

Annex 13b

Assessment of GHG emission reductions and their monitoring and reporting

to the GCF Funding Proposal

Climate-resilient landscapes in Central Asia

August 2026

Version 1.1

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Abbreviations and Acronyms

AE	Accredited Entity
AGB	Above Ground Biomass
ALM	Agricultural Land Management
BGB	Below Ground Biomass
CDM	Clean Development Mechanism
CH ₄	Methane
CO ₂	Carbon dioxide
DBH	Diameter at Breast Height
EF	Emission Factor
EX-ACT	Environmental Externalities Accounting Tool
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GHG	Greenhouse Gas
GH	Greenhouse
GIS	Geospatial Information Systems
IPCC	International Panel on Climate Change
IPM	Integrated Pest Management
IIASA	International Institute for Applied Systems Analysis
M&E	Monitoring and Evaluation
MoA	Ministry of Agriculture
MRV	Measurement, Reporting and Verification
NDC	Nationally Determined Contribution
NFI	National Forest Inventory
NIR	National Inventory Report
N ₂ O	Nitrous Oxide
NPK	Nitrogen Phosphorus and Potassium
NTFP/ NTFPs	Non-Timber Forest Product(s)
OF	Open Field
PPP	Public and Private Partnerships
LDN	Land Degradation Neutrality
LU	Land Use
SFE	State Forest Enterprise
SME	Small and Medium-sized Enterprise
SOC	Soil Organic Carbon
tCO ₂ e	Tonnes of Carbon Dioxide Equivalent
VCS	Verified Carbon Standard

Executive Summary

The project Climate-resilient Landscapes in Central Asia will be implemented in the Kyrgyz Republic, Tajikistan, and Uzbekistan. The project aims to enhance the climate resilience of the most vulnerable populations and of the transboundary landscapes they depend upon.

The greenhouse gas (GHG) assessment aims to transparently quantify the project's mitigation impact.

The project targets 78,929 ha of agricultural land and 860,425 ha of restoration activities, for a total direct implementation area of 929,690 ha. The intervention package combines: (i) improved agricultural land management in croplands and perennial systems (e.g., conservation agriculture in rainfed cereals, seed potato production, horticulture, improved orchard management and establishment and management of new orchards), and (ii) land restoration measures in grasslands and forests (sustainable pasture use and pasture restoration, afforestation/reforestation on degraded open land, and forest restoration), with mitigation driven primarily by increased soil organic carbon (SOC) and biomass growth.

The aggregated ex-ante mitigation impact for the full intervention portfolio across the three countries is estimated at -277,642 tCO₂e by mid-term (3.5 years), -1,271,826 tCO₂e by the end of implementation (7 years), and -6,953,950 tCO₂e over the 20-year mitigation lifetime.

Mitigation impacts are quantified ex-ante using FAO EX-ACT (Excel v9.4.2) (FAO, 2022) and will be updated annually using monitored activity data. EX-ACT applies a scenario-based approach comparing a "with-project" scenario against a "without-project" baseline, reporting the carbon balance as the difference in total emissions and removals. The tool separates impacts into an implementation phase and a capitalization phase to reflect continued effects after implementation. The EX-ACT assessments are compiled in three country-specific worksheets and one summary sheet, which report annual results by activity and totals at mid-term, end of implementation and over the mitigation lifetime.

In alignment with GCF guidance in support of decision B33/12 (GCF, 2024), EX-ACT is complemented by established methodologies to set boundaries, define baselines, demonstrate additionality, address leakage and structure MRV: Verra VM0042 v2.2 (Verra, 2025) for agricultural activities and CDM AR-ACM0003 v2.0 (CDM, 2013a) for afforestation/reforestation and enhancement of forest carbon stocks, including use of the CDM combined tool for baseline and additionality determination (CDM, 2007).

Key assumptions include: (i) the baseline scenario generally reflects continuation of pre-project practices (consistent with VM0042 baseline logic); (ii) the accounting covers CO₂, CH₄ and N₂O and uses IPCC AR5 Global Warming Potentials consistent with national inventories (iii) EX-ACT is set up for 7 years of implementation plus 13 years of capitalization (20-year total horizon) and reporting follows GCF formats for annual ex-post and cumulative values, as well as ex-ante mid-term (3.5 years), final (7 years) and lifetime targets; agriculture activities apply a 7-year mitigation lifetime, while afforestation, reforestation and restoration apply a 20-year lifetime; and (iv) assumptions are aligned with national reporting by applying country-specific emission factors from National Inventory (Kyrgyz Republic, 2025; Republic of Tajikistan et al., 2024; Republic of Uzbekistan et al., 2024) and forestry parameters from the Second National Forest Inventory of The (Kyrgyz Republic, Unique land use, et al., 2022) as it provides the most comprehensive forestry data. Leakage is considered where relevant (e.g., additional manure sourced from outside project areas; potential grazing displacement).

The proposed MRV system will measure baseline parameters at the start of implementation and monitor key activity and emissions-driver data annually. Results will be disclosed through the Annual Performance Report, supported by archiving of EX-ACT model files and datasets and GIS layers.

1. Introduction

The climate Resilient Landscapes in Central Asia will be implemented in the Kyrgyz Republic, Tajikistan, and Uzbekistan. The project aims to enhance the climate resilience of the most vulnerable populations and of the transboundary landscapes they depend upon in Central Asia.

The project effectively addresses the countries' needs and supports their Nationally Determined Contributions (NDCs) and Land Degradation Neutrality (LDN) targets.

This assessment aims to transparently quantify the project's mitigation impact by defining the impact boundaries, establishing a credible baseline and demonstrating additionality to ensure that emission reductions and removals are attributable to the intervention. The assessment also outlines the MRV approach and data needs to provide periodic updates for GCF reporting, while aligning assumptions and emission factors with national inventories.

The GHG assessment was conducted using the FAO EX-ACT tool (v9.4.2) (FAO, 2022). In alignment with GCF guidance in support of decision B33/12 (GCF, 2024), EX-ACT was complemented with Verra VM0042v2.2 (Verra, 2025) for agricultural activities and CDM AR-ACM0003 v2.0 (CDM, 2013a) for forest activities, to set boundaries, establish the baseline, demonstrate additionality, and define MRV steps. The analysis used country-specific emission factors from national inventory reports (Kyrgyz Republic, 2025; Republic of Tajikistan et al., 2024; Republic of Uzbekistan et al., 2024) and the Second Forest National Inventory of The Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022) to align with national reporting as outlined in the GCF guidance. The MRV system will generate data to calculate GCF Mitigation Core Indicator 1 (tCO₂e reduced) via ex-ante estimates and annual updates, with baseline and annual monitoring results reported in the Annual Performance Report.

Section 2 presents a detailed explanation of the methodological approach followed in the assessment including applied deviations and parametrization. Section 3 presents a detailed explanation of the results at the project level and for each of the countries. Under section 3.1 the document describes the activities to be implemented in each of the countries, the estimated GHG fluxes and their drivers. In addition, section 3.1 explains how boundaries, baseline and additionality was determined and the key parameters used in the assessment. Section 4. Provides a description of the MRV to be used in line with the ex-ante assessment.

The project will target 78,929 hectares of agricultural lands and 860,425 hectares for restoration activities, achieving a total area of direct implementation of 939,353 hectares.

The carbon balance at implementation (7 years) is estimated at -1,271,826 tCO₂e. The lifespan carbon balance at 20 years is estimated at -6,953,950 tCO₂e.

2. Methodological Approach

The GHG assessment used the FAO EX-ACT tool (Excel version 9.4.2) (FAO, 2022), combined with relevant mitigation methodologies, to determine impact boundaries, define the baseline, determine additionality, and outline the steps for measurement, reporting, and verification (MRV), as indicated in the guidance for establishing the mitigation impact potential of GCF-funded activities in support of decision B33/12 (GCF, 2024). The methodologies used to complement EX-ACT were:

- For agricultural activities: Verra VM0042 *Improved Agricultural Land Management*, v2.2. (Verra, 2025)
- For reforestation and afforestation activities and enhancing carbon stocks in existing forests: the CDM A/R large-scale consolidated methodology for *Afforestation and Reforestation of Lands Except Wetlands* (CDM, 2013a), used to define the carbon pools and emission sources involved, and, consistent with the methodology, the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” to assess the baseline and additionality.

Following the requirements outlined in the GCF guidance (GCF, 2024), the analysis has been complemented by using country specific emission factors from National Inventories (Kyrgyz Republic, 2025; Republic of Tajikistan et al., 2024; Republic of Uzbekistan et al., 2024) and the Second Forest National Inventory of The Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022) to ensure project alignment to the national NDCs when those diverge from the Tier 1 values already integrated in EX-ACT.

The MRV system described will produce the information required to calculate GCF Mitigation Core Indicator 1 (tCO₂eq reduced) using EX-ACT for ex-ante estimates and annual updates based on monitored activity data and measured parameters. Agricultural practice monitoring and verification is guided by VM0042 requirements and Afforestation, reforestation and enhancing forest carbon stocks monitoring is guided by AR-ACM0003. The MRV system will measure and collect all MRV parameters at the start of implementation (baseline) and then annually, with results disclosed in the Annual Performance Report.

2.1 Mitigation Impact Calculation Methodology(ies)

EX-ACT – Environmental eXternalities ACcounting Tool (previously EX-Ante Carbon balance Tool) (FAO, 2022)

EX-ACT excel version 9.4.2. has been used to perform GHG fluxes calculations. This version has been developed using primarily volume 4 of the 2019 Refinement to the 2006 Guidelines for National Greenhouse Gas Inventories (IPCC, 2019) and the 2013 Supplement to the IPCC, 2006 Guidelines for National Greenhouse Gas Inventories (IPCC, 2014).

EX-ACT is a land-use based GHG accounting tool developed by FAO to estimate how agriculture and land-use interventions affect GHG emissions and carbon stock changes. It quantifies changes across five carbon pools: above-ground biomass, below-ground biomass, litter, deadwood, and soil carbon incorporates emissions sources from livestock, infrastructure and inputs. EX-ACT permits the inclusion of tier 2 values (e.g. country specific EF).

EX-ACT applies a scenario-based approach in which it compares a “with project” scenario to a “without project” (baseline/reference) scenario. The tool then reports the project's carbon balance as the difference in total GHG emissions and removals between these two situations. To capture how impacts evolve over time, EX-ACT separates the analysis into two distinct periods: an implementation phase, when project activities are introduced or expanded, and a capitalization phase, when the effects of those activities continue after implementation. For each activity, EX-ACT calculates the gross emissions or removals in both scenarios using either emission factors or biomass growth rates, multiplied by the relevant activity units. Once the capitalization period ends, EX-ACT assumes that the activity-related GHG fluxes stop, and the user defines the duration of both the implementation and capitalization phases to ensure consistency with the accounting approach applied.

The assessment consists of three country specific EX-ACT excel worksheets and one summary excel sheet. The calculation tab of each country excel assessment presents annual results for each activity, mid-term, implementation and lifespan. The summary sheet presents the results for each country and the aggregated project results.

The assessment uses national emission factors and specific agricultural practices defined in each of the National Inventory reports (Kyrgyz Republic, 2025; Republic of Tajikistan et al., 2024; Republic of Uzbekistan et al., 2024) for activities in agriculture. However, forestry activities use values from the Second National Forest Inventory Report in The Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022) because it contains the most accurate and comprehensive forestry data.

The EX-ACT¹ was set up to account for 6 years of implementation and 13 years of capitalization and considers the three main GHG gases: Carbon Dioxide (CO₂), Methane (CH₄) and Nitrous Oxide (N₂O). The assessment uses the Global Warming Potential values from the IPCC fifth Assessment report in line with all the national inventories. The values are reflected in 1. Description tab of each EX-ACT assessment (Figure 1)

Figure 1. Global Warming Potential applied in the assessment

1.3 Global warming potential	
Source:	100 yr AR5 w/out CC feedback
CO ₂	1
CH ₄	28
N ₂ O	265

For consistency all three EX-ACT assessments are set up to a Cool Temperate Dry climate representing the Fergana valley. Climate was defined using the climate identifier in EX-ACT (Figure 2), developed following IPCC methodology and available at the HELP tab.

Figure 2. EX-ACT climate identifier reflecting climate parameters

CLIMATE IDENTIFIER		
MAT	Mean Annual Temperature in C	6.2
MAP	Mean Annual Precipitation in mm	349
PET	Potential Evapotranspiration in mm	1,520
Elevation	Elevation above sea level	1,897
Climate	Cool Temperate	
Moisture	Dry	

The Earth map platform (Morales et al., 2023) was used to retrieve the appropriate datasets. Values represent the mean of the last 20 available years.

Mean annual precipitation	CHIRPS
Mean average Temperature	ERA5-Land Monthly Aggregated - ECMWF Climate Reanalysis
Potential evapotranspiration	MOD16A2GF.061: Terra Net Evapotranspiration Gap-Filled 8-Day Global 500m
Mean elevation	SRTM Digital Elevation Data Version 4

¹ In the Tier 2 section of each module's Excel worksheet, EX-ACT allows users to specify the implementation year for each activity (each represented by an analysis row). The analysis did not make use of this feature. In the country files the revision was applied in the 'Calculations' tab, from which the Summary tab is populated; the 'Results' tab retains the earlier year alignment, so the revised 'Calculations'/'Summary' tab presents the programme results starting implementation in year 2.

Similarly, the calculation tab applies a differentiated lifetime values for agriculture (7 years) and ARR (20 years) to align to the GCF Guidance for establishing the mitigation impact potential of GCF funded activities in support of Decision B.33/12.

The dominant soil type was defined as High Activity Clay Soils using the reclassification of the Harmonized World Soil Database 2.0 (FAO & IIASA, 2023) to IPCC soil classes available the earth map data platform. (Morales et al., 2023). All data is available in the earthmap tab in each national assessment. The SOC reference was set to 43tC/ha according to IPCC table 2.3.

The SOC ref applied in the assessment is 43 tC/ha according to IPCC, 2019 table 2.3. The aim was to provide comparable results among the countries and ensure consistency in the assessment.

The values deviate from the national inventories.

The NIR in Kyrgyzstan does not provide specific SOCref value (Kyrgyz Republic, 2025). However, following IPCC, 2006 tables, SOCref in cool temperate climate = 50tC/ha. The value deviates from the NIR in Uzbekistan which considers the climate as Warm temperate dry and a SOCref of 38tC/ha for mineral soils (Republic of Tajikistan et al., 2024). The value deviates from the NIR in Tajikistan which considers an aggregate value for High Activity Clay soils considering all different types of climates in the country of 47.25 tC/ha (Republic of Uzbekistan et al., 2024) .

The scenarios defined by applying the VM0042 methodology were translated using the tables in EX-ACT (Table 29) in Appendix 1.

VM0042 – improved Agricultural Land Management, version 2.2 (Verra, 2025)

VM0042 is an agricultural land management (ALM) methodology developed by VERRA to quantify GHG emission reductions and removals resulting from the adoption of improved ALM practices. The methodology applies to all agricultural activities under the project including activities in croplands and grasslands.

In the methodology, “the continuation of pre-project ALM practices is determined to be the most plausible scenario”. Therefore, the project baseline assumes pre-project management continues unchanged.

The definition of baseline practices in the assessment deviated from VM0042 requirements of at least a three-year historical look-back to develop an annual schedule of management activities (e.g., tillage, planting, harvesting, and fertilization). The practices considered in the baseline reflect common historical agricultural practices framed into IPCC practices and operationalized in EX-ACT. The definition of historical agricultural practices relied on interviews and data collection from agricultural experts in Tajikistan, The Kyrgyz Republic and Uzbekistan and complemented with secondary sources when required.

The methodology requires applying the principle of conservativeness. Therefore, the assessment selected emission factors and practices that yielded the lowest expected baseline emissions or the highest baseline stock increase to avoid overestimating.

Additionality is demonstrated using the project method. It requires a step-by-step process to demonstrate **regulatory surplus, barrier analysis** and confirmation that the proposed practice changes are **not common practice**. A practice change may include adopting a new practice, discontinuing an existing one (e.g., tillage or irrigation), modifying an existing practice, or a combination of these actions. The barrier analysis must consider financial barriers, information barriers and institutional barriers. **Common practice is defined as adoption greater than 20%**. The methodology applies a two-step approach: first, determine whether adoption is **below 20%** in the region; if adoption appears **above 20%** or if reliable data are not available, then in step 2 proponents must instead demonstrate the activity is not common practice by comparing the activity to other initiatives in the host country with similar activities being promoted and demonstrate how the project activity differs.

The **project boundary** spatial extent is defined as “all lands planning to implement the proposed improved ALM practice(s)”². In these lands carbon pools to be included in the project boundary in both scenarios include above ground woody biomass, and SOC. The inclusion of Below ground woody biomass is optional. All other pools are not to be included. It also describes sources to be included (Table 1).

² Accounting must not occur on lands that have been cleared from native vegetation within 10 years, must not be organic soils, must not be wetlands.

Table 1: Sources of emissions to be considered under VM0042

Source	Gas	Included?	Justification/Explanation
SOC	CO ₂	Yes	Quantified as stock change in the pool, rather than an emissions source
Fossil Fuel	CO ₂	S*	Sources of fossil fuel emissions are vehicles (mobile sources, such as trucks, tractors) and mechanical equipment required by the ALM activity.
Liming	CO ₂	S*	Application of limestone or dolomite as soil amelioration may represent a significant source of CO ₂ .
Soil methanogenesis	CH ₄	S*	Anoxic conditions in soils may lead to soil methanogenesis.
Enteric Fermentation	CH ₄	Yes	Where livestock are present in the project or baseline scenarios, CH ₄ emissions from enteric fermentation must be included in the project boundary.
Manure Deposition	CH ₄	Yes	Where livestock are present in the project or baseline scenarios, CH ₄ and N ₂ O emissions from manure deposition and management must be included in the project boundary.
	N ₂ O	Yes	
Use of nitrogen fertilizers	N ₂ O	Yes	Must be included where: The project area would have been subject to nitrogen fertilization in the baseline scenario; or Nitrogen fertilization is greater in the with-project scenario relative to the baseline scenario.
Use of nitrogen-fixing species	N ₂ O	Yes	Where nitrogen-fixing species are planted in the project, N ₂ O emissions from nitrogen-fixing species must be included in the project boundary.
Biomass burning	CO ₂	Excluded	Carbon stock decreases due to burning are accounted as a carbon stock change.
	CH ₄	S*	Biomass burning releases CH ₄ .
	N ₂ O	S*	Biomass burning releases N ₂ O.
Woody biomass	CO ₂	S*	Quantified as stock change in the pool rather than an emissions source

S* – Must be included where the project activity significantly increases emissions (i.e., by more than 5%) compared to the baseline scenario and may be included where the project activity reduces emissions compared to the baseline scenario.

Source: VM0042 table 3: GHG sources included in or excluded from the project boundary in the baseline and project scenarios.

The methodology allows the exclusion of carbon pools and sources based on a de minimis threshold if their combination does not reach a 5% of the total project GHG benefits. The de minimis rule can be applied to leakage.

Leakage occurs through new applications of organic amendments from outside the project area, productivity declines, displacement of livestock outside of the project boundary and/or diversion of biomass residues that were used for bioenergy applications in the baseline scenario.

Leakage occurs under the project through the application of organic amendments from outside the project area. Leakage has been only calculated for activities with increased manure use from outside the project, with net emission reductions or net removals and when this manure was used previously as organic soil amendment.

AR-ACM0003 - A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands Version 02.0 (CDM, 2013a)

This methodology permits afforestation and reforestation on any land that is not classified as wetland and was developed by the Clean Development Mechanism. The methodology applies to afforestation and reforestation activities under the project.

The methodology has been adapted to account for sustainable forest management activities, which enhance existing carbon stocks. The methodology has been applied under the consideration that pre-project stands are mature and approaching a steady state, if not decreasing, and forest regeneration is not occurring, reflecting a change in biomass in the baseline as zero. Therefore, consistent with AR-Tool14 (CDM, 2013a) used to calculate carbon stock changes baseline net removals “conditions under which carbon stock and change in carbon stock may be estimated zero” are met: (1) “pre-project trees are neither harvested nor cleared nor removed during project implementation”; (2) pre-project trees do not suffer mortality because of competition of trees planted or damaged because of implementation of activities” and; (3) “pre-project trees are not measured together with project trees when monitoring, but their ongoing presence is monitored throughout the crediting period confirming they remain consistent with baseline scenario.”

The project boundary includes the land subject to project activity and the following carbon pools: above-ground biomass and below-ground biomass, while dead wood, litter, and soil organic carbon may be included on an optional basis. The assessment includes Above and below ground biomass. Emissions from burning woody biomass for site preparation or for forest management purposes (CH₄ and N₂O) can also be incorporated. The assessment has not identified burning in either case.

As indicated by the methodology, the assessment applied the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities version 1” (CDM, 2007). The assessment followed the defined step-by-step approach for identifying the baseline scenario while also demonstrating additionality. The assessment disregarded step 0 preliminary screening. Therefore, the approach used:

- Step 1. Identification of alternative land use scenarios to the proposed A/R CDM project activity
- Sub-step 1a: Identify credible alternative land use scenarios to the proposed activity;
At a minimum the identified scenarios must include:
 - o Continuation of the pre-project land use
 - o Forestation of the land within the project boundary performed without being registered as the GCF project activity.
- Sub-step 1b. Consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations.
 - o Demonstration that land use scenarios are following all regulatory requirements, if not compliant, then that regulations are not enforced and remove land use scenarios that do not fall under those conditions.
- Step 2. Barrier Analysis.
- Sub-step 2a. Identification of barriers that would prevent the implementation of at least one alternative land use scenario.
- Sub-step 2b. Elimination of land use scenarios that are prevented by the identified barriers.
- Sub-step 2c. Determination of a baseline scenario (if allowed by the barrier analysis).
- Step 3. Investment analysis has not been performed as barrier analysis has deemed only one possible land use scenario.
- Step 4. Common practice analysis
Analysis of the extent to which afforestation is already happening and the differences among them.

Leakage due to displacement of agricultural activities is to be accounted under tool 15 “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity” (CDM, 2013a). In this project, the only potentially relevant leakage source due to the implementation of Afforestation and reforestation practices and enhancement of forests carbon stocks is the displacement of grazing activities. However, the project provides improved access to until now remote grazing areas. The combined number of animals (existing plus displaced) will not exceed the carrying capacity of the receiving grazing land. Under this condition, “leakage emissions associated with grazing displacement are expected to be insignificant and then accounted as zero”.

3. Ex- ante Mitigation Impacts

The project will target 78,929 hectares of agricultural lands and 860,425 hectares for restoration activities achieving a total area of direct implementation of 939,354 hectares.

The carbon balance at implementation (7 years) is estimated at -1,271,826 tCO₂e. The lifespan carbon balance at 20 years is estimated at -6,953,950.

The project in Uzbekistan will target 22,425 hectares of agricultural lands and 141,849 hectares for restoration activities achieving a total area of direct implementation of 164,274 hectares. The carbon balance at implementation (7 years) is estimated at -236,238 tCO₂e. The lifespan carbon balance at 20 years is estimated at -982,941 tCO₂e.

The project in The Kyrgyz Republic will target 21,386 hectares of agricultural lands and 458,324 hectares for restoration activities achieving a total area of direct implementation of 479,710 hectares. The carbon balance at implementation (7 years) is estimated at -695,844 tCO₂e. The lifespan carbon balance at 20 years is estimated at -4,015,852 tCO₂e.

The project in Tajikistan will target 35,119 hectares of agricultural lands and 260,251 hectares for restoration activities achieving a total area of direct implementation of 295,370 hectares. The carbon balance at implementation (7 years) is estimated at -339,744 tCO₂e. The lifespan carbon balance at 20 years is estimated at -1,955,157 tCO₂e.

Table 2: Total Ex-ante GHG project results per activity at mid-term, end of implementation and project lifespan

Activity		Mitigation potential (tCO ₂ e)			
Description	Area (ha)	Lifespan	Mid-term (3.5 years)	Implementation (7 years)	Lifespan
Conservation agriculture in rainfed cereal production	29,495	7	-11,480	-29,929	-29,929
Seed potato production in highland areas	939	7	-447	-1,895	-1,895
Horticulture	21,358	7	-872	-4,069	-4,069
Orchards in unproductive rainfed land	73	7	-319	-1,487	-1,487
Improved orchard management technologies	27,065	7	-16,276	-75,955	-75,955
Sustainable and climate resilient use of pastures	641,457	20	-131,267	-612,580	-3,617,141
Pasture restoration	160,801	20	-65,827	-307,194	-1,813,906
Afforestation and Reforestation on Degraded open land	2,380	20	-1,706	-7,963	-47,021
Forest Restoration	55,786	20	-49,447	-230,754	-1,362,548
TOTAL	939,354	20	-277,642	-1,271,826	-6,953,950

Table 3: Ex-ante GHG project results per activity at mid-term, end of implementation and project lifespan in Uzbekistan

Activity		Mitigation potential (tCO ₂ e)			
Description	Area (ha)	Lifespan	Mid-term (3.5 years)	Implementation (7 years)	Lifespan
Conservation agriculture in rainfed cereal production	-	7	0	0	0
Seed potato production in highland areas	295	7	5	25	25
Horticulture	13,158	7	-1,649	-7,696	-7,696
Improved orchard management technologies	8,972	7	-16,356	-76,327	-76,327
Sustainable and climate resilient use of pastures	98,825	20	-10,956	-51,126	-301,887
Pasture restoration	24,706	20	-5,478	-25,563	-150,943
Afforestation and Reforestation on Degraded open land	280	20	-201	-937	-5,532
Forest Restoration	18,038	20	-15,989	-74,615	-440,582
TOTAL	164,274	20	-50,622	-236,238	-982,941

Table 4: Ex-ante GHG project results per activity at mid-term, end of implementation and project lifespan in The Kyrgyz Republic

Activity		Mitigation potential (tCO ₂ e)			
Description	Area (ha)	Lifespan	Mid-term (3.5 years)	Implementation (7 years)	Lifespan
Conservation agriculture in rainfed cereal production	15,897	7	-9,101	-18,826	-18,826
Seed potato production in highland areas	324	7	-104	-296	-296
Horticulture	3,711	7	276	1,288	1,288
Orchards in unproductive rainfed land	73	7	-319	-1,487	-1,487
Improved orchard management technologies	1,381	7	80	372	372
Sustainable and climate resilient use of pastures	336,491	20	-74,606	-348,163	-2,055,820
Pasture restoration	84,385	20	-37,419	-174,624	-1,031,112
Afforestation and Reforestation on Degraded open land	1,000	20	-717	-3,346	-19,757
Forest Restoration	36,448	20	-32,306	-150,762	-890,215
TOTAL	479,710	20	-154,217	-695,844	-4,015,852

Table 5: Ex-ante GHG project results per activity at mid-term, end of implementation and project lifespan in Tajikistan

Activity		Mitigation potential (tCO ₂ e)			
Description	Area (ha)	Lifespan	Mid-term (3.5 years)	Implementation (7 years)	Lifespan
Conservation agriculture in rainfed cereal production	13,598	7	-2,379	-11,103	-11,103
Seed potato production in highland areas	320	7	-348	-1,624	-1,624
Horticulture	4,489	7	501	2,339	2,339
Improved orchard management technologies	16,712	7	0	0	0
Sustainable and climate resilient use of pastures	206,141	20	-45,705	-213,291	-1,259,434
Pasture restoration	51,710	20	-22,930	-107,007	-631,851
Afforestation and Reforestation on Degraded open land	1,100	20	-789	-3,680	-21,732
Forest Restoration	1,300	20	-1,152	-5,377	-31,752
TOTAL	295,370	20	-72,802	-339,744	-1,955,157

3.1 Mitigation Activity(ies) – Activity Description and Scenarios

3.1.1 Kyrgyz Republic

Conservation agriculture in rainfed cereal production

The activity will be implemented in 15,897 ha. The carbon balance for the intervention is -18,826 tCO₂e of removals during 7 years of accounting. This outcome is driven by the shift to no-till management and increased of organic inputs through residue retention and crop rotations. These practices convert the soil organic carbon (SOC) pool from a source to a sink. The resulting increase in SOC stock compensates increased emissions associated with fertilizer use, leading to an overall enhanced removal of GHG emissions.

The determination of impact boundaries followed VM0042, the spatial extent considered wheat areas cultivated under traditional practices to transition to no-till wheat. According to the methodology the Soil Organic Carbon pool is the only considered as no woody biomass exists in annual croplands. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, N-fixing crops and Residue burning.

The lifespan of the activity is 7 years.

The **proposed GCF intervention** will finance and scale a package of improved agricultural land management (ALM) practices including no-till supported by direct seeding, residue retention, improved nutrient management (organic and mineral), and improved rotations including legumes, alongside capacity building and advisory services to manage transition risks (e.g., weed pressure and potentially higher herbicide and manual weeding needs). The financial support of the project will focus on making no-till accessible to farmers and no-till service providers.

The baseline reflects the continuation of pre-project ALM practices. Therefore, in the absence of the project, farmers would continue traditional production of a spring cereal crop (spring wheat or barley) in a single growing season, using conventional tillage as the standard land preparation practice. Crop residues are typically removed from the field and sometimes sold. Residue retention is constrained where free-grazing livestock enter fields and consume residues, reflecting limited control of animals at field level. Soil nutrient management in the baseline is characterized by application of mineral fertilizers and no application of organic amendments.

Additionality has been demonstrated according to VM0042 v.2.2:

Step 1. Regulatory surplus: A review of publicly available official legal and regulatory instruments (e.g., legislation on land use and on farm holdings) indicates that these frameworks do not include provisions that directly require farmers to adopt no-tillage practices as a legal obligation. While such laws govern land-use arrangements and the organizational and economic aspects of agricultural production, they do not prescribe mandatory agronomic management requirements (e.g., specifying tillage management practices).

Hence, this additionality condition is met for the project.

Step 2. Barrier analysis:

- **Financial barriers:** Adoption is constrained by the high capital cost of specialized no-till equipment (e.g., direct sowing) and by limited access to credit due to high interest rates, limited availability of appropriate products, and complex requirements. These constraints prevent farmers from acquiring the machinery and services needed to implement no-till in practice. In addition, farmers face higher costs and perceive economic risk during the transition period, which further weakens the feasibility of shifting away from conventional tillage without dedicated support.
- **Information and capacity barriers:** Farmers often lack the necessary knowledge and practical experience to implement no-till successfully, including skills related to residue management and crop rotation and lack of access to training materials in Kyrgyz language.
- **Technology barrier:** Even where farmers are interested, no-till is difficult to implement without reliable access to enabling technology and the associated input supply chain.

The project overcomes these barriers by providing integral support on accessing the required technology and advisory services during the transition.

Hence, additionality condition is met for the project.

Step 3. Common practice: The share of no-tillage technology implementation is concentrated primarily in the southern regions of the country: Osh and Jalal-Abad Regions. The total area under wheat cultivation in The Kyrgyz Republic is 247,600 hectares, of which 4,200 hectares are no-till, equivalent to approximately 1.7% of the total wheat area³. However, of the country's total rainfed land area of 438,000 hectares, no-till cultivation covers less than 1%. This indicates the extremely limited adoption of no-till technology in The Kyrgyz Republic's agriculture. No-till wheat adoption is below 20% adoption threshold.

Hence, this additionality condition is met.

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 6: Conservation agriculture changes of practices in The Kyrgyz Republic according to VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Crop harvesting	Wheat yield 1.8 t/ha	Wheat yield; 2.5 t/ha	3.Cropland 3.1 Annual cropping system remaining annual cropping system (the activity is represented under 2 lines of analysis)
Tillage and residue management	Tillage: Full tillage Residues: Exported (sold/removed; also grazed off-field effect)	Tillage: No-till (direct seeding) Residues: Retained	
Residue burning	No	No	
Input of organic material	Carbon input: Low (no organic amendments, residues removed and only synthetic fertilizer application)	Carbon input: Medium (introduction of legumes in rotations and residue retention)	
Nitrogen Fertilizer application	Urea: 100 kg/ha Ammonium phosphate: 0 kg/ha	Urea: 150 kg/ha Ammonium phosphate: 100 kg/ha	9.Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	Yes. Yield (Other pulses): 1.48 t/ha Residue: retained	3.Cropland 3.1 Annual cropping system remaining annual cropping system (Tier 2- minor season crop)
Water management/irrigation	No	No.	
Fossil fuel (ploughing)	Mobile – Diesel: 42 l/ha for ploughing, harrowing, conventional seeding	Mobile – diesel: 15 l/ha for no till seeding.	9.Inputs and investments – 9.2 Energy consumption – Liquid or gaseous; Mobile – gasoil/ diesel Oil.

Assumptions:

³ Total wheat area data are sourced from the National Statistics Committee of the Kyrgyz Republic. Estimates of no-till adoption area are based on information provided by various projects and organizations that promote and support no-till practices, including communication AFC.

- The NIR (Kyrgyz Republic, 2025) does not provide national parameter values for the cropland coefficients F_{LU} , F_{MG} and F_{MG} , which are used to estimate SOC stock changes in croplands as per IPCC methodology. Therefore, assumptions were developed using the IPCC practice-based definitions applied in EX-ACT, informed by interviews with agricultural experts in The Kyrgyz Republic.
- Nitrogen fixing species residue production. Other pulses were assumed as the legume crop to be added in the rotation. Yields were extracted from FAOSTAT and represented an average of the last 5 available years (2020-2024)
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

Seed potato production in highland areas

The activity will be implemented in 324 ha. The carbon balance for the intervention is - 296 tCO₂e of avoided emissions during 7 years of accounting. This outcome is driven by the increase of organic inputs through residue retention and crop rotations and reduced use of urea. These practices compensate the induced emissions from soil carbon losses due to reduced tillage and implementation of irrigation systems.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of ware potato cultivation under traditional practices to transition to improved seed potato production. According to the methodology the Soil Organic Carbon pool is the only considered as no woody biomass exists in annual croplands. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of nitrogen-fixing crops and residue burning. The lifespan of the activity is 7 years.

The **proposed GCF intervention** will scale up the certified seed potato production by addressing the seed potato system. It will (i) expand and strengthen four-field crop rotations that integrate potatoes with grains and forage crops (e.g., sainfoin) and promote efficient agronomy and technologies for the non-potato rotation crops to maintain productivity and soil health including reduced tillage practices; (ii) improve water management through deployment of sprinkler irrigation systems; (iii) invest in enabling post-harvest infrastructure, notably seed-quality storage facilities; and (iv) strengthen farmer cooperation/aggregation (e.g., through cooperatives or collective schemes) to support compliance with certification requirements, access to services and infrastructure, and market linkages.

The baseline reflects the continuation of pre-project ALM practices. Therefore, ware potato cultivation would continue the traditional spring-season production, where farmers typically hire machinery services to till the soil for land preparation before planting. Fertilizer applications would continue irregularly (varying by farmer resources and access), and fields would be irrigated only when water is available, with recurring water-access constraints affecting irrigation reliability. Harvesting would be carried out once the above-ground potato plant has dried, after which tubers are lifted and collected. Residues are removed before digging the potatoes.

Additionality has been assessed in accordance with the procedures set out in VM0042 v.2.2

Step 1. Regulatory surplus: No law mandates farmers to grow seed potato. However, the Law of the Kyrgyz Republic "On Seeds" (1997) regulates seed production and the Law of the Kyrgyz Republic "On State Subsidies in Seed Production" (February 2, 2019, No. 22) creates the legal basis for government financial support to improve the seed sector by making certified seeds of priority crops more affordable. The resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. ID-81060 dated 08.06.2023 "On additional measures to increase local potato production and further strengthen the seed base" states that actors producing certified super-elite and elite seed potatoes will receive a 50% reduction in land tax, property tax, and small enterprise turnover taxes until January 1, 2025.

Seed production is regulated and encouraged, but a law mandating farmers to transition to seed production does not exist. **Hence, this additionality condition is met for the project.**

Step 2. Barrier analysis:

- **Financial barriers:** Adoption of potato seed production is constrained by high costs of production and outdated machinery.
- **Information barriers:** Farmers lack knowledge on the crop management practices required for seed potato production and financial literacy to manage business-oriented production. At the same time, many farmers do not purchase certified seeds due to limited understanding of their benefits.
- **Institutional barriers:** The small land plot size provides a structural constraint limiting economies of scale and aggregation, limiting access to markets. There is a lack of qualified agronomists.
- **Technological barriers:** Lack of modern agriculture machinery.

The project overcomes the barriers by providing integral support on strengthening farmer cooperation and infrastructure. **Hence, this additionality condition is met for the project.**

Step 3. Common practice: The current adoption rate of certified seed potatoes is 0.3%. In The Kyrgyz Republic, the total land area for potato cultivation is 65,000 hectares, including seed and ware potato. According to the Department of Crop Expertise, farmers have applied for seed certification for a total of 213 hectares (Personal communication, 2025)

See Potato production is below 20% adoption thresholds. **Hence, this additionality condition is met.**

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 7: Potato cultivation changes of practices in The Kyrgyz Republic according to VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Crop harvesting	Ware potato yield 22 t/ha	Seed potato yield; 35 t/ha	3.Cropland 3.1 Annual cropping system remaining annual cropping system (the activity is represented under 2 lines of analysis)
Tillage and residue management	Tillage: Full tillage (plough/till pre-plant) Residues: Residues removed (plants dry in the field and are removed before digging the potatoes)	Tillage: Reduced tillage (GCF intervention objective and longer rotations) Residues: Residues removed (plants dry in the field and are removed before digging the potatoes)	
Residue burning	No	No	
Input of organic material	Carbon input: Low (irregular fertilizer; organic inputs not described; rotations short and limited)	Carbon input: Medium (longer rotations including cover crop and irrigation)	
Nitrogen Fertilizer application	Urea: 200 kg/ha Diammophoska: 200 kg/ha	Urea: 150 kg/ha Diammophoska: 200 kg/ha	9.Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	Yes, Sainfoin (other pulses) Yield (Other pulses): 1.48 t/ha Residue: retained	
Water management/irrigation	No	Yes, drip irrigation	9.Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	For conservativeness no change in fuel use in ploughing has been considered		

Assumptions:

- The NIR (Kyrgyz Republic, 2025) does not provide national parameter values for the cropland coefficients F_{LU} , F_{MG} and F_{MG} , which are used to estimate SOC stock changes in croplands as per IPCC methodology. Therefore, assumptions were developed using the IPCC practice-based definitions applied in EX-ACT, informed by interviews with agricultural experts in The Kyrgyz Republic.
- Nitrogen fixing species residue production. Other pulses were assumed as the legume crop to be added in the rotation. Yields were extracted from FAOSTAT and represented an average of the last 5 available years (2020-2024)
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

Horticulture

The activity will be implemented in 3,711 ha. The carbon balance for the intervention is 1,288 tCO₂e of induced emissions during 7 years of accounting. This outcome is driven by the increase in fertilizers induced emissions and the steady state of SOC in the project area.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of annual cropland which already produce vegetables following conventional practices which will shift to project promoted improved practices. According to the methodology the Soil Organic Carbon pool is the only considered as no woody biomass exists in annual croplands. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of N-fixing crops and residue burning.

The lifespan of the activity is 7 years.

The proposed GCF intervention will support the adoption of improved agricultural land management practices in vegetable production. It will introduce structural improvements by combining capacity building for farmers on whole farm agrotechnology and management practices together with facilitating access to drip irrigation and shade nets. The intervention package will also promote complementary productivity measures such as the use of drought and heat tolerant varieties and strengthened balance in use of synthetic fertilizers and manure.

The **baseline reflects the continuation of pre-project ALM practices**. Current practices follow conventional production methods with plowing, harrowing and leveling the soil before cultivation and rely on furrow irrigation. It has been identified that farmers follow improper fertilizer management, onions are overfertilized and nutrient use is focused solely on Nitrogen. Crop residues are fed to livestock or discarded rather than managed sustainably.

Additionality has been assessed in accordance with the procedures set out in VM0042 v.2.2:

Regulatory surplus: The project intervention activities are not legally mandated. However, they are in line with the government commitment into advancing agricultural production practices, for example with the Kyrgyz Republic national development program and the GLOBAL GAP framework that producers must meet to access international markets (Kyrgyz Republic, 2024; UNDP, 2025)

Hence, this additionality is met.

Barrier analysis:

- **Financial barriers:** The adoption of better irrigation systems and plant protection infrastructure are costly. Many farmers cannot afford the initial investment. In addition, these operations face rising production costs and government subsidies disproportionately support larger farms and agricultural cooperatives over smallholder producers.
- **Information barriers:** Limited understanding on the performance of varieties under climate change conditions. In addition, farmers lack financial literacy to manage a business-oriented production and know – how on use of balanced fertilizers.

- **Institutional barriers:** Current growing systems, which have established themselves over the past 2-3 years, represent highly profitable product lines that attract farmer investment, yet depend on reliable seedling supply and orientation toward export markets.

By working on capacity building and direct support in technology investment the project will overcome these barriers. **Hence, this additionality condition is met.**

Common practice:

Most vegetable farmers in the target provinces use traditional fertilizer practices with focus on nitrogen. The more balanced Diammophoska is used by a small number of farmers. Drip irrigation is now being introduced by a few innovative farmers in areas with acute deficits of irrigation water for tomatoes. For drip irrigation in onions, an extension organisation is conducting first tests. Shade nets are rarely used.

Only a small number of farmers started to use shade nets for tomatoes in one tomato area. There are no statistical figures on the adoption of climate-resilient practices in vegetable crops, but estimates by local agronomists are that the number for balanced fertilizers is below 10%, for drip irrigation below 1% and for shade nets far below 1%.

Hence, this additionality condition is met.

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 8: Horticulture changes of practices in The Kyrgyz Republic based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Crop harvesting	Onion: 36 t/ha Tomato: 40 t/ha Tomato: 40 t/ha Average: 39 t/ha	Onion: 45 t/ha Tomato: 55 t/ha Tomato early: 80 t/ha Average: 60 t/ha	3. Cropland 3.1 Annual cropping system remaining annual cropping system (the activity is represented under 2 lines of analysis)
Tillage and residue management	Tillage: Full tillage (ploughing, harrowing and levelling) Residues: Exported	Tillage: Full tillage (ploughing and levelling) Residues: Exported	
Residue burning	No	No	
Input of organic material	Carbon input: medium (residues removed and use of organic amendments)	Carbon input: Medium (residues removed and use of organic amendments)	
Nitrogen Fertilizer application	Averages from 3 crops above: Urea: 550 kg/ha Ammonium Nitrate: 550 kg/ha Ammonium Phosphate: 250 kg/ha Diammophoska: 0 kg/ha Manure: 8t/ha	Averages from 3 crops above: Urea: 416 kg/ha Ammonium Nitrate: 100 kg/ha Ammonium Phosphate: 133 kg/ha Diammophoska: 416 kg/ha Manure: 17t/ha	9. Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	No	
Water management/irrigation	Yes, furrow irrigation	Yes, drip irrigation	9. Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	No change in fuel use		

Assumptions:

- The NIR (Kyrgyz Republic, 2025) does not provide national parameter values for the cropland coefficients F_{LU} , F_{MG} and F_{MG} , which are used to estimate SOC stock changes in croplands as per IPCC methodology. Therefore, assumptions were developed using the IPCC practice-based definitions applied in EX-ACT, informed by interviews with agricultural experts in The Kyrgyz Republic.
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

Orchards in unproductive rainfed land

The activity will be implemented in 73 ha. The carbon balance for the intervention is -1,487 tCO₂e of enhanced removals during 7 years of accounting. This outcome is driven by enhanced removals from biomass growth that compensate the induced emissions from the use of inputs including fertilizers.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of unproductive rainfed land where orchards will be planted. According to the methodology the Soil Organic Carbon pool and AGB and BGB are considered. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of N-fixing crops and residue burning.

The lifespan of the activity is 7 years.

Leakage has been identified from the additional application of manure from outside the project area. Leakage is calculated using equation 33 (Verra, 2025). The identified leakage has been deemed de minimis. Cumulative emissions from leakage in year 7 are estimated at 20 tCO₂e and therefore, will not represent more than 5% of the activity removals (see calculation sheet from the EX-ACT excel file).

The **GCF funded intervention** will establish intensively managed orchards on existing unproductive rainfed land. Orchards are going to be intercropped on the initial years and enable integrated fodder management, cut and carry grass for livestock feed and where appropriate maintain winter grazing. For these new orchards, irrigation infrastructure, including drip irrigation and wells, will be installed. Cultivars with flowering periods that minimize the risk of frost damage, as well as drought and heat-tolerant cultivars will be planted. Further, the introduction of soil testing and advisory services to optimize nutrient inputs and crop protection practices, regular application of manure and synthetic fertilizers at appropriate rates will result in higher yields and profits. No burning of residues.

The **baseline reflects the continuation of pre-project ALM practices** Therefore, in the absence of the project, the unproductive rain-fed land would continue to have limited plant cover and be used for grazing goats and sheep. The prevailing extensive, herded free-range grazing system characterized by continuous grazing on the same accessible areas. To be conservative the assessment considers a grassland under a steady condition.

Additionality has been assessed in accordance with the procedures set out in VM0042 v.2.2.

Regulatory Surplus: Intensive fruit cultivation is not mandated by any law.

Hence, this additionality condition is met.

Barrier analysis:

- **Institutional barriers:** The government has the theoretical knowledge to design policies and strategies. However, extension officers (public and private) lack expertise an in-depth practical know-how on implementing them.
- **Information barrier:** Farmers have low know-how on intensive orchard management, especially soil fertility and pest management and drip irrigation. In addition, farmers have limited business management knowledge.
- **Financial barrier:** Establishing an orchard has high upfront costs (e.g. seedlings, drip irrigation systems) which are very difficult to cover by smallholders. Furthermore, the lack of long-term lending mechanisms for purchasing field equipment and financing production costs poses additional financial barriers.
- **Technological barrier:** In The Kyrgyz Republic there is limited access to specialized equipment to manage intensive orchards. Practical technical solutions for climate-resilient technologies (e.g. drought-resistant rootstocks and cultivars, and frost protection methods) are not available in the country.

The project support on investments and adequate advisory services will overcome the existing barriers. **Hence, this additionality condition is met by the project.**

Common practice:

Although most fruit orchards are located on irrigated land, in recent years apricot orchards have increasingly been established on unproductive rainfed land, based on a change in legislation that allows to plant perennial crops on such land. This requires high initial investment. So far only a very limited number of new orchards have been established on unproductive rainfed land – as per estimate on less than 1% of the available suitable land (Communication with government representatives and local agronomists in the target area).

Hence, this additionality condition is met.

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 9: Fruit trees in grasslands changes of practices in The Kyrgyz Republic based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Grazing	Non-degraded and high intensity grazed grasslands.	Intensively managed orchards	2.Land Use change 2.3 Other land use changes
Crop harvesting		Apricot: 7t/ha	3.Cropland 3.1 Perennial cropping system (3.2.1) from other LU
Tillage and residue management	No	Tillage: No tillage Residues: no burning	
Residue burning	No	No	
Input of organic material	No	Carbon input: high with manure (constant ground cover and regular application of manure)	
Nitrogen Fertilizer application	No	Urea: 200 kg/ha Ammonium Phosphate: 250 kg/ha Diammophoska: 250 kg/ha Manure: 0.42t/ha	9.Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	No	
Water management/irrigation	No	Yes, drip irrigation	9.Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	No	Not accounted	

Assumptions:

- The NIR (Kyrgyz Republic, 2025) references table 5.1 of the 2006 IPCC guidelines to determine biomass accumulation rates for perennial systems with the coefficient corresponding to moderate dry climate. Therefore, the assessment makes use of a value of 2.1 tC/ha/year and a max of 63 tC/ha. Below ground is not considered due to lack of a root to shoot ratio and to maintain alignment with national reporting.
- The NIR (Kyrgyz Republic, 2025) does not provide national parameter values for the cropland coefficients F_{LU} , F_{MG} and F_{MG} , which are used to estimate SOC stock changes in croplands as per IPCC methodology. Therefore, assumptions were developed using the IPCC practice-based definitions applied in EX-ACT, informed by interviews with agricultural experts in The Kyrgyz Republic.
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

- The calculation of leakage considered the application of goat manure with a carbon content of 0.3165 tC/t manure (Pancapalaga et al., 2021).

Improved orchard management technologies

The activity will be implemented in 1,381 ha. The carbon balance for the intervention is 372 tCO₂e of induced emissions during 7 years of accounting. This outcome is driven by the increase in fertilizers induced emissions and the steady state of SOC and biomass in the project area.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of traditional orchards where improved orchards are going to be introduced. According to the methodology the Soil Organic Carbon pool and AGB and BGB are considered. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of N-fixing crops and residue burning.

The lifespan of the activity is 7 years.

The **GCF funded intervention** will implement drip irrigation and improved management practices in existing fruit orchards. Farmers will introduce drip irrigation and adopt frost protection measures when necessary. Also, low producing old trees will be replaced with young trees and the tree density be increased. Intercropping of alfalfa or beans contributes to soil fertility. Where there is no intercropping, grass is cut for livestock feed.

Orchards are going to be intercropped on the initial years and enable integrated fodder management, cut and carry grass for livestock feed and where appropriate maintain winter grazing, introduction of soil testing and advisory services to optimize nutrient inputs and yields, regular application of manure and apply synthetic fertilizers at appropriate rates. Farmers will introduce drip irrigation in orchards.

The **baseline reflects the continuation of pre-project ALM practices**. Therefore, traditional orchard systems would remain. Furrow irrigation is used and as a result, irrigation water deficiencies occur frequently. There are frequent losses due to frost during flowering. Apricot orchard systems contain old trees. Farmers use insufficient manure and unbalanced synthetic fertilizer (mainly nitrogen). Livestock may graze on it. Residues are not composted, nor burned on the fields.

Additionality has been assessed in accordance with the procedures set out in VM0042 v.2.2:

Regulatory Surplus: Adoption of drip irrigation and improved fruit cultivation are not mandated by any law.

Hence, this additionality condition is met by the project

Barrier analysis:

- **Institutional barriers:** The government has theoretical knowledge to design policies and strategies. However, extension officers (public and private) lack expertise and in-depth practical know-how in implementing them.
- **Information barrier:** Farmers have low know-how on improved orchard management, especially soil fertility and pest management and drip irrigation. In addition, farmers have limited business management knowledge.
- **Financial barrier:** Shifting to an improved orchard has high upfront costs (e.g. seedlings, drip irrigation) which are very difficult to cover by smallholders. Furthermore, the lack of long-term lending mechanisms at affordable terms for purchasing field equipment and financing production costs poses additional financial barriers.
- **Technological barrier:** In The Kyrgyz Republic there is limited access to specialized equipment to manage intensive orchards.

The project support on investments and adequate advisory services will overcome the existing barriers. **Hence, this additionality condition is met by the project.**

Common practice:

It is estimated that around 10% of fruit farms in the Kyrgyz Republic use improved, intensive production practices and technologies. In the target regions, this figure is far lower, likely below 5%; however, the actual adoption rate depends on what constitutes an 'improved' production practice (Local extension organizations and farmer leaders, personal communication, 2025).

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 10: Improved orchard management technologies changes of practices in The Kyrgyz Republic based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Grazing	Non-degraded and high intensity grazed grasslands.	Intensively managed orchards	2.Land Use change 2.3 Other land use changes
Crop harvesting	Apricot: 5.3t/ha	Apricot: 7t/ha	3.Cropland 3.1 Perennial cropping system (3.2.1) from other LU
Tillage and residue management	Tillage: No tillage Residues: no burning	Tillage: No tillage Residues: no burning	
Residue burning	No	No	
Input of organic material	Carbon input: high with manure (constant ground cover and regular application of manure)	Carbon input: high with manure (constant ground cover and regular application of manure)	
Nitrogen Fertilizer application	Urea: 180 kg/ha Ammonium Phosphate: 220 kg/ha Manure: 0.29t/ha	Urea: 200 kg/ha Ammonium Phosphate: 250 kg/ha Diammophoska: 250 kg/ha Manure: 0.42t/ha	9.Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	No	
Water management/irrigation	Yes, furrow irrigation	Yes, drip irrigation	9.Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	No	No data	

Assumptions:

- The NIR (Kyrgyz Republic, 2025) references table 5.1 of the (IPCC, 2006) 2006 IPCC guidelines to determine biomass accumulation rates for perennial systems with the coefficient corresponding to moderate dry climate. Therefore, the assessment makes use of a value of 2.1 tC/ha/year and a max of 63 tC/ha. Below ground is not considered due to lack of a root to shoot ratio and to maintain alignment with national reporting.
- The NIR (Kyrgyz Republic, 2025) does not provide national parameter values for the cropland coefficients F_{LU} , F_{MG} and F_{MG} , which are used to estimate SOC stock changes in croplands as per IPCC methodology. Therefore, assumptions were developed using the IPCC practice-based definitions applied in EX-ACT, informed by interviews with agricultural experts in The Kyrgyz Republic.
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.
- The NIR (Kyrgyz Republic, 2025) applies a single value for all perennial systems assuming the same growth. The replacement trees, smaller but planted in a higher density, will grow as old traditional trees.

Sustainable and climate resilient use of pastures and Pasture restoration

The sustainable use of pastures will be implemented in 336,491 ha and Pasture restoration in 84,385 ha⁴. The carbon balance for both interventions are -2,055,820 tCO₂e and -1,031,112 tCO₂e respectively, of enhanced removals during 20 years of accounting. The outcome is driven by an increase in SOC in grasslands due to reduced degradation.

⁴ Pasture restoration includes 240 hectares to be restored inside Protected Areas representing 80% of the 300 hectares to be restored in protected areas in The Kyrgyz Republic. The remaining 20%, 60 hectares are forest areas included under forest restoration.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of pasture where improved pasture management practices and infrastructure will be introduced. According to the methodology only Soil Organic Carbon pool is considered. The lifespan of the activity is 20 years according to restoration activities (GCF guidance).

The **proposed GCF intervention** under sustainable use will strengthen local pasture governance and enable sustainable grazing. Under the project, existing pasture user groups will be organized and trained to plan and enforce grazing rotations, agree on stocking rates, and carry out community-based monitoring and restoration. The project will finance practical rangeland improvements: installation and rehabilitation of water points, small pasture infrastructure, introduction of drought-tolerant forage species and implementation of rotational grazing, using natural boundaries or temporary fencing with planned rest periods. The intervention will improve access to not grazed distant pastures and will monitor pasture conditions. Pasture restoration will establish areas of temporary exclusion for reseeding and natural regrowth and permanent exclusion on areas of high degradation; corridors will be fenced to channel livestock away from most degraded areas to until now inaccessible areas.

The **baseline reflects the continuation of pre-project ALM practices**. Therefore, in the absence of the project, pasture management would continue under the prevailing extensive, herded free-range grazing system, characterized by continuous grazing on the same accessible areas. To be conservative the assessment considers a steady state of degradation which will not be further exacerbated. Therefore, non-degraded areas would have also remained non-degraded.

Additionality has been demonstrated in accordance with the procedures set out in VM0042 v.2.2.

Regulatory surplus: The pasture governance framework is primarily set by the Law “On Pastures” (2008/2009), applied alongside the Land Code. They establish the rules and principles for pasture use, improvement, and sustainable management. However, the regulatory framework is in transition: reforms are underway to better align pasture management with the modern land legal regime.

Although the legislation allocates pastures based on livestock standards, this allocation mechanism is often not implemented in practice. As a result, overgrazing persists as a key driver of pasture degradation and productivity losses, driven by weak enforcement by responsible authorities and pasture committees.

Hence, this additionality condition is met by the project

Barrier analysis:

- **Financial barriers:** Pasture users perceive high intensity grazing as the most effective management to maximize pasture use. In contrast, the introduction of sustainable practices requires additional effort and investment. Sustainable practices are perceived as less cost-effective.
- **Institutional barriers:** Sustainable pasture management is constrained by weak enforcement of existing rules and limited local willingness and ability to apply sanctions. Community actors (e.g., aksakals, villagers and local residents) find it difficult to impose penalties on neighbours, even when mandated by law.

The participatory approach on pasture management together with financial support to improve existing infrastructure will overcome the identified barriers for sustainable pasture management. **Hence, this additionality condition is met by the project.**

Common practice: The Kyrgyz Republic's pasture sector can be characterized as high grazing pressure with only partial and inconsistently applied rotational management.

Half of farms practice seasonal rotations but not intra-season rotation. Institutionally, roughly 9 million ha or 85% of pastures are managed predominantly by municipal enterprises after replacing the existing “jayit committees”, in half of those, sustainable management is partially practiced while the other half is unmanaged (continuous grazing and weak adherence to grazing schedule) (CAMP Alatoo, personal communication, 2025).

Overall, sustainable pasture management remains limited in practice. In addition, the management according to “project package” is even less.

Hence, the additionality condition is met for the project.

Table 11: Sustainable and climate resilient use and Pasture restoration changes of practices in The Kyrgyz Republic based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Sustainable and climate resilient use	High intensity grazed grasslands.	50% of the lands high intensity grazed, 50% of the lands non-degraded grasslands.	4.Grasslands
Pasture restoration	High intensity grazed grasslands.	Non-degraded grasslands.	4.Grasslands
Burning	No	No	

Assumptions:

- The current grassland condition is not known. Following tier 1 approach the assessment assumes an improvement of one level of degradation in SOC to another for 20 years.
- Under the GCF intervention, the assessment assumes a change from high intensity grazing to non-degraded chosen as the most conservative
- Under the baseline, the assessment assumes a steady state of degradation, therefore no further degradation is modelled.

High intensity grazing to non-degraded	4.3 tC/ha
Severely degraded to high intensity grazing	8.6 tC/ha

- Improvements tight to the adoption of sustainable and climate resilient use assume an adoption rate of 50% over all the area targeted by the project.

Afforestation and reforestation on degraded open land

The activity will be implemented in 1,000 ha. The carbon balance for the intervention is -19,757 tCO₂e of enhanced removals during 20 years of accounting. The outcome is driven by an increase in biomass.

The **determination of impact boundaries** followed AR-ACM0003, the spatial extent considered areas of degraded grassland where afforestation and reforestation activities will take place. According to the methodology the Above ground biomass and below ground biomass are to be considered while other carbon pools are optional. Burning of biomass does not occur.

The lifespan of the activity is 20 years for restoration activities (GCF, 2024)

The assessment of leakage using the AR-TOOL15 deemed that displaced animals will move to existing grassland without exceeding the carrying capacity as they will move to grazing lands made accessible by the project.

The **GCF intervention** focuses on the conversion of degraded pastures into Juniper, Saxaul and Pistachio forests with grazing. Therefore, the project seeks to restore productivity of lands and provide additional ecological benefits without excluding grazing completely. The SFE will be responsible for the implementation of activities.

The **baseline and Additionality** have been determined by following the approach described in the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” (CDM, 2007).

Step1 - Alternative scenarios:

Two alternative scenarios compliant with all regulatory requirements are identified, (1) **the continuation of High Intensity grazed grasslands** and (2) **forestation of the land without being part of the GCF.**

Step 2: Barrier analysis:

Institutional Barriers: Governance is weakened by fragmentation and unclear mandates across national agencies, which creates inconsistent implementation. In addition, political resistance to decentralization limits the transfer of authority and resources to local levels which oversee implementation. In the Fergana valley, these dynamics are represented by the limited participation of the local communities in decision-making, reducing local ownership (Mamatova, 2018; Murzakulova & Mestre, 2016)

Financial barriers: Currently, there is insufficient state funding and increasing difficulty in mobilizing resources for core forest management functions. Forest management institutions face weak and long-term financial sustainability as their operations depend heavily on international agencies rather than domestic financing (Mamatova, 2018)

Therefore, according to the barriers presented the forestation and afforestation activity proposed under the project will be impossible to implement without GCF funding.

The baseline scenario is determined as the continuation of pre-project situation. In the absence of the project, pasture management would continue under the prevailing extensive, herded free-range grazing system resulting in significantly high grazing pressure.

Step 4 Common practice:

The Kyrgyz Republic's forest management combines active reforestation, natural regeneration, and participatory sustainable practices. The country operates large-scale seedling production (producing approximately 15 million seedlings annually at 140 hectares of nurseries) and conducts restoration on over 1,100 hectares yearly; The "Jashyl Muras" (Green Legacy) campaign coordinates nationwide tree-planting through government agencies, international organizations, and communities. Management is guided by the Forest Code and Forestry Sector Development Concept until 2040, with increasing emphasis on collaborative and community-based forest management models that engage local stakeholders in decision-making; These approaches balance ecological conservation with sustainable livelihood development for rural forest-dependent populations (CBD, 2025; UNDP, 2025; UNECE, 2025).

The GCF intervention differs from common practice for several reasons: (i) it goes beyond tree planting and instead builds a durable, measurable restoration system; (ii) it integrates carbon accounting; (iii) it embeds community involvement as a core delivery mechanism; iv) it focuses on practical and local design choices: locally selected, climate-adapted tree species matched to site conditions, hardening of seedlings to improve survival rates after transplantation and a suitable planting scheme.

Hence, the intervention is additional to common practice.

Table 12: Afforestation and reforestation on degraded open land changes of practices in The Kyrgyz Republic based on CDM boundaries and EX-ACT parameters

Hectares	Initial and baseline	GCF intervention	EX-ACT representation
Land use	Grasslands under high intensity grazing	Juniper, saxaul, walnut, Pistachio and Riparian forests	2.Land Use Change/ 2.2 Afforestation & Reforestation.
Tree AGB and BGB (tC/ha)	0	Juniper: 6.99 tC/ha Saxaul: 0.13tC/ha (shrub forest) Walnut: 43.25tC/ha Pistachio and almond forest: 1.24tC/ha Riparian: 12.81 tC/ha (Other mixed broadleaved forests) Weighted Average: 12.90 tC/ha	
Tree AGB and BGB growth	0	Juniper forest: 0.19tC/ha/year Saxaul: 0.01tC/ha/year Walnut: 1.12tC/ha/year	

		Pistachio and almond forest: 0.05 tC/ha/year Riparian: 0.44tC/ha/year (Other mixed broadleaved forests) Weighted Average: 0.35 tC/ha/year	
Deadwood, litter and SOC	No	No	

Assumptions:

- The intervention will not disturb the soil cover in more than 10%. No losses of biomass from the initial land use are considered.
- The assessment makes use of AGB and BGB average values calculated using the Second National Forest Inventory Report in the Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022).
- The weighted average used as tier 2 in the assessment considers that 5% of the afforestation and reforestation activities will target riparian forests. The remaining 95% will plant the other references forest types.

Forest Restoration

The activity will be implemented in 36,448 ha. The carbon balance for the intervention is -890,215 tCO₂e of enhanced removals during 20 years of accounting. The outcome is driven by an increase in biomass.

The determination of impact boundaries followed AR-ACM0003, the spatial extent considered areas of degraded forest where forest regeneration activities will take place. According to the methodology the Above ground biomass and below ground biomass are to be considered while other carbon pools are optional. Burning of biomass does not occur. The lifespan of the activity is 20 years according to restoration activities (GCF guidance).

The GCF intervention will implement integrated sustainable forest management and restoration to reduce pressure on natural forests, enabling sufficient natural regeneration, and promoting sustainable harvesting of non-timber forest products (NTFPs), activities will also restore degraded forests and degraded riparian forests into better-stocked, more resilient forest ecosystems through targeted tree planting and improved management practices. Areas under restoration will be protected from physical disturbance to enable self-regeneration. However, additional planting on the most degraded areas will be undertaken.

The **baseline and Additionality** have been set by following the approach described in the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” (CDM, 2007)

Step1 - Alternative scenarios:

Two alternative scenarios compliant with all regulatory requirements where identified, (1) **the continuation of degraded forest in a steady state** and (2) **enhancing forest stocks without being part of the GCF**.

Step 2: Barrier analysis:

- **Institutional Barriers:** Governance is weakened by fragmentation and unclear mandates across national agencies, which creates inconsistent implementation. In addition, political resistance to decentralization limits the transfer of authority and resources to local levels which oversee implementation. In the Fergana valley, the dynamics are represented by the limited participation of the local communities in decision-making, reducing local ownership (Mamatova, 2018; Murzakulova & Mestre, 2016).
- **Financial barriers:** Currently, there is insufficient state funding and increasing difficulty in mobilizing resources for core forest management functions. At the same time, newer forest management institutions face weak and long-term financial sustainability as their operation depends heavily on international agencies rather than domestic financing (Mamatova, 2018).

Therefore, according to the barriers presented the sustainable forest management activity proposed under the project will be impossible to implement without GCF funding.

The baseline scenario is determined as the continuation of pre-project situation. In the absence of the project, forest will continue under the same level of degradation.

Step 4 Common practice:

Forest ecosystems are impacted by human activity at a level which is increasing from year to year through expansion of human settlements, deadwood removal for firewood, cattle grazing, among other factors.

The Kyrgyz Republic's forest management combines active reforestation, natural regeneration, and participatory sustainable practices. The country operates large-scale seedling production (producing approximately 15 million seedlings annually at 140 hectares of nurseries) and conducts restoration on over 1,100 hectares yearly; The "Jashyl Muras" (Green Legacy) campaign coordinates nationwide tree-planting through government agencies, international organizations, and communities. Management is guided by the Forest Code and Forestry Sector Development Concept until 2040, with increasing emphasis on collaborative and community-based forest management models that engage local stakeholders in decision-making; These approaches balance ecological conservation with sustainable livelihood development for rural forest-dependent populations (CBD, 2025; UNDP, 2025; UNECE, 2025)

The GCF intervention differs from common practice for several reasons: (i) it goes beyond tree planting and instead builds a durable, measurable restoration system; (ii) it integrates carbon accounting; (iii) it embeds community involvement as a core delivery mechanism; iv) it focuses on practical and local design choices: locally selected, climate-adapted tree species matched to site conditions, hardening of seedlings to improve survival rates after transplantation and a suitable planting scheme. Hence, the intervention is additional to common practice.

The activities are stratified according to forest types based on the NFI of The Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022)

Table 13: Forest restoration changes of practices in the Kyrgyz Republic based on CDM boundaries and EX-ACT parameters

	Initial baseline and	GCF intervention	EX-ACT representation
Land use	Forest (no regeneration)	Forests growing according to their natural growth rates ensuring regeneration.	
Tree AGB and BGB (tC/ha)	0	Non-degraded forest stocks: Spruce-fir forest: 52.03 tC/ha Juniper: 6.99 tC/ha Walnut forest: 43.25 tC/ha Pistachio and almond forest: 1.24tC/ha Other mixed broadleaved forests: 12.81 tC/ha Shrub forests: 0.13 tC/ha Average (all forest types): 14.27 tC/ha	5.management
Tree AGB and BGB growth	0	Natural growth rate: Spruce-fir forest:1.01 tC/ha/year Juniper forest: 0.19tC/ha/year Walnut forest: 1.12tC/ha/year Pistachio and almond forest:0.05 tC/ha/year Other mixed broadleaved forests: 0.44tC/ha/year Shrub forests: 0.01 tC/ha/year Average (all forest types):0.35 tC/ha/year	

Assumption:

- Under the GCF intervention forests will grow according to their natural growth rates, while without the intervention they will remain in a steady state.
- Carbon stock changes baseline net removals are estimated zero as the project activity is applied under the “conditions under which carbon stock and change in carbon stock may be estimated zero” (see methodology description)

3.1.2 Uzbekistan

Conservation agriculture in rainfed cereal production

Not implemented

Seed potato production in highland areas

The activity will be implemented in 295 ha. The carbon balance for the intervention is 25 tCO₂e of induced emissions during 7 years of accounting. This outcome is driven by the induced emissions from soil carbon losses due to reduced tillage and implementation of irrigation systems.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of ware potato cultivation under traditional practices to transition to improved seed potato production. According to the methodology the Soil Organic Carbon pool is the only considered as no woody biomass exists in annual croplands. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of nitrogen-fixing crops and residue burning. The lifespan of the activity is 7 years.

The **proposed GCF intervention** will scale up the transition from ware-potato production to certified seed potato production by addressing the seed potato system in mountain areas. It will (i) expand and strengthen four-field crop rotations that integrate potatoes with grains and forage crops (e.g., sainfoin) and promote efficient agronomy and technologies for the non-potato rotation crops to maintain productivity and soil health including reduced tillage practices; (ii) improve water management through deployment of sprinkler irrigation systems; (iii) invest in enabling post-harvest infrastructure, notably seed-quality storage facilities; and (iv) strengthen farmer cooperation/aggregation (e.g., through cooperatives or collective schemes) to support compliance with certification requirements, access to services and infrastructure, and market linkages.

The baseline reflects the continuation of pre-project ALM practices. Therefore, ware potato cultivation would continue the traditional cultivation practices. In practice, this baseline reflects prevailing smallholder conditions of short rotations (wheat–potato–wheat) driven by land pressure, limited manure availability, and occasional residue burning. Tillage is dominated by conventional full soil inversion, furrow/sprinkler irrigation, and mostly manual operations with partial mechanization for harvesting. Potatoes are harvested once the plant has dried.

Additionality has been assessed in accordance with the procedures set out in VM0042 v.2.2

Step 1. Regulatory surplus: Uzbekistan has a strong, potato-specific seed regulation framework: seed-farming laws and presidential acts promote and organize seed-potato production, mainly through certification, quality control, and registration requirements plus state programs/targets to expand output.

- Law “About seed farming” (No. ZRU-521, 16 Feb 2019) – defines seed farming and regulates seed-production relations.
- Law “On Seed Culturing” (No. 267-I, 29 Aug 1996) – governs seed reproduction and quality control.
- Presidential Decree UP-109 (7 Jul 2025) – reforms the crop-seed quality evaluation system.
- Presidential Resolution PP-269 (8 Sep 2025) – sets potato/seed-potato development measures and production targets (e.g., mini-tubers and high-reproduction seed).
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. ID-81060 dated 08.06.2023 “On additional measures to increase local potato production and further strengthen the seed base”.

Seed production is regulated and encouraged, but a law mandating farmers to transition to seed production does not exist. **Hence, this additionality condition is met for the project.**

Step 2. Barrier analysis:

- **Financial barriers:** Adoption of potato seed production is constrained by high costs of production and outdated machinery. Farmers can't afford starter seed (mini-tubers/elite seed) or the investments needed for seed-quality production, especially proper storage facilities and other supporting infrastructure.
- **Information barriers:** Seed-potato production requires specialized technical knowledge beyond ware-potato farming. Farmers may lack training and extension support on stricter practices such as intensive roguing, managing seed plots to meet standards, and preparing for inspections and certification-related quality requirements.
- **Institutional barriers:** Farmers depend on reliable access to starter seed supply systems, functioning certification arrangements, and workable contract schemes with buyers. However, weak farmer groups and cooperatives make it difficult to coordinate isolation plots or blocks needed to reduce disease and varietal mixing, which is a key requirement for seed production.
- **Biophysical barriers:** Heat waves reduce suitability for potato cultivation.

The project overcomes the barriers by providing integral support on strengthening farmer cooperation and infrastructure. **Hence, this additionality condition is met for the project.**

Step 3. Common practice: Uzbekistan has roughly 1.8–2.2 million dehqon (household) farms, but only around 70 to 80 thousand regularly grow potatoes. Seed potato production is a specialized niche requiring stricter standards. In most countries, only 1–5% of potato farmers ever become seed producers. Potato seed production is below the 20% adoption thresholds. **Hence, this additionality condition is met.**

Table 14 table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 14: Potato cultivation changes of practices in Uzbekistan according to VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Crop harvesting	Ware potato yield 15 t/ha	Potato seed yield; 20 t/ha	3. Cropland 3.1 Annual cropping system remaining annual cropping system (the activity is represented under 2 lines of analysis)
Tillage and residue management	Tillage: Full tillage (plough/till pre-plant) Residues: Residues retained (plants dry in the field)	Tillage: Reduced tillage (GCF intervention objective and longer rotations) Residues: Retained (plants dry in the field)	
Residue burning	No	No	
Input of organic material	Carbon input: medium (organic inputs not described; rotations short and limited); matching NIR	Carbon input: High input without manure (longer rotations including cover crop and irrigation)	
Nitrogen Fertilizer application	Ammonium phosphate: 300 kg/ha Ammonium Sulphate: 450 kg/ha	Ammonium phosphate: 300 kg/ha Ammonium Sulphate: 450 kg/ha	9. Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	Yes, Sainfoin (other pulses) Yield (Other pulses): 3.8 t/ha Residue: retained	3. Cropland 3.1 Annual cropping system remaining annual cropping

			system (tier 2 – minor season crop)
Water management/irrigation	No	Yes, drip irrigation	9.Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	For conservativeness no change in fuel use in ploughing has been considered		

Assumptions:

- The NIR (Republic of Uzbekistan et al., 2024) provide national parameter values for the cropland coefficients $F_{LU}=0.8$, $F_{MG} = 1$ and $F_I = 1$, which are used to estimate SOC stock changes in croplands as per IPCC methodology.
- Nitrogen fixing species residue production. Other pulses were assumed as the legume crop to be added in the rotation. Yields were extracted from FAOSTAT and represented an average of the last 5 available years (2020-2024)
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

Horticulture

The activity will be implemented in 13,158 ha. The carbon balance for the intervention is -7,696 tCO₂e of avoided emissions during 7 years of accounting. This outcome is driven by the decrease in urea's induced emissions and the steady state of SOC in the project area.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of annual cropland which already produce vegetables following conventional practices which will shift to project promoted improved practices. According to the methodology the Soil Organic Carbon pool is the only considered as no woody biomass exists in annual croplands. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of N-fixing crops and residue burning. The lifespan of the activity is 7 years.

The proposed GCF intervention will support the adoption of improved agricultural land management practices in vegetable production. It will introduce structural improvements by combining capacity building for farmers on whole farm agrotechnology and management practices together with facilitating access to drip irrigation and shade nets. The intervention package will also promote complementary productivity measures such as the use of frost resilient seeds and strengthened balance use of synthetic fertilizers and manure.

The **baseline reflects the continuation of pre-project ALM practices**. Current practices follow conventional production methods with plowing, harrowing and leveling the soil before cultivation and rely on furrow irrigation. It has been identified that farmers use imbalanced fertilizers and fertilizer quantities. Crop residues are fed to livestock or discarded rather than managed sustainably.

Additionality has been assessed in accordance with the procedures set out in VM0042 v.2:

Regulatory surplus: Recent reforms improved the enabling environment for horticulture, with policy oriented toward export-led growth. The project intervention activities are not legally mandated. However, the project is broadly aligned with scaling horticultural production and exports.

Hence, this additionality condition is met.

Barrier analysis:

- **Financial barriers:** The adoption of better irrigation systems and plant protection infrastructure are costly. Many farmers cannot afford the initial investment. Producers and agribusinesses often face high collateral requirements, high interest rates, and loan products that are short-term and poorly aligned with agricultural cashflows.
- **Information barriers:** Gaps in knowledge and service delivery continue to limit uptake. Even within large national horticulture programs, some planned support functions such as integrated pest management (IPM) activities have not been fully delivered. This points to persistent weaknesses in consistent extension and advisory systems.

- **Institutional barriers:** Market and value chain development reduce incentives to invest at farm level.

By working on capacity building and direct support in technology investment the project will overcome these barriers. **Hence, this additionality condition is met.**

Common practice: Improved practices may be common within a specific, supported subset of larger farms, but they are not common practice across the broader horticulture producer base, particularly among smallholders who face binding access-to-finance and service constraints.

Hence, this additionality condition is met.

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 15: Horticulture changes of practices in Uzbekistan based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Crop harvesting	Onion: 45 t/ha Tomato: 55 t/ha Garlic: 10 t/ha Tomato (GH): 70 t/ha Strawberry (GH): 3 t/ha Average: 36.6 t/ha	Onion: 55 t/ha Tomato: 65 t/ha Garlic: 15 t/ha Tomato (GH): 85 t/ha Strawberry (GH): 9 t/ha Average: 45.8 t/ha	3. Cropland 3.1 Annual cropping system remaining annual cropping system (the activity is represented under 2 lines of analysis)
Tillage and residue management	Tillage: Full tillage (ploughing, harrowing and levelling) Residues: Exported	Tillage: Full tillage (ploughing and levelling) Residues: Exported	
Residue burning	No	No	
Input of organic material	Carbon input: Medium (yielding crops and residues removed) but alignment with NIR.	Carbon input: medium (low yielding crops and residues removed but alignment with NIR.	
Nitrogen Fertilizer application	Averages from 5 crops above: Urea: 780 kg/ha NPK: 40 kg/ha Ammonium Phosphate: 300 kg/ha	Averages from 5 crops above: Urea: 620 kg/ha NPK: 140 kg/ha Ammonium Phosphate: 300 kg/ha	9. Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen-fixing species	No.	No	
Water management/irrigation	Yes, furrow irrigation	Yes, drip irrigation	9. Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	No change in fuel use		

Assumptions:

- The NIR (Republic of Uzbekistan et al., 2024) provide national parameter values for the cropland coefficients $F_{LU}=0.8$, $F_{MG} = 1$ and $F_I = 1$, which are used to estimate SOC stock changes in croplands as per IPCC methodology.
- Nitrogen fixing species residue production. Other pulses were assumed as the legume crop to be added in the rotation. Yields were extracted from FAOSTAT and represented an average of the last 5 available years (2020-2024)
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

Improved orchard management technologies

The activity will be implemented in 8,972 ha. The carbon balance for the intervention is -76,327 tCO₂e of enhanced removals during 7 years of accounting. This outcome is driven by the increase in removals from no-till practices and increased carbon input from residue retention and perennial grasses.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of traditional orchards where improved orchards are going to be introduced. According to the methodology the Soil Organic Carbon pool and AGB and BGB are considered. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of N-fixing crops and residue burning.

The lifespan of the activity is 7 years.

The **GCF funded intervention** will implement intensively managed orchards in existing traditional orchard by replacing low producing old trees with young trees increasing the tree density. Orchards are going to be intercropped on the initial years and enable integrated fodder management, cut and carry grass for livestock feed and where appropriate maintain winter grazing, introduction of soil testing and advisory services to optimize nutrient inputs and yields, regular application of manure and apply synthetic fertilizers at appropriate rates. Residues will be exported. Farmers will introduce drip irrigation in orchards.

The **baseline reflects the continuation of pre-project ALM practices**. Therefore, in the absence of the project, orchard management would continue under prevailing conventional practices characterized by (i) periodic tillage as the main weed-control approach, typically linked to furrow irrigation and canal-scheduled water delivery; (ii) application of organic soil amendments, relying mainly on what is locally available; and (iii) routine residue management through collection and removal (often for household fuelwood) or open burning for sanitation, with some burning continuing in practice even if it is penalized when it causes air pollution.

Regulatory Surplus: Improved fruit cultivation is not mandated by any law.

Hence, this additionality condition is met by the project

Barrier analysis:

- **Institutional barriers:** Slow district-level implementation of horticulture strategies and investment programmes, weak pesticide regulation and enforcement (creating residue and export compliance risks), limited coordination across ministries (Agriculture, Trade, Phytosanitary standards and Water Resources) and slow rollout of digital orchard registration and traceability.
- **Information barrier:** Adoption is constrained by gaps in know-how and advisory support, many farmers have weak orchard management skills (e.g., pruning, thinning, pest control and nutrient management), limited familiarity and capacity to implement integrated pest management (IPM), and limited ability to shift to more efficient irrigation even where water scarcity creates a strong need. These barriers are reinforced by weak extension and advisory services, and limited access to decision-support services needed to apply improved practices effectively.
- **Financial barrier:** Apricot producers, often operating very small orchards (around 0.1–0.4 ha), face major financing constraints including the long payback period for orchard establishment, high upfront capital needs for modern irrigation systems, and additional investment requirements for cold storage, drying, and processing equipment.

The project support on investments and adequate advisory services will overcome the existing barriers.

Hence, this additionality condition is met by the project.

Common practice:

Uzbekistan's horticulture sector is sizable and still expanding, with around 330,000–350,000 hectares in fruit and nut orchards and further growth encouraged through credit lines and public programs. Yet "modern" orchard systems, such as high-density or semi-intensive planting, certified planting material, and climate-smart water and risk management, remain a relatively small share of total area. As a result, uptake is uneven: advanced production and post-harvest practices tend to cluster among stronger commercial hubs and larger farms or SMEs (often where structured support exists), while most

smallholders continue to depend on traditional orchard management and marketing channels. Considering that the share of dehqan farms and households engaged in apricot production is 58.5% (National Statistics Committee of the Republic of Uzbekistan, 2024) and that larger farms and commercial hubs monopolize uptake probably less than 30% of farmers adopt improved tree cultivation and less a combination of the practices proposed by the project.

Hence, this additionality condition is met.

Table 16: Improved orchard management technologies changes of practices in Uzbekistan based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Grazing	Traditional orchards	Intensively managed orchards	2.Land Use change 2.3 Other land use changes
Crop harvesting	Apricot:5.3t/ha	Apricot: 7t/ha	3.Cropland
Tillage and residue management	Tillage: Full tillage Residues: no burning	Tillage: No tillage Residues: no burning	3.1 Perennial cropping system (3.2.1) from other LU
Residue burning	No	No	
Input of organic material	Carbon input: Medium carbon input (aligned with NIR assumptions)	Carbon input: high with manure (constant ground cover and regular application of manure)	
Nitrogen Fertilizer application	Urea: 250 kg/ha Ammonium Phosphate: 250 kg/ha Manure: 3 t/ha	Urea: 250 kg/ha Ammonium Phosphate: 250 kg/ha Manure: 3 t/ha	9.Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	No	
Water management/irrigation	Yes, furrow irrigation	Yes, drip irrigation	9.Input 9.3 irrigation-implementation of new systems
Fossil fuel	No data	No data	

Assumptions:

- For conservativeness no burning of residues is considered.
- The NIR (Republic of Uzbekistan et al., 2024) references table 5.1 of the IPCC, 2006 guidelines to determine biomass accumulation rates for perennial systems with the coefficient corresponding to moderate dry climate. Therefore, the assessment makes use of a value of 2.1 tC/ha/year and a max of 63 tC/ha. Below ground is not considered due to lack of a root to shoot ratio and to maintain alignment with national reporting.
- The NIR (Republic of Uzbekistan et al., 2024) provide national parameter values for perennial cropland coefficients $F_{LU}=1$, $F_{MG} = 1$ and $F_I = 1$, which are used to estimate SOC stock changes in croplands as per IPCC methodology.
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.
- The NIR (Republic of Uzbekistan et al., 2024) applies a single value for all perennial systems assuming the same growth. The replacement trees, smaller but planted in a higher density, will grow as old traditional trees.

Sustainable and climate resilient use and Pasture restoration

The sustainable use of pastures will be implemented in 98,825 ha and Pasture restoration in 24,706 ha. The carbon balance for both interventions are -301,887 tCO₂e and -150,943 tCO₂e respectively, of enhanced removals during 20 years of accounting. The outcome is driven by an increase in SOC in grasslands due to reduced degradation.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of pasture where improved pasture management practices and infrastructure will be introduced.

According to the methodology only Soil Organic Carbon pool is considered. The lifespan of the activity is 20 years according to restoration activities.

The **proposed GCF intervention** under sustainable use will strengthen local pasture governance and enable sustainable grazing. Under the project, existing pasture user groups will be organized and trained to plan and enforce grazing rotations, agree on stocking rates, and carry out community-based monitoring and restoration. The project will finance practical rangeland improvements: installation and rehabilitation of water points, small pasture infrastructure, introduction of drought-tolerant forage species and implementation of rotational grazing, using natural boundaries or temporary fencing with planned rest periods. The intervention will improve access to not grazed distant pastures and will monitor pasture conditions. Pasture restoration will establish areas of temporary exclusion for reseeding and natural regrowth and permanent exclusion on areas of high degradation; corridors will be fenced to channel livestock away from most degraded areas.

The **baseline reflects the continuation of pre-project ALM practices**. Therefore, in the absence of the project, pasture management in Fergana Valley and Surkhandarya would continue under the prevailing extensive, herded free-range grazing system characterized by continuous grazing on the same accessible areas with little or no planned rotation, limited or degraded watering points, and reliance on nearby communal areas, canal banks, road verges, field margins, and post-harvest crop residues, especially near settlements in Fergana and in valley-bottom and foothill-to-mountain systems in Surkhandarya. National and regional evidence indicates that the prevailing common pasture management situation is continuous, high-pressure grazing with limited rotation and limited enabling infrastructure, resulting in widespread rangeland degradation. To be conservative the assessment considers a steady state of degradation which will not be further exacerbated.

Additionality has been demonstrated in accordance with the procedures set out in VM0042 v.2.2.

Regulatory surplus: The Law “On Pastures” (No. ZRU-538, 2019, amended 2024) creates a general legal obligation to ensure sustainable pasture use (rational use, protection, reproduction and restoration), including provisions for rules, norms, standards, state oversight, and roles for local authorities and pasture user associations to organize and control pasture use. While the law establishes an enabling and supervisory framework for sustainable pasture management, it does not prescribe or mandate the specific pasture management techniques that the project will implement. Therefore, the proposed project practices are not legally required. In addition, the law cannot be systematically enforced until regulations are fully in place and funded. Now, users continue old overgrazing patterns, despite the law’s sustainable-use language.

Hence, this additionality condition is met by the project

Barrier analysis:

- **Financial barriers:** Farmers have limited capacity to invest in improved pasture because key investments, such as reseeding, rehabilitation of water points, fencing, and other pasture infrastructure, require upfront capital that many cannot mobilize. These constraints are exacerbated by poor rural roads that raise transaction costs further weakening incentives and ability to invest.
- **Institutional barriers:** Governance and coordination constraints limit adoption of sustainable grazing practices, including unclear or insecure pasture-use rights that discourage long-term investment, weak pasture-user associations that reduce collective action for planning and enforcement of rotational grazing, fragmented supply chains with many small producers and weak aggregation.
- **Information barriers:** There are gaps in data and advisory support, including limited availability of reliable information on pasture condition, alongside insufficient technical guidance for grazing management and pasture improvement. In addition, reliance on crop residues and the perception of pasture as a secondary resource reduces motivation to shift to improved pasture management.

The participatory approach on pasture management together with financial support to improve existing infrastructure will overcome the identified barriers for sustainable pasture management. **Hence, this additionality condition is met by the project.**

Common practice: Across Uzbekistan, a large share of pastureland is described as in “crisis” or degraded, characterized by strongly reduced biomass and biodiversity, low plant diversity, soil erosion, invasive species, and increasing vulnerability to recurrent drought and declining biomass. The NIR

(Republic of Uzbekistan et al., 2024) highlights that 77.3% of Uzbekistan's 21 million ha of pastures are degraded. Overall, sustainable pasture management remains limited in practice. In addition, the management according to "project package" is even less.

Hence, the additionality condition is met for the project.

Table 17: Sustainable and climate resilient use and Pasture restoration changes of practices in Uzbekistan based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Grazing controlled grazing)	High intensity grazed grasslands.	50% of the lands high intensity grazed, 50% of the lands non-degraded grasslands.	4.Grasslands
Grazing (biodiversity)	High intensity grazed grasslands.	Non-degraded grasslands.	4.Grasslands
Burning	No	No	

Assumptions:

- The current grassland condition is not known. Following the NIR (Republic of Uzbekistan et al., 2024) the assessment assumes that degraded grasslands are represented by $F_{mg} = 0.95$.
- Under the baseline, the assessment assumes a steady state of degradation, therefore no further degradation is modelled.

High intensity grazing to non - degraded	2.15 tC/ha
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- Improvements tight to the adoption of controlled grazing assume an adoption rate of 50% over all the area targeted by the project.

Afforestation and reforestation on degraded open land

The activity will be implemented in 280 ha. The carbon balance for the intervention is -5,532 tCO₂e of enhanced removals during 20 years of accounting. The outcome is driven by an increase in biomass.

The **determination of impact boundaries** followed AR-ACM0003, the spatial extent considered areas of degraded grassland where afforestation and reforestation activities will take place. According to the methodology the Above ground biomass and below ground biomass are to be considered while other carbon pools are optional. Burning of biomass does not occur.

The lifespan of the activity is 20 years according to restoration activities.

The assessment of leakage using the AR-TOOL15 (CDM, 2013c) deemed that displaced animals will move to existing grassland without exceeding the carrying capacity as they will move to grazing lands made accessible by the project.

The **GCF intervention** focuses on the conversion of degraded pastures into Juniper, Saxaul and Pistachio forests with grazing. Therefore, the project seeks to restore productivity of lands and provide additional ecological benefits without excluding grazing completely. The SFE will be responsible for the implementation of activities.

The **baseline and Additionality** have been determined by following the approach described in the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities"(CDM, 2007)

Step1 - Alternative scenarios:

Two alternative scenarios compliant with all regulatory requirements are identified, (1) **the continuation of High Intensity grazed grasslands** and (2) **forestation of the land without being part of the GCF**.

Step 2: Barrier analysis:

- **Institutional Barriers:** Scaling is constrained by institutional and human capacity gaps like limited skills in advanced silviculture, GIS, MRV, value-chain development and public private partnership (PPP) management inside core agencies. While frameworks for restoration exist practical implementation and the required enforcement for successful regeneration is missing.
- **Financial barriers:** There is difficulty in covering upfront costs and the required ongoing financing.
- **Implementation barriers:** Existing systems required for successful regeneration are weak and unable to gather quantitative data.

Therefore, according to the barriers presented the forestation and afforestation activity proposed under the project will be impossible to implement without GCF funding.

The baseline scenario is determined as the continuation of pre-project situation. In the absence of the project, pasture management would continue under the prevailing extensive, herded free-range grazing system resulting in significantly high grazing pressure.

Step 4 Common practice:

There are efforts at the national level on afforestation and reforestation, however they are limited to pilot level. Therefore, A/R remains insufficient to transform the sector and become common practice. Current coverage remains limited to respond to national needs and scaling faces many barriers.

Hence, the intervention is additional to common practice.

Table 18: Afforestation and reforestation on degraded open land changes of practices in Uzbekistan based on CDM boundaries and EX-ACT parameters

	Initial and baseline	GCF intervention	EX-ACT representation
Hectares			
Land use	Grasslands under high intensity grazing	Juniper, saxaul, walnut, Pistachio and Riparian forests	2.Land Use Change/ 2.2 Afforestation & Reforestation.
Tree AGB and BGB (tC/ha)	0	Juniper: 6.99 tC/ha Saxaul: 0.13tC/ha (shrub forest) Walnut: 43.25tC/ha Pistachio and almond forest: 1.24tC/ha Riparian: 12.81 tC/ha (Other mixed broadleaved forests) Weighted Average: 12.90 tC/ha	
Tree AGB and BGB growth	0	Juniper forest: 0.19tC/ha/year Saxaul: 0.01tC/ha/year Walnut: 1.12tC/ha/year Pistachio and almond forest: 0.05 tC/ha/year Riparian: 0.44tC/ha/year (Other mixed broadleaved forests) Weighted Average: 0.35 tC/ha/year	
Deadwood, litter and SOC	No	No	

Assumptions:

- The intervention will not disturb the soil cover in more than 10%. No losses of biomass from the initial land use are considered.

- The assessment makes use of AGB and BGB average values calculated using the Second National Forest Inventory Report in The Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022).
- The weighted average used as tier 2 in the assessment considers that 5% of the afforestation and reforestation activities will target riparian forests. The remaining 95% will plant the other references forest types.

Forest Restoration

The activity will be implemented in 18,038 ha. The carbon balance for the intervention is -440,582 tCO₂e of enhanced removals during 20 years of accounting. The outcome is driven by an increase in biomass.

The determination of impact boundaries followed AR-ACM0003, the spatial extent considered areas of degraded forest where forest regeneration activities will take place. According to the methodology the Above ground biomass and below ground biomass are to be considered while other carbon pools are optional. Burning of biomass does not occur. The lifespan of the activity is 20 years according to restoration activities (GCF guidance).

The GCF intervention will implement integrated sustainable forest management and restoration to reduce pressure on natural forests by enabling sufficient natural regeneration and promoting sustainable harvesting of non-timber forest products (NTFPs), activities will also restore degraded forests and degraded riparian forests into better-stocked, more resilient forest ecosystems through targeted tree planting and improved management practices. Areas under restoration will be protected from physical disturbance to enable self-regeneration. However, additional planting on the most degraded areas will be undertaken.

The **baseline and Additionality** have been set by following the approach described in the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” (CDM, 2007)

Step1 - Alternative scenarios:

Two alternative scenarios compliant with all regulatory requirements where identified, (1) **the continuation of degraded forest in a steady state** and (2) **enhancing forest stocks without being part of the GCF**.

Step 2: Barrier analysis:

- **Institutional Barriers:** Scaling is constrained by institutional and human capacity gaps like limited skills in advanced silviculture, GIS, MRV, value-chain development and PPP management inside core agencies. While frameworks for restoration exist practical implementation and the required enforcement for successful regeneration is missing.
- **Financial barriers:** There is difficulty in covering upfront costs and the required ongoing financing.
- **Implementation barriers:** Existing systems required for successful regeneration are weak and unable to gather quantitative data.

Therefore, according to the barriers presented the sustainable forest management activity proposed under the project will be impossible to implement without GCF funding.

The **baseline scenario** is determined as the continuation of pre-project situation. In the absence of the project, forest will continue under the same level of degradation.

Step 4 Common practice:

There are efforts at the national level on afforestation and reforestation, however they are limited to pilot level. Therefore, A/R remains insufficient to transform the sector and become common practice. Therefore, current coverage remains short from national needs and scaling faces many barriers.

The activities are stratified according to forest types based on the NFI of The Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022)

Table 19: Forest restoration changes of practices in Uzbekistan based on CDM boundaries and EX-ACT parameters

	Initial baseline and	GCF intervention	EX-ACT representation
Land use	Forest (no regeneration)	Forests growing according to their natural growth rates ensuring regeneration.	
Tree AGB and BGB (tC/ha)	0	Non-degraded forest stocks: Spruce-fir forest: 52.03 tC/ha Juniper: 6.99 tC/ha Walnut forest: 43.25 tC/ha Pistachio and almond forest: 1.24tC/ha Other mixed broadleaved forests: 12.81 tC/ha Shrub forests: 0.13 tC/ha Average (all forest types): 14.27 tC/ha	5.management
Tree AGB and BGB growth	0	Natural growth rate: Spruce-fir forest:1.01 tC/ha/year Juniper forest: 0.19tC/ha/year Walnut forest: 1.12tC/ha/year Pistachio and almond forest:0.05 tC/ha/year Other mixed broadleaved forests: 0.44tC/ha/year Shrub forests: 0.01 tC/ha/year Average (all forest types):0.35 tC/ha/year	

Assumption:

- Under the GCF intervention forests will grow according to their natural growth rates, while without the intervention they will remain in a steady state.
- Carbon stock changes baseline net removals are estimated zero as the project activity is applied under the “conditions under which carbon stock and change in carbon stock may be estimated zero” (see methodology description)

3.1.3 Tajikistan

Conservation agriculture in rainfed cereal production

The activity will be implemented in 13,598 ha. The carbon balance for the intervention is –11,103 tCO₂e of removals during 7 years of accounting. This outcome is driven by the shift to no-till management and increased of organic inputs through residue retention and crop rotations. These practices convert the soil organic carbon (SOC) pool from a source to a sink.

The determination of impact boundaries followed VM0042, the spatial extent considered wheat areas cultivated under traditional practices to transition to no-till wheat. According to the methodology the Soil Organic Carbon pool is the only considered as no woody biomass exists in annual croplands. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, N-fixing crops and Residue burning. The lifespan of the activity is 7 years.

The **proposed GCF intervention** will finance and scale a package of improved agricultural land management (ALM) practices including no-till supported by direct seeding, residue retention, improved nutrient management (organic and mineral), and improved rotations including legumes, alongside capacity building and advisory services to manage transition risks (e.g., weed pressure and potentially higher herbicide and manual weeding needs). The financial support of the project will focus on making no-till accessible to farmers and no-till service providers.

The baseline reflects the continuation of pre-project ALM practices. Therefore, in the absence of the project, In the absence of the project, wheat production would continue under prevailing conventional land preparation practices dominated by full tillage (e.g., ploughing and subsequent passes). Crop residues would be commonly removed for livestock feed due to limited pasture access, constraining residue retention on fields. Household-level reliance on cow dung for cooking and heating further limits availability of organic amendments returned to cropland soils.

Additionality has been demonstrated according to VM0042 v.2.2

Step 1. Regulatory surplus: There is no requirement obligating farmers to adopt no-till wheat; therefore, shifting to no-till is not legally mandated.

Hence, this additionality condition is met for the project.

Step 2. Barrier analysis:

- **Information barrier:** Farmers hold limited knowledge on no till production. In addition, extension support for no-till agronomy is very limited. Lack of practical training materials in Yajik
- **Financial barriers:** Small farm sizes reduce ability to purchase machinery individually. High upfront costs.
- **Technology barriers:** no-till equipment is expensive, and service markets are limited. Farmers graze animals in croplands after harvesting.
- **Institutional barriers:** Weak policy support; CA is not yet mainstreamed into national agricultural programs (M. Muminov, personal communication, 2025)
- The project overcomes these barriers by providing integral support on accessing the required technology and advisory services during the transition.

Hence, additionality condition is met for the project.

Step 3. Common practice: Current literature does not provide a numeric penetration rate for no-till wheat in Tajikistan, and available field evidence indicates that adoption is still negligible (Husenov et al., 2020) However, data from the Sarob cooperative, one of the main promoters of no-till in the country, no till is currently practiced on a total area of around 1200 hectares.

Hence, this additionality condition is met.

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 20: Conservation agriculture changes of practices in Tajikistan according to VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Crop harvesting	Wheat yield 2.8 t/ha	Wheat yield; 3 t/ha	3.Cropland 3.1 Annual cropping system remaining annual cropping system (the activity is represented under 2 lines of analysis)
Tillage and residue management	Tillage: Full tillage Residues: Exported (sold/removed; also grazed off-field effect)	Tillage: No-till (direct seeding) Residues: Retained	
Residue burning	No	No	
Input of organic material	Carbon input: Medium (no organic amendments, residues removed and only synthetic fertilizer application in alignment with NIR)	Carbon input: High without manure (introduction of legumes in rotations and residue retention)	
Nitrogen Fertilizer application	Urea: 300 kg/ha	Urea: 300 kg/ha	9.Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers

Use of nitrogen- fixing species	No.	Yes. Yield (Other pulses): 5.43 t/ha Residue: retained	3.Cropland 3.1 Annual cropping system remaining annual cropping system (Tier 2- minor season crop)
Water management/irrigation	No	No.	
Fossil fuel (ploughing)	Mobile – Diesel: 70 l/ha for ploughing, harrowing, conventional seeding	Mobile – diesel: 28 l/ha for no till seeding.	9.Inputs and investments – 9.2 Energy consumption – Liquid or gaseous; Mobile – gasoil/ diesel Oil.

Assumptions:

- The NIR (Republic of Tajikistan et al., 2024) provides national parameter values for the cropland coefficients F_{LU} , F_{MG} and F_{MG} , which are used to estimate SOC stock changes in croplands as per IPCC methodology.
 - Baseline: $F_{LU}=0.76$; $F_{MG}=1$; $F_i=1$
- Nitrogen fixing species residue production. Other pulses were assumed as the legume crop to be added in the rotation. Yields were extracted from FAOSTAT and represented an average of the last 5 available years (2020-2024)
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

Seed potato production in highland areas

The activity will be implemented in 320 ha. The carbon balance for the intervention is – 1,624 tCO₂e of enhanced removals during 7 years of accounting. This outcome is driven by the increase of organic inputs through residue retention and crop rotations and reduced use of urea. These practices compensate the induced emissions from soil carbon losses due to reduced tillage and implementation of irrigation systems.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of ware potato cultivation under traditional practices to transition to improved seed potato production. According to the methodology the Soil Organic Carbon pool is the only considered as no woody biomass exists in annual croplands. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of nitrogen-fixing crops and residue burning. The lifespan of the activity is 7 years.

The **proposed GCF intervention** will scale up the transition from ware-potato production to certified seed potato production by addressing the seed potato system. It will (i) expand and strengthen four-field crop rotations that integrate potatoes with grains and forage crops (e.g., sainfoin) and promote efficient agronomy and technologies for the non-potato rotation crops to maintain productivity and soil health including reduced tillage practices; (ii) improve water management through deployment of sprinkler irrigation systems; (iii) invest in enabling post-harvest infrastructure, notably seed-quality storage facilities; (iv) strengthen farmer cooperation/aggregation (e.g., through cooperatives or collective schemes) to support compliance with certification requirements, access to services and infrastructure, and market linkages. (v) on-farm compost making.

The baseline reflects the continuation of pre-project ALM practices. Therefore, in the absence of the project, potato production would continue under traditional ware potato agricultural land management practices typical of smallholders operating under land scarcity. Farmers would generally maintain short 2–3 year rotations, most commonly potato with wheat or barley–potato, potato–vegetables. Land preparation would remain based on conventional autumn and spring tillage at approximately 20–25 cm depth, followed by spring harrowing or rotary tillage to prepare the seedbed. Soil fertility management would continue to rely on variable and input-constrained mineral fertilization, with urea commonly applied during planting and again at hilling, and other fertilizers would remain low

and inconsistent. Where livestock are present, especially in highland systems, farmers would apply farmyard manure but availability would continue to limit consistent application. Residue management in the baseline would remain dominated by harvesting potatoes when the plan dries, with rare composting, and with some residue burning continuing in lowland areas. Crop protection would remain oriented to ware potato needs and affordability. Finally, irrigation would continue to be dominated by surface (furrow) irrigation, with highland producers relying on snowmelt and canal systems and applying supplemental irrigation during tuber bulking when water is available.

Additionality has been assessed in accordance with the procedures set out in VM0042 v.2. Additionality is demonstrated in three steps under VM0042:

Step 1. Regulatory surplus: Tajikistan has a formal seed-sector framework and a government program to develop seed production (including potato seed) through stronger organization, quality control, and state support. In particular, the Government approved the Program for the Development of the Seed Production Industry in the Republic of Tajikistan for 2021–2025 (Decree No. 117, dated 3 April 2021), which aims to expand availability of high-quality seed and strengthen the seed industry. At the same time, this is a sector development program, not a blanket mandate that converts all ware-potato farmers into certified seed producers

Seed production is regulated and encouraged, but a law mandating farmers to transition to seed production does not exist. **Hence, this additionality condition is met for the project.**

Step 2. Barrier analysis:

- **Financial barriers:** Adoption of potato seed production is constrained by high costs of production and outdated machinery.
- **Information barriers:** Certified seed production requires stricter management (seed health, integrated crop management, and post-harvest handling) highlighting low farmer technical capacity, limited extension services, and weak knowledge of integrated packages (seed + fertilizer + plant protection) and post-harvest handling. These constraints directly undermine the ability to meet certification standards and maintain seed quality.
- **Institutional barriers:** The small land plot size provides a structural constraint limiting economies of scale and aggregation, limiting access to markets. There is a lack of qualified agronomists.
- **Technological barriers:** lack of modern agriculture machinery and limited access to high-quality seed.

The project overcomes the barriers by providing integral support on strengthening farmer cooperation and infrastructure. **Hence, this additionality condition is met for the project.**

Step 3. Common practice: Potato seed production in Tajikistan is underdeveloped. Most of the potato seed is imported. Therefore, it is assumed that seed potato cultivation is below 20% adoption thresholds. **Hence, this additionality condition is met.**

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 21: Potato cultivation changes of practices in Tajikistan according to VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Crop harvesting	Ware potato yield 23 t/ha	Potato seed yield; 50 t/ha	3. Cropland 3.1 Annual cropping system remaining annual cropping system (the activity is represented under 2 lines of analysis)
Tillage and residue management	Tillage: Full tillage (plough/till pre-plant) Residues: Residues retained (plants dry in the field)	Tillage: Reduced tillage (GCF intervention objective and longer rotations) Residues: Retained (plants dry in the field)	
Residue burning	No	No	

Input of organic material	Carbon input: medium (irregular fertilizer; organic inputs not described; rotations short and limited)	Carbon input: high with manure (longer rotations including cover crop, irrigation and regular application of compost)	
Nitrogen Fertilizer application	Urea: 300 kg/ha Compost: 0 t/ha	Urea: 0 kg/ha Compost: 20 t/ha	9.Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	Yes, Sainfoin (other pulses) Yield (Other pulses): 5.42 t/ha Residue: retained	
Water management/irrigation	No	Yes, drip irrigation	9.Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	For conservativeness no change in fuel use in ploughing has been considered		

Assumptions:

- The NIR (Republic of Tajikistan et al., 2024) provides national parameter values for the cropland coefficients F_{LU} , F_{MG} and F_{MG} , which are used to estimate SOC stock changes in croplands as per IPCC methodology.
 - Baseline: $F_{LU}=0.76$; $F_{MG}=1$; $F_i=1$
- Nitrogen fixing species residue production. Other pulses were assumed as the legume crop to be added in the rotation. Yields were extracted from FAOSTAT and represented an average of the last 5 available years (2020-2024)
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

Horticulture

The activity will be implemented in 4,489 ha. The carbon balance for the intervention is 2,339 tCO₂e of induced emissions during 7 years of accounting. This outcome is driven by the increase in fertilizers induced emissions and the steady state of SOC in the project area.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of annual cropland which already produce vegetables following conventional practices which will shift to project promoted improved practices. According to the methodology the Soil Organic Carbon pool is the only considered as no woody biomass exists in annual croplands. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of N-fixing crops and residue burning.

The lifespan of the activity is 7 years.

The proposed GCF intervention will support the adoption of improved agricultural land management practices in vegetable production. It will introduce structural improvements by combining capacity building for farmers on whole farm agrotechnology and management practices together with facilitating access to drip irrigation and shade nets. The intervention package will also promote complementary productivity measures such as the use of frost resilient seeds and strengthened balance use of synthetic fertilizers and manure.

The **baseline reflects the continuation of pre-project ALM practices**. Current practices follow conventional production methods with plowing, harrowing and leveling the soil before cultivation and rely on furrow irrigation. It has been identified that farmers follow improper fertilizer management, onions are overfertilized and nutrient use is focused solely on Nitrogen. Crop residues are fed to livestock or discarded rather than managed sustainably.

Additionality has been assessed in accordance with the procedures set out in VM0042 v.2:

Regulatory surplus: Horticulture is controlled by regulations on irrigation and natural resources regulation and plant quarantine, agrochemicals and food safety. Therefore, while horticulture production must comply with some regulations there is no mandatory regulation on improved agricultural land management practices in vegetable production.

Hence, this additionality condition is met.

Barrier analysis:

Financial barriers: The availability and affordability of quality seeds and planting materials remain limited. In addition, many producers operate on very small plots and have limited capacity to invest, while agricultural insurance remains underdeveloped and exposure to climate shocks and price volatility is high. Under these conditions, even profitable innovations can be perceived as too risky, especially when they require higher levels of input use and more intensive management.

Information barriers: Limited reach and consistency of advisory and extension services. Many smallholders remain hesitant to change practices unless they can see clear, practical demonstrations and receive reassurance from trusted local experts.

Institutional barriers: Horticulture technologies have largely entered the sector through donor-supported projects, but they are not scaling on their own. Technical options are known and have been demonstrated in places, but existing support systems have not been sufficient to drive widespread uptake.

By working on capacity building and direct support in technology investment the project will overcome these barriers. **Hence, this additionality condition is met.**

Common practice: The proposed improved horticulture practices remain project-driven and constrained in smallholder farmers, rather than standard operating practice.

Hence, this additionality condition is met.

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 22: Horticulture changes of practices in Tajikistan based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Crop harvesting	Onion: 45 t/ha Tomato (OF): 20 t/ha Tomato (GH): 25 t/ha Strawberry (GH): 17.5 t/ha Average: 26.8 t/ha	Onion: 55 t/ha Tomato (OF): 25 t/ha Tomato (GH): 35 t/ha Strawberry (GH): 30 t/ha Average: 36.2 t/ha	3. Cropland 3.1 Annual cropping system remaining annual cropping system (the activity is represented under 2 lines of analysis)
Tillage and residue management	Tillage: Full tillage (ploughing, harrowing and levelling) Residues: Exported	Tillage: Full tillage (ploughing and levelling) Residues: Exported	
Residue burning	No	No	
Input of organic material	Carbon input: medium (residues removed and use of organic amendments)	Carbon input: Medium (residues removed and use of organic amendments)	
Nitrogen Fertilizer application	Averages from 3 crops above: Urea: 262 kg/ha Ammonium Phosphate: 100 kg/ha Manure: 5t/ha	Averages from 3 crops above: Urea: 250 kg/ha Ammonium Phosphate: 150 kg/ha Manure: 10t/ha	9. Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers

Use of nitrogen- fixing species	No.	No	
Water management/irrigation	Yes, furrow irrigation	Yes, drip irrigation	9.Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	No change in fuel use		

Assumptions:

- The NIR (Republic of Tajikistan et al., 2024) provides national parameter values for the cropland coefficients F_{LU} , F_{MG} and F_{MG} , which are used to estimate SOC stock changes in croplands as per IPCC methodology.
 - Baseline: $F_{LU}=0.76$; $F_{MG}=1$; $F_i=1$
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30.

Improved orchard management technologies

The activity will be implemented in 16,712 ha. The carbon balance for the intervention is 0 tCO₂e of during 7 years of accounting. This outcome is driven because no change on the parameters affecting sinks and sources are expected to change.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of traditional orchards where improved orchards are going to be introduced. According to the methodology the Soil Organic Carbon pool and AGB and BGB are considered. Sources considered in the activity include fossil fuels from soil preparation, the use of nitrogen fertilizers, the use of N-fixing crops and residue burning.

The lifespan of the activity is 7 years.

The **GCF funded intervention** will implement intensively managed orchards in existing traditional orchard by replacing low producing old trees with young trees and increasing the tree density. Orchards are going to be intercropped on the initial years and enable integrated fodder management, cut and carry grass for livestock feed and where appropriate maintain winter grazing, introduction of soil testing and advisory services to optimize nutrient inputs and yields, regular application of manure and apply synthetic fertilizers at appropriate rates. Residues will be exported. Farmers will introduce drip irrigation in orchards.

The **baseline reflects the continuation of pre-project ALM practices**. Traditional orchard practices in Tajikistan are fundamentally characterized by a long-term, low-intensity management approach centred on manual tree care rather than repeated soil cultivation. Rather than employing conventional full-field tillage, Tajik orchards rely on manual pruning and grafting ; Organic carbon input and soil fertility in traditional orchards are maintained through diversified tree species and his diversification strategy is complemented by intercropping with vegetables in inter-row spaces; Mulching with organic materials provides additional soil carbon input; Residue management in traditional Tajik orchards emphasizes on-site retention and incorporation of biomass (CABAR, 2022; IIED, 2019)

Regulatory Surplus: Intensive fruit cultivation is not mandated by any law.

Hence, this additionality condition is met.

Barrier analysis:

- **Institutional barriers:** The government has the theoretical knowledge to design policies and strategies. However, extension officers (public and private) lack expertise an in-depth practical know-how on implementing them.
- **Information barrier:** Farmers have low know-how on intensive orchard management, especially pest management, and drip irrigation. Practical technical solutions for climate-resilient technologies (e.g. drought-resistant root stocks and cultivars, and frost protection methods) are not available in the country. In addition, farmers have limited business management knowledge.
- **Financial barrier:** Establishing an orchard has high upfront costs (e.g. seedlings, drip irrigation) which are very difficult to cover by smallholders. Furthermore, the lack of long-term lending mechanisms for purchasing field equipment and financing production costs poses additional financial barriers.
- **Technological barrier:** In Tajikistan there is limited access to specialized equipment to manage intensive orchards.

The project support on investments and adequate advisory services will overcome the existing barriers.
Hence, this additionality condition is met by the project.

Common practice:

Official data indicates the total area of fruit orchards, including citrus and berry plantations, was 166,612 hectares in 2023 (TAJSTAT, 2024) Within this area, the Ministry of Agriculture reported the establishment of 1,224 hectares of intensive orchards. Anti-hail nets were installed on super-intensive orchard plots covering 30 hectares (MoA, 2025) The current adoption of intensive orchards is 0.73% way below 20% threshold.

Hence, this additionality condition is met.

The table below translates the described scenarios into IPCC parameters accounted in EX-ACT according to the definitions in IPCC, 2019 tables on practices for cropland (Table 29)

Table 23: Improved orchard management technologies changes of practices in Tajikistan based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Grazing	Traditional orchard	Intensively managed orchards	2.Land Use change 2.3 Other land use changes
Crop harvesting	Apricot:9t/ha	Apricot: 21t/ha	3.Cropland 3.1 Perennial cropping system (3.2.1) from other LU
Tillage and residue management	Tillage: No tillage Residues: no burning	Tillage: No tillage Residues: no burning	
Residue burning	No	No	
Input of organic material	Carbon input: high without manure (constant ground cover)	Carbon input: high without manure (constant ground cover)	
Nitrogen Fertilizer application	Urea: 100 kg/ha	Urea: 100 kg/ha	9.Inputs and investments 9.1 Inputs - Fertilizers Synthetic fertilizers
Use of nitrogen- fixing species	No.	No	
Water management/irrigation	Yes, furrow irrigation	Yes, drip irrigation	9.Input 9.3 irrigation-implementation of new systems
Fossil fuel (ploughing)	No	No data	

Assumptions:

- The NIR (Republic of Tajikistan et al., 2024) determines biomass accumulation rates for perennial systems of 2.1 tC/ha/year and a max of 63 tC/ha. Below ground is not considered due to lack of a root to shoot ratio and to maintain alignment with national reporting.
- The NIR (Republic of Uzbekistan et al., 2024) provide national parameter values for perennial cropland coefficients $F_{LU}=1$, $F_{MG} = 1$ and $F_I = 1$, which are used to estimate SOC stock changes in croplands as per IPCC methodology.
- The degradation level in the baseline is aligned to the NIR by accommodating a $F_{mg} = 0.90$
- Nitrogen Contents of Nitrogen Fertilizers are collected in Table 30

Sustainable and climate resilient use and Pasture restoration

The sustainable use of pastures will be implemented in 206,141 ha and Pasture restoration in 51,710 ha⁵. The carbon balance for both interventions are -1,259,434 tCO₂e and -631,815 tCO₂e respectively, of enhanced removals during 20 years of accounting. The outcome is driven by an increase in SOC in grasslands due to reduced degradation.

The **determination of impact boundaries** followed VM0042, the spatial extent considered areas of pasture where improved pasture management practices and infrastructure will be introduced. According to the methodology only Soil Organic Carbon pool is considered. The lifespan of the activity is 20 years according to restoration activities (GCF guidance).

The **proposed GCF intervention** under sustainable use will strengthen local pasture governance and enable sustainable grazing. Under the project, existing pasture user groups will be organized and trained to plan and enforce grazing rotations, agree on stocking rates, and carry out community-based monitoring and restoration. The project will finance practical rangeland improvements: installation and rehabilitation of water points, small pasture infrastructure, introduction of drought-tolerant forage species and implementation of rotational grazing, using natural boundaries or temporary fencing with planned rest periods. The intervention will improve access to not grazed distant pastures and will monitor pasture conditions. Pasture restoration will establish areas of temporary exclusion for reseeding and natural regrowth and permanent exclusion on areas of high degradation; corridors will be fenced to channel livestock away from most degraded areas.

The **baseline reflects the continuation of pre-project ALM practices**. Therefore, In the absence of the project, pasture systems would continue under the prevailing uncontrolled and continuous grazing pattern that drives a vicious cycle of low productivity and degradation. Grazing pressure would remain concentrated on the most accessible lowland areas because grazing corridors are blocked and access to more remote pastures is constrained, resulting in repeated use of the same areas and limited effective resting of vegetation. Pasture condition would continue to be characterized by widespread degradation (Approx. 85% of land is degraded), with edible grasses increasingly mixed with non-edible species, reducing forage quality.

Additionality has been demonstrated in accordance with the procedures set out in VM0042 v.2.

Regulatory surplus: The Law 'On Pasture' and its by-laws passed in 2013. They regulate access to pasture resources. Primary pasture use rights over most pastures have been allocated to individuals, often on a first-come-first-served basis.

Although the legislation allocates pastures based on livestock standards, this allocation mechanism is often not implemented in practice. As a result, overgrazing persists as a key driver of pasture degradation and productivity losses, driven by weak enforcement by responsible authorities and pasture committees.

Hence, this additionality condition is met by the project

Barrier analysis:

- **Financial barriers:** The underdeveloped meat and milk value chains reduce profitability and limit reinvestment in pasture management. Weak processing, storage and market access means farmers often cannot obtain price premiums, so they have limited incentive and capacity to finance infrastructure or accept short-term adjustments in grazing pressure that would improve pasture condition over time.
- **Institutional barriers:** Even if farmers are willing to rotate, blocked corridors and weak local coordination constrain livestock movement and concentrate grazing on accessible areas. At the same time, remote pasture infrastructure is not well maintained (mobile pumping, pipelines, and pasture development inputs), and institutions responsible for these assets are underbudgeted, making it difficult to operationalize rotational systems and reduce pressure on degraded lowlands.
- **Information barriers:** Producers lack sufficient knowledge, experience, and extension support to plan and implement controlled grazing systems (e.g., setting stocking rates, defining rotations/rest

⁵ Pasture restoration includes 160 hectares to be restored inside Protected Areas representing 80% of the 200 hectares to be restored in protected areas in Tajikistan. The remaining 20%, 40 hectares are forest areas included under forest restoration.

periods, monitoring pasture condition, and adapting based on rainfall or forage growth). Without reliable technical support, the perceived risk of changing grazing patterns remains high, and baseline overuse continues.

The participatory approach on pasture management together with financial support to improve existing infrastructure will overcome the identified barriers for sustainable pasture management. **Hence, this additionality condition is met by the project.**

Common practice: Overall, sustainable pasture management remains limited in practice due to the lack of secure pasture use rights for most livestock keepers, high rental fees, underuse of remote pastures and overuse of pastures near villages, and few incentives for land use right holders and pasture users for sustainable management of pastures. As of 2025, 64 Pasture Management Plans have been developed and implemented across 50 new and 14 existing Pasture Users' Unions (PUUs), resulting in the rehabilitation of 27,718 hectares of pastures. However, this rehabilitated area represents only a small fraction of Tajikistan's 3.8 million hectares of total pastureland, underscoring the vast gap between current intervention capacity and the magnitude of degradation affecting the country's rangelands (CAREC, 2025; UNCCD, 2024).

Hence, the additionality condition is met for the project.

Table 24: Sustainable and climate resilient use and Pasture restoration changes of practices in Tajikistan based on VM0042 boundaries and EX-ACT parameters

ALM practice	Initial and baseline	GCF intervention	EX-ACT representation
Grazing controlled grazing)	High intensity grazed grasslands.	50% of the lands high intensity grazed, 50% of the lands non-degraded grasslands.	4.Grasslands
Grazing (biodiversity)	High intensity grazed grasslands.	Non-degraded grasslands.	4.Grasslands
Burning	No	No	

Assumptions:

- The current grassland condition is not known. The assessment made use of the NIR (Republic of Tajikistan et al., 2024) value of $F_{mg} = 0.9$ for rangelands in line with high intensity grazing. Following tier 1 approach the assessment assumes an improvement of one level of degradation in SOC to another for 20 years.
- Under the GCF intervention, the assessment assumes a change from high intensity grazing to non-degraded chosen as the most conservative
- Under the baseline, the assessment assumes a steady state of degradation, therefore no further degradation is modelled.

high intensity grazing to non-degraded	4.3 tC/ha
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- Improvements tight to the adoption of controlled grazing assume an adoption rate of 50% over all the area targeted by the project.

Afforestation and reforestation on degraded open land

The activity will be implemented in 1,100 ha. The carbon balance for the intervention is -21,732 tCO₂e of enhanced removals during 20 years of accounting. The outcome is driven by an increase in biomass.

The **determination of impact boundaries** followed AR-ACM0003, the spatial extent considered areas of degraded grassland where afforestation and reforestation activities will take place. According to the methodology the Above ground biomass and below ground biomass are to be considered while other carbon pools are optional. Burning of biomass does not occur.

The lifespan of the activity is 20 years according to restoration activities.

The assessment of leakage using the AR-TOOL15 (CDM, 2013c) deemed that displaced animals will move to existing grassland without exceeding the carrying capacity as they will move to grazing lands made accessible by the project.

The **GCF intervention** focuses on the conversion of degraded pastures into Juniper, Saxaul and Pistachio forests with grazing. Therefore, the project seeks to restore productivity of lands and provide additional ecological benefits without excluding grazing completely. The SFE will be responsible for the implementation of activities.

The **baseline and Additionality** have been determined by following the approach described in the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”.

Step1 - Alternative scenarios:

Two alternative scenarios compliant with all regulatory requirements are identified, (1) **the continuation of High Intensity grazed grasslands** and (2) **forestation of the land without being part of the GCF**.

Step 2: Barrier analysis:

- **Institutional Barriers:** weak law enforcement and governance enable ongoing illegal exploitation and the government capacity to monitor and prevent it remains limited; unclear institutional responsibility for forest management, inadequate coordination between local and national authorities failing to account for local conditions ecological and social context (AAH & IRIS, 2017; UNECE & FAO, 2018; World Bank, 2020).
- **Financial barriers:** inadequate financing for forest restoration infrastructure and limited budgetary allocation for afforestation programs constraints the scale of restoration activities needed to reverse decades of forest loss; high cost of land degradation prevention, repairs alone reduce available capital for proactive forest management investment (Vagit, 2025; World Bank, 2020).
- **Technological barriers:** poorly developed material and technical base prevent effective forest management.
- Therefore, according to the barriers presented the forestation and afforestation activity proposed under the project will be impossible to implement without GCF funding.

The baseline scenario is determined as the continuation of pre-project situation. In the absence of the project, pasture management would continue under the prevailing extensive, herded free-range grazing system resulting in significantly high grazing pressure.

Step 4 Common practice:

Forest management is centralized combined with increasing community-based approaches. State forestry agency sets targets and lesskhozes (local forest management enterprises) implement management on the ground receiving minimal central funding and generating revenue from selling forest products. Active restoration and reforestation are guided by large-scale reforestation targets around 7,300 ha from 2009-2018 and the Bonn challenge to restore 66,000 ha of degraded forest. co-management groups are being established (UNECE & FAO, 2018)

The GCF intervention differs from common practice for several reasons: (i) it goes beyond tree planting and instead builds a durable, measurable restoration system; (ii) it integrates carbon accounting; (iii) it embeds community involvement as a core delivery mechanism; iv) it focuses on practical and local design choices: locally selected, climate-adapted tree species matched to site conditions, hardening of seedlings to improve survival rates after transplantation and a suitable planting scheme.

Hence, the intervention is additional to common practice.

Table 25: Afforestation and reforestation on degraded open land changes of practices in Tajikistan based on CDM boundaries and EX-ACT parameters

Hectares	Initial and baseline	GCF intervention	EX-ACT representation
Land use	Grasslands under high intensity grazing	Juniper, saxaul, walnut, Pistachio and Riparian forests	2.Land Use Change/ 2.2 Afforestation & Reforestation.
Tree AGB and BGB (tC/ha)	0	Juniper: 6.99 tC/ha Saxaul: 0.13tC/ha (shrub forest) Walnut: 43.25tC/ha Pistachio and almond forest: 1.24tC/ha Riparian: 12.81 tC/ha (Other mixed broadleaved forests) Weighted Average: 12.90 tC/ha	
Tree AGB and BGB growth	0	Juniper forest: 0.19tC/ha/year Saxaul: 0.01tC/ha/year Walnut: 1.12tC/ha/year Pistachio and almond forest: 0.05 tC/ha/year Riparian: 0.44tC/ha/year (Other mixed broadleaved forests) Weighted Average: 0.35 tC/ha/year	
Deadwood, litter and SOC	No	No	

Assumptions:

- The intervention will not disturb the soil cover in more than 10%. No losses of biomass from the initial land use are considered.
- The assessment makes use of AGB and BGB average values calculated using the Second National Forest Inventory Report in The Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022).
- The weighted average used as tier 2 in the assessment considers that 5% of the afforestation and reforestation activities will target riparian forests. The remaining 95% will plant the other references forest types.

Forest Restoration

The activity will be implemented in 1,300 ha. The carbon balance for the intervention is -31,752 tCO₂e of enhanced removals during 20 years of accounting. The outcome is driven by an increase in biomass.

The determination of impact boundaries followed AR-ACM0003, the spatial extent considered areas of degraded forest where forest regeneration activities will take place. According to the methodology the Above ground biomass and below ground biomass are to be considered while other carbon pools are optional. Burning of biomass does not occur. The lifespan of the activity is 20 years according to restoration activities (GCF guidance).

The GCF intervention will implement integrated sustainable forest management and restoration to reduce pressure on natural forests by enabling sufficient natural regeneration, and promoting sustainable harvesting of non-timber forest products (NTFPs), activities will also restore degraded forests and degraded riparian forests into better-stocked, more resilient forest ecosystems through targeted tree planting and improved management practices. Areas under restoration will be protected

from physical disturbance to enable self-regeneration. However, additional planting on the most degraded areas will be undertaken.

The **baseline and Additionality** have been set by following the approach described in the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” (CDM, 2007)

Step1 - Alternative scenarios:

Two alternative scenarios compliant with all regulatory requirements were identified, (1) **the continuation of degraded forest in a steady state** and (2) **enhancing forest stocks without being part of the GCF**.

Step 2: Barrier analysis:

- **Institutional Barriers:** weak law enforcement and governance enables ongoing illegal exploitation and the government capacity to monitor and prevent remains limited; unclear institutional responsibility for forest management, inadequate coordination between local and national authorities failing to account for local conditions ecological and social context (AAH & IRIS, 2017; UNECE & FAO, 2018; World Bank, 2020)
- **Financial barriers:** inadequate financing for forest restoration infrastructure and limited budgetary allocation for afforestation programs constraints the scale of restoration activities needed to reverse decades of forest loss; high cost of land degradation prevention, repairs alone reduce available capital for proactive forest management investment. (World Bank, 2020; Vagit, 2025)
- **Technological barriers:** poorly developed material and technical base prevent effective forest management.
- Therefore, according to the barriers presented the forestation and afforestation activity proposed under the project will be impossible to implement without GCF funding.

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The baseline scenario is determined as the continuation of pre-project situation. In the absence of the project, pasture management would continue under the prevailing extensive, herded free-range grazing system resulting in significantly high grazing pressure.

Step 4 Common practice:

Forest management is centralized combined with increasing community-based approaches. State forestry agency sets targets and lesskhozes (local forest management enterprises) implement management on the ground receiving minimal central funding and generating revenue from selling forest products. Active restoration and reforestation are guided by large-scale reforestation targets around 7,300 ha from 2009-2018 and the Bonn challenge to restore 66,000 ha of degraded forest. co-management groups are being established (UNECE & FAO, 2018).

The GCF intervention differs from common practice for several reasons: (i) it goes beyond tree planting and instead builds a durable, measurable restoration system; (ii) it integrates carbon accounting; (iii) it embeds community involvement as a core delivery mechanism; iv) it focuses on practical and local design choices: locally selected, climate-adapted tree species matched to site conditions, hardening of seedlings to improve survival rates after transplantation and a suitable planting scheme. Hence, the intervention is additional to common practice.

The activities are stratified according to forest types based on the NFI of The Kyrgyz Republic (Kyrgyz Republic, Unique land use, et al., 2022)

Table 26: Forest restoration changes of practices in Tajikistan based on CDM boundaries and EX-ACT parameters

	Initial baseline and	GCF intervention	EX-ACT representation
Land use	Forest (no regeneration)	Forests growing according to their natural growth rates ensuring regeneration.	
Tree AGB and BGB (tC/ha)	0	Non-degraded forest stocks: Spruce-fir forest: 52.03 tC/ha Juniper: 6.99 tC/ha Walnut forest: 43.25 tC/ha Pistachio and almond forest: 1.24tC/ha Other mixed broadleaved forests: 12.81 tC/ha Shrub forests: 0.13 tC/ha Average (all forest types): 14.27 tC/ha	5.management
Tree AGB and BGB growth	0	Natural growth rate: Spruce-fir forest:1.01 tC/ha/year Juniper forest: 0.19tC/ha/year Walnut forest: 1.12tC/ha/year Pistachio and almond forest:0.05 tC/ha/year Other mixed broadleaved forests: 0.44tC/ha/year Shrub forests: 0.01 tC/ha/year Average (all forest types):0.35 tC/ha/year	

Assumption:

- Under the GCF intervention forests will grow according to their natural growth rates, while without the intervention they will remain in a steady state.
- Carbon stock changes baseline net removals are estimated zero as the project activity is applied under the “conditions under which carbon stock and change in carbon stock may be estimated zero” (see methodology description)

4. Measurement, Reporting and Verification (MRV)

The project will measure and collect all MRV parameters at the start of implementation, which can serve to refine the baseline. The MRV will then track key activity parameters annually. The results are to be disclosed in the Annual Performance Report.

The MRV system will produce the information required to calculate GCF Mitigation Core Indicator 1 (tCO₂eq reduced) using EX-ACT for ex-ante estimates and annual updates based on monitored activity data and measured parameters. Agricultural practice monitoring and verification is guided by VM0042 requirements and Afforestation, reforestation and enhancing forest carbon stocks monitoring is guided by AR-ACM0003.

4.1 Indicators and Reporting Requirements

The primary mitigation indicator required is core indicator 1: tCO₂eq reduced as a result of GCF funded project (GCF, 2022)

The indicator is required to be **reported in different formats:**

- **Annual value (ex-post):** tCO₂eq achieved **during the reported calendar year.**
- **Cumulative value (ex-post):** tCO₂eq achieved from the start of the physical implementation of the project until the reported calendar year.

- **Mid-term Target (ex-ante):** tCO₂e expected to be achieved up to half-time of implementation (i.e. 3.5 years)
- **Final Target (ex-ante):** tCO₂e expected to be achieved up to the end of implementation (i.e. 7 years)
- **Expected lifetime emission reduction target (ex-ante):** tCO₂e of emission reductions over the project lifetime.
 - For Agriculture activities: 7 years
 - For Afforestation, Reforestation and Restoration: 20 years

Outcome indicators:

- **Soil Organic Carbon (SOC)** stock change by activity type and country. (tC/ha/year)
- **Biomass carbon stock** change in agroforestry and forestry activities (Above and Below ground Biomass) (tC/ha/year)

Activity data indicators:

- **Area** (ha) under each type of activity disaggregated by country and stratum.
- **Yield** (t/ha) under each type of activity disaggregated by country and stratum.
- **Management practices** including tillage management and residue management under each type of activity disaggregated by country and stratum according to IPCC definitions (Table 30)
- **Emission sources:**
 - **Nitrogen Fertilizer application** (kg fertilizer/ha and kg organic amendment/ha) under each type of activity disaggregated by country and stratum.
 - **Use of nitrogen-fixing species** (yield: t/ha) under each type of activity disaggregated by country and stratum.
 - **Use of irrigation** (ha) under each type of activity disaggregated by country and stratum
 - **Fossil fuel use** (litres/ha) under each type of activity disaggregated by country and stratum

4.2 Project boundary and stratification

All intervention areas will be mapped as GIS polygons across the three countries, and used as the spatial reference for sampling, activity tracking, and verification. The polygons will include country, administrative unit, activity type, start date and stratum code. The monitoring will be active for 7 years corresponding to the implementation period and cover the main GHG gases (CO₂, CH₄ and N₂O).

The MRV will divide the activities and areas into different subunits according to their similarity based on key parameters. The aim of stratification is to reduce uncertainty.

The stratification must cover the following information per type of land use:

- **Cropland:** soil type, agroecological zone, irrigation status (irrigated/rainfed), management practices.
- **Grassland:** ecological zone, baseline condition, management, elevation, soil type
- **Agroforestry:** system type, age class, soil type, agroecological zone, irrigation status (irrigated/rainfed), management practices, precipitation.
- **Forest:** tree species, carbon stock, management.

4.3 Baseline and Project Scenario rules

The baseline will remain **static** throughout implementation and represent continuation of current land management. Baseline characterization will include:

- **Cropland survey:** current tillage, residue management and rotation, fertilizer use (covering a full rotation where relevant).
- **Grassland survey:** grazing regime and pasture condition.
- **SOC sampling:** stratified random sampling according to vm0042 requirements.
- **Biomass** will remain 0 throughout the accounting.

For the definition of the project scenario, the ex-ante assumptions will be replaced **annually** with monitored implementation data. At mid-term and endline, SOC sampling and biomass measurements will be conducted.

If measurements are only conducted in year 7, this will represent a deviation from VCS, which requires verification every 5 years or more frequently.

- **SOC sampling** will be conducted as a stratified random sampling aligned with VM0042 guidelines. The sampling campaign (mid-term and end-term) will be conducted in the same month as the baseline sampling campaign,
- **Biomass** estimates will be based on field measurements of diameter at breast height (DBH) and applicable allometric equations, documented and performed according to CDM methodologies.

4.4 Quantification approach

EX-ACT will be used to calculate core indicator 1, annually using monitored activity data.

The project duration recorded in the “1. Description tab” is to be modified in the following way:

- Year 1 – Implementation phase: 1 year and capitalization phase 19
- Year 2 – Implementation phase: 1 year and capitalization phase 18
- Year 3 – Implementation phase: 1 year and capitalization phase 17
- ...
- Year 7 – Implementation phase: 1 year and capitalization phase 13

The number of hectares in the ex-ante assessment are to be modified by the number of hectares implemented for each of the activities. The comparison needs to represent always the same number of hectares in the baseline (without project) and GCF intervention (with project).

For each line of analysis, the dynamic of change is to be modified to “1” corresponding to immediate changes. This change is necessary to account for the full year.

This quantification approach assumes that when one farmer implements it does not drop out.

SOC measurements will be used to anchor and validate SOC estimates and to update EX-ACT parameters in 3. cropland. After the baseline the SOC value will replace the $SOC_{ref} \times Flu$ in the project and baseline.

At mid-term and end of the project the SOC value will replace $SOC_{ref} \times Flu \times F_{mg} \times F_i$ in the project scenario.

Biomass field measurements and applicable allometric equations will be used to anchor and validate biomass estimates. Biomass growth rates will replace current national values.

A small sample of field measurements from forest restoration activities could be used to support a geospatial analysis reducing the costs of MRV. A potential method to follow was tested using data from the second National Forest Inventory in the Kyrgyz Republic (Unique land use & CAREC, 2022). The method classifies the different types of forests according to their crown cover, from less than 5% to more than 70%, and then compares the basal area and volume from these forest areas. The comparison gave a direct correlation between crown cover, basal area and volume. Therefore, decreasing crown cover correlates with a decrease in basal area and volume which in turns correlates with a decrease in biomass and carbon. The tables below represent the correlation for Juniper forests and Walnut forests (Table 27) using data for all regions of the Kyrgyz Republic.

Table 27: A. Juniper forests and B. Walnut forests in the Kyrgyz Republic. Crown cover correlation to mean basal area and volume

A. Juniper Forests				B. Walnut forest			
Crown Cover	Area (ha)	Mean Basal Area (m2/ha)	Mean Volume (m3/ha)	Crown Cover	Area (ha)	Mean Basal Area (m2/ha)	Mean Volume (m3/ha)
5	31,537			15	3,161	2	11
15	130,189	3	11	30	11,183	8	45
30	204,608	7	28	50	42,866	14	85
50	106,367	12	59	70	34,065	19	121
70	11,623	17	77	Total	91,275	12	75
Total	484,324	9	40				

4.5 Data collection

All the data represented below should be included in the M&E system as part of the annual recording. Data collected at the baseline is used as refined baseline values.

Activity implementation (annual)

Data / Parameter	A
Data unit	Hectare (ha)
Description	Area under management by one of the beneficiaries under specific activity where change of management practices occurs. Data collection needs to follow the stratification defined in section 4.2.
Use in EX-ACT	The data should be inputted in the respective module and line of analysis representing the activity under analysis in the respective country according to the project activity commitments.
Source of data	Project M&E system
Value applied	Activity specific according to project implementation pace.
Justification of choice of data or description of measurement methods and procedures applied	Delineation of the project area is determined by a project beneficiary adopting the project promoted specific practices.
Comments	Data corresponds to core indicator 4 but it requires disaggregation. Management practices are to be defined according to table in Table 29

Inputs and emission drivers (annual)

Data / Parameter	Fossil Fuel consumption
Data unit	Liters/ha
Description	Consumption of fossil fuel type j (gasoline or diesel) for quantification unit i in year t
Use in EX-ACT	Input tab
Source of data	The collection of data on fuel use per field should be producer reported (M&E).
Value applied	Project beneficiary specific
Justification of choice of data or description of measurement methods and procedures applied	Directly reported data by farmers.
Comments	If specific data is not available, then proxy indicators as time spend in each of the tasks or distance and the type of machinery will be used to calculate fuel use.

Data / Parameter	<i>Fertilizer use</i>
Data unit	t fertilizer/ha
Description	Mass of N-containing synthetic fertilizer applied per crop.
Use in EX-ACT	Input tab
Source of data	The collection of data on fertilizer use per field should be producer reported (M&E)
Value applied	Project beneficiary specific
Justification of choice of data or description of measurement methods and procedures applied	Recorded mass or purchased fertilizer.
Comments	The amount of Nc (Nitrogen content) per each type of fertilizer should also be recorded. Then the value is to be updated if the synthetic fertilizer is modified.

Data / Parameter	Yield of N-fixing crop
Data unit	t dm/ha
Description	Annual yield of N-fixing species included in the rotation returned to soils
Use in EX-ACT	3.cropland, tier 2, minor season crop
Source of data	Farmer reported
Value applied	Project beneficiary specific
Justification of choice of data or description of measurement methods and procedures applied	The yield is used to calculate the quantity of residues following EX-ACT programmed IPCC methodologies. Relevant for the calculation of N ₂ O emissions from residue management.
Comments	None

Data / Parameter	Yield
Data unit	t/ ha
Description	Average productivity for product and country for each of the activities
Use in EX-ACT	Cropland input tab
Source of data	The collection of data on yields should be producer reported (M&E)
Value applied	Project instance-specific
Justification of choice of data or description of measurement methods and procedures applied	Recorded weight.
Purpose of Data	The yield is used to calculate the quantity of residues following EX-ACT programmed IPCC methodologies. Relevant for the calculation of N ₂ O emissions from residue management.
Comments	None

Data / Parameter	Organic fertilizer
Data unit	t/ ha
Description	Type and quantity of organic N fertilizer applied to crops under the project
Use in EX-ACT	Input tab
Source of data	M&E system of the project
Description of measurement methods and procedures to be applied	The collection of data on organic fertilizer used should be producer reported and integrated into the M&E.
Comments	Nitrogen content in manure is 1.75%

Carbon stock measurements

Data / Parameter	SOC
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Data unit	Kg/ha
Description	SOC mass in soil sample
Use in EX-ACT	Tier 2 values in 3.cropland and 4.Grassland
Source of data	Measured in the project area
Description of measurement methods and procedures to be applied	SOC content calculated according to guidance in vm0042
Frequency of monitoring/recording	At the start and end of project implementation in representative fields.
Purpose of data	Calculation of baseline and project emissions
Comments	None

Data / Parameter	Tree biomass growth
Data unit	tC/ha/year
Description	Average change in the amount of carbon stored in living trees based on type of agroforestry system and forest stratification.
Use in EX-ACT	2.LUC afforestation and reforestation, 3. Cropland 3.2 perennial systems and 5. Management.
Source of data	Determined in project area
Description of measurement methods and procedures to be applied	Calculated using the CDM A/R tools
Frequency of monitoring/recording	At the start and end of project implementation in selected fields.
Purpose of data	Calculation of project emissions.
Comments	None

4.6 Measurement and Reporting plan

Annual MRV cycle (during implementation)

- Collection of activity, input and emission sources data.
- Application of QA/QC checks for completeness, consistency and outlier screening
- Update of EX-ACT inputs and rerun of baseline vs project calculations (see section 4.4)
- Archive of EX-ACT files, input datasets, GIS layer, calculations and evidence folders.
 - Generation of a single excel file that incorporates annual calculations for each year of implementation.
- Report on annual core indicator 1 values (other values are automatically updated or left static)

Baseline (before implementation) and verification (ex-post) (year 7)

- SOC field measurements and recalculate ex-ante estimations, if possible.
- Biomass field measurements and recalculation of ex-ante estimations.

4.7 Verification

For mitigation results tCO₂e

- EX-ACT model files for each year and excel file containing all years.
- GIS land and intervention datasets.
- SOC baseline and endline datasets incorporate lab reports.
- Biomass measurement datasets

For inputs and emission drivers

- Field inspection forms and beneficiary practice registers.
- Independent third-party verification at minimum in the final year.

4.8 MRV institutional arrangements

General:

- **M&E lead:** From the accredited entity. Overall accountability for the MRV. Compiles annual result tables, narrative and logical framework reporting. Manages databases.
- **M&E officers:** Track and verify adoption and maintenance of management practices, maintain beneficiary registers and supports sampling visits. One for each country.
- **GHG accounting specialist:** Maintains the EX-ACT files and model consistency. Updates EX-ACT and documents assumptions and changes. Ensures alignment with selected methodologies. Performs internal verification.
- **GIS specialist:** Maintains spatial datasets.

For measurement campaigns:

- **SOC field team lead:** Plans and executes SOC sampling (baseline and endline) and train teams.
- **SOC laboratory manager:** Manages soil sample analysis
- **Biomass measurement specialist:** Ensure methodology compliant biomass measurement approach and train teams.

Assurance and oversight:

- **Independent verifier (third party):** Verifies reported mitigation results and key underlying datasets through desk review, sampling and site visits (if necessary).
- **Project team:** Reviews MRV performance and risks and approves major methodological changes if required.

4.9 Budget

The table below provides an overview of the estimated budget required to operate the MRV system under the project. A lower and an upper scenario are provided to account for different monitoring intensities. Detailed items and calculations can be found in an excel file provided separately.

Table 28: Project's MRV budget overview

Items	Min budget	Max budget
Planning/documentation	20,000	40,000
Carbon datasets for monitoring events	6,000	18,000
Soil sample analysis	75,000	90,000
Teams equipment	15,750	26,100
Personnel (salaries)	173,340	173,340
Personnel equipment	3,000	3,000
Car rental	82,350	82,620
Training	45,000	90,000
Platform (database)	-	62,000
Expertal experts	793,800	793,800
Total	1,214,240	1,378,860

5. References

- AAH & IRIS. (2017). *Ferghana valley five year humanitarian trends assessment* (Aging Leadership, Economic Shocks, Decreased Funding and Reduced Resilience to Environmental Hazards). Action Against Hunger and IRIS. <https://www.iris-france.org/wp-content/uploads/2017/03/Ferghana-Valley-Report.pdf>
- CABAR. (2022, June 2). Tajikistan is losing its traditional fruit varieties. CABAR.Asia. <https://cabar.asia/en/tajikistan-is-losing-its-traditional-fruit-varieties>
- CAREC. (2025). *RESILAND Tajikistan: Key Achievements and Progress of Activities – CACIP Central Asia Climate Information Portal*. <https://centralasiacclimateportal.org/document/resiland-tajikistan-key-achievements-and-progress-of-activities/>
- CBD. (2025). *Kyrgyzstan—Country Profile*. <https://www.cbd.int/countries/profile?country=kg>
- CDM. (2007). *A/R Methodological tool “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” version 01. Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version01)*.
- CDM. (2013a). *AR-ACM0003—A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands Version 02.0 THNRJC15IW4K89UBE6DFZYX23OVP0Q*. <https://cdm.unfccc.int/UserManagement/FileStorage/THNRJC15IW4K89UBE6DFZYX23OVP0Q>
- CDM. (2013c). *AR-TOOL 15 – A/R methodological tool: Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity*. <https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-15-v2.0.pdf>
- FAO. (2022). *Ex-Ante Carbon balance Tool*. FAO. <https://doi.org/10.4060/cc0142en>
- FAO & IIASA. (2023). *Harmonized World Soil Database version 2.0*. FAO; International Institute for Applied Systems Analysis (IIASA); <https://doi.org/10.4060/cc3823en>
- GCF. (2022). *Integrated Results Management Framework (IRMF)*. <https://www.greenclimate.fund/sites/default/files/document/draft-results-handbook-v11-01092023.pdf>
- GCF. (2024). *Guidance for establishing the mitigation impact potential of GCF funded activities in support of Decision B.33/12 (Vol. 1)*. <https://www.greenclimate.fund/sites/default/files/document/mitigation-impact-potential-v1.pdf>
- Husenov, B., Otambekova, M., Muminjanov, H., Morgounov, A., Asaad, S., Garkava-Gustavsson, L., & Johansson, E. (2020). Constraints and Perspectives for Sustainable Wheat Production in Tajikistan. *Frontiers in Sustainable Food Systems*, 4, 27. <https://doi.org/10.3389/fsufs.2020.00027>
- IIED. (2019). *The Apple Park and Wheat Park, Tajikistan, Case study guidance on Biocultural Heritage Territories*. INMIP TAJIKISTAN CASE STUDIES. <https://www.iied.org/sites/default/files/pdfs/migrate/G04437.pdf>
- IPCC. (2006). *IPCC Guidelines for National Greenhouse Gas Inventories*. <https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html>
- IPCC. (2014). *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. IPCC, Switzerland. https://doi.org/https://www.ipcc.ch/site/assets/uploads/2018/03/Wetlands_Supplement_Entire_Report.pdf
- IPCC. (2019). *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. <https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html>
- Kyrgyz Republic. (2024). *Presidential decree of the kyrgyz republic*.
- Kyrgyz Republic. (2025). *NATIONALLY DETERMINED CONTRIBUTION OF THE KYRGYZ REPUBLIC NDC3.0*. https://unfccc.int/sites/default/files/2025-10/NDC3.0_Kyrgyzstan_English_30-09-2025%20%282%29.pdf

- Kyrgyz Republic, Unique land use, & CAREC. (2022). *Second National Forest Inventory in Kyrgyzstan, Report on the results of NFI#2*. https://nfi2-kyrgyzstan.info/wp-content/uploads/2024/07/2022-09-30_NFI2-Report-Web-ENG.pdf
- Mamatova, D. (2018). *Grassroots Peacebuilding: Cross-Border Cooperation in the Ferghana Valley*. CAP Fellows Paper 202. <https://centralasiaprogram.org/wp-content/uploads/2018/02/Mamatova-CAP-Fellows-Paper-February-2018.pdf>
- MoA. (2025). *The information provided by Head of department on Phytosanitary, Plant Quarantine, and Breeding of Ministry of Agriculture of Tajikistan*.
- Morales, C., Díaz, A. S.-P., Dionisio, D., Guarnieri, L., Marchi, G., Maniatis, D., & Mollicone, D. (2023). Earth Map: A Novel Tool for Fast Performance of Advanced Land Monitoring and Climate Assessment. *Journal of Remote Sensing*, 3, 0003. <https://doi.org/10.34133/remotesensing.0003>
- Murzakulova, A., & Mestre, I. (2016). *Natural Resource Management Dynamics in Boarder Communities of Kyrgyzstan and Tajikistan*. Mountain Societies Research Institute Research Paper. Natural Resource Management Dynamics in Boarder Communities of Kyrgyzstan and Tajikistan
- National Statistics Committee of the Republic of Uzbekistan. (2024). *Statistical publication, Agriculture*. <https://sgg.gouv.bj/doc/loi-2020-03/>
- Pancapalaga, W., Suyatno, S., & Sedlacek, D. (2021). The Use of Rumen Contents as Bio-Activators for Fermentation in Goat Manure Fertilizer Production. *E3S Web of Conferences*, 226, 00048. <https://doi.org/10.1051/e3sconf/202122600048>
- Republic of Tajikistan, ICAT, & GHG Management Institute. (2024). *Report on the National Greenhouse Gas Inventory of the Republic of Tajikistan for 1990–2022* [National inventory document (NID)]. United Nations Framework Convention on Climate Change. <https://unfccc.int/documents/645124>
- Republic of Uzbekistan, UNEP, & GEF. (2024). *Inventory of Anthropogenic Emissions by Sources and Removals by Sinks of Greenhouse Gases, 1990–2022: National Report*. UN Framework Convention on Climate Change (UNFCCC). https://unfccc.int/sites/default/files/resource/NIR_BTR_kadastrGHG_Uzbekistan_27_10_2025_final_eng.pdf
- TAJSTAT. (2024). *Оҳирон маҷмӯаи кишоварзӣ дар соли 2024 (Agriculture in the Republic of Tajikistan 2024)*. Agency on Statistics under the President of the Republic of Tajikistan. <https://www.stat.tj/wp-content/uploads/2024/09/ohiron-machmuai-kishovarzi-dar-soli-2024.pdf>
- UNCCD. (2024). *Global Land Outlook Thematic Report on Rangelands and Pastoralism*. United Nations Convention to Combat Desertification.
- UNDP. (2025). *Kyrgyzstan approves the National Interpretation Document for GLOBALG.A.P. version 6*. <https://www.undp.org/kyrgyzstan/press-releases/kyrgyzstan-approves-national-interpretation-document-globalgap-version-6>
- UNECE. (2025). *Country Profile: The Kyrgyz Republic* [UNECE Forest Hub]. United Nations Economic Commission for Europe. <https://land.unece.org/forests/>
- UNECE, & FAO. (2018). *Forest Landscape Restoration in the Caucasus and Central Asia* [GENEVA TIMBER AND FOREST DISCUSSION PAPER 72]. United Nