitoring. That is, each strata have 3 sites and each site install 3 quadrats. Estimate the coverage of plants in each quadrat by visual inspection, that is, visually estimate the vertical projection area of all plants in the quadrat. The monitoring activities are carried out by the County Forestry and Grassland bureau every year.  |                           | grass. and the grassland vegetation coverage increased by around 6 percentage points on average.   |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
|------------------------------------|------------------------------------|------------|---|---------------------------|--|-----|---------|------------|---|---------------------------|----|---|-------------------------|----|---|------------------------|----|---|----------------------------|----|---|--------------------------|----|---|--------------|----|---|---------------------|
| Biodiversity and threatened status | Grass species in the project area  | /          | Grass species coverage monitoring is carried out together with productivity monitoring. Plot size is set to be a rectangle land with 1m*1m (1m <sup>2</sup> ). The plant species of each quadrat will be recorded.  | Before every verification | <i>Elymus nutans</i> , <i>Elymus sibiricus</i> , <i>Poa pratensis</i> , <i>Agropyron cristatum</i> , <i>Festuca rubra</i> , <i>Artemisia sphaerocephala</i>  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
|                                    | The numbers of endangered animals; | /          | The monitoring activities are carried out by Gansu Province Academy of Qilian Water Resource Conservation Forests Research Institute. They visit the project land, and monitor the numbers for endangered animals in the project zone. Taking the project implementation region as the unit, the survey is divided into 6 geographical units: Ganzhou District, Gaotai County, Shandan Machang, Minle County, Shandan County and Su'nan County. Each geographic unit includes sample lines. 6 monitoring lines (6 geographical units and each of 3km) have been set in each strata to monitor endangered animals which were selected randomly from the sample | Before every verification | According to the biodiversity survey report, there are 7 threatened species has been protected.<br><table border="1"> <thead> <tr> <th>No.</th> <th>Species</th> <th>IUCN level</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><i>White-eyed Pochard</i></td> <td>NT</td> </tr> <tr> <td>2</td> <td><i>Northern Lapwing</i></td> <td>NT</td> </tr> <tr> <td>3</td> <td><i>Eurasian Curlew</i></td> <td>NT</td> </tr> <tr> <td>4</td> <td><i>Black-tailed Godwit</i></td> <td>NT</td> </tr> <tr> <td>5</td> <td><i>Himalayan Griffon</i></td> <td>NT</td> </tr> <tr> <td>6</td> <td><i>Saker</i></td> <td>EN</td> </tr> <tr> <td>7</td> <td><i>Meadow Pipit</i></td> <td>NT</td> </tr> </tbody> </table> | No. | Species | IUCN level | 1 | <i>White-eyed Pochard</i> | NT | 2 | <i>Northern Lapwing</i> | NT | 3 | <i>Eurasian Curlew</i> | NT | 4 | <i>Black-tailed Godwit</i> | NT | 5 | <i>Himalayan Griffon</i> | NT | 6 | <i>Saker</i> | EN | 7 | <i>Meadow Pipit</i> |
| No.                                | Species                            | IUCN level |   |                           |  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
| 1                                  | <i>White-eyed Pochard</i>          | NT         |   |                           |  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
| 2                                  | <i>Northern Lapwing</i>            | NT         |   |                           |  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
| 3                                  | <i>Eurasian Curlew</i>             | NT         |   |                           |  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
| 4                                  | <i>Black-tailed Godwit</i>         | NT         |   |                           |  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
| 5                                  | <i>Himalayan Griffon</i>           | NT         |   |                           |  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
| 6                                  | <i>Saker</i>                       | EN         |   |                           |  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |
| 7                                  | <i>Meadow Pipit</i>                | NT         |   |                           |  |     |         |            |   |                           |    |   |                         |    |   |                        |    |   |                            |    |   |                          |    |   |              |    |   |                     |

|                    |   |   |    |   |                           |   |
|--------------------|---|---|----|---|---------------------------|---|
|                    |   |   |    | plots set for monitoring of climate. A total of 108 monitoring lines (18x6=108) would be set up. 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. |                           |   |
|                    |   | Reduced threats to endangered animals.<br><br>(Area of grassland restoration) | ha | The grassland guardians patrolled the management and protection area regularly, once every 15 days, supervise the area of vegetation restoration and report the protect situation to the county Forestry and Grassland Bureau.  | Before every verification | According to the records, the project restored 77,002.43 ha of seriously degraded grassland by reseeded grass which increase the wildlife habitat and reduces the threat of biodiversity. |
| Pressure variables | The frequency or intensity of anthropogenic | Number of fires occurred  | /  | The grassland guardians patrolled the management and protection area regularly, once every 15 days, recorded and reported the grassland   | Once every year           | According to the statistical results of the Forestry and Grassland Bureau, there was no fire in the project area during this monitoring period  |

|  |   |   |    |   |                 |   |
|--|---|---|----|---|-----------------|---|
|  | impacts that are directly harmful to biodiversity in the project zone |   |    | <p>fire to the county Forestry and Grassland Bureau.</p> <p>The Forestry and Grassland Bureau counted the number of grasslands fires every year according to the report records of grass guardians.</p>   |                 |   |
|  |   | <p>Effected grassland area suffered rodents and pests</p> | ha | <p>The grassland guardians patrolled the management and protection area every 15 days, record and report the rodent and insect diseases to the county Forestry and Grassland Bureau.</p> <p>The Forestry and Grassland Bureau counted effected grassland area suffered rodents and pests every year according to the report records of grass guardians.</p>                               | Once every year | 0 |
|  |   | <p>Overgrazing</p>  | ha | <p>The grassland guardians patrolled the management and protection area every 15 days, supervise the herders in the project area to implement rotational and rest grazing and reseeding grass and ensure that there is no overgrazing.</p> <p>The Forestry and Grassland Bureau shall record overgrazing circumstances according to the report records of grass guardians every year.</p> | Once every year | 0 |

|                    |  |  |    |   |                 |            |
|--------------------|--|--|----|---|-----------------|------------|
|                    |  |  |    |   |                 |            |
|                    |  | Chemical pesticides  | t  | <p>The grassland guardians patrol the management and protection area every 15 days, record and report the chemical pesticides to the county Forestry and Grassland Bureau.</p> <p>The Forestry and Grassland Bureau recorded chemical pesticides every year according to the report records of grass guardians.</p> | Once every year | 0          |
| Response variables | The frequency or intensity of project interventions relevant to biodiversity | Grassland area under prevention control from fires             | ha | The Forestry and Grassland Bureau recorded grassland area under prevention control from fires every year according to the report records of grass guardians.  | Once every year | 261,059.80 |
|                    |  | Grassland area under prevention control from rodents and pests | ha | The Forestry and Grassland Bureau recorded grassland area under prevention control from rodents and pests every year according to the report records of grass guardians.  | Once every year | 261,059.80 |
|                    |  | Project area of sustainable grassland management               | ha | The Forestry and Grassland Bureau record project area of sustainable grassland management every year according to the report records of grass guardians.  | Once every year | 261,059.80 |
|                    |  | Project area for restoration of                                | ha | The Forestry and Grassland Bureau recorded project area for restoration of degraded grassland every year  | Once every year | 261,059.80 |

|  |  |                       |  |  |  |  |
|--|--|-----------------------|--|--|--|--|
|  |  | degraded<br>grassland |  | according to the report records of<br>grass guardians. |  |  |
|--|--|-----------------------|--|--|--|--|

### **5.3.2 Biodiversity Monitoring Plan Dissemination (B4.3)**

The Biodiversity Monitoring Plan has been published on VCS and CCB website which can be easily download by stakeholders. Hard copies of Biodiversity Monitoring Plan have been distributed among local stakeholders by project proponent and the grassland guards. At the same time, public notice boards have been used to publicize information regarding how to access to the monitoring plan through internet. Technical staff from project proponent have also explained Biodiversity Monitoring Plan to local herders. Also, a contact person with phone number was published in case any stakeholders want to directly contact the project proponent and raise opinions.

For each verification, the monitoring team will summarize all the comments received from stakeholders and corresponding responses regarding Biodiversity Monitoring Plan and results, which will be published on VCS and CCB website along with the monitoring report for each monitoring period.

During this monitoring period, no comments on the monitoring plan and results received yet.

### **5.4 Optional Criterion: Exceptional Biodiversity Benefits**

Not applicable.

#### **5.4.1 Trigger Species Population Trends (GL3.3)**

Not applicable.

## **6 ADDITIONAL PROJECT IMPLEMENTATION INFORMATION**

Not applicable.

## **7 ADDITIONAL PROJECT IMPACT INFORMATION**

Not applicable.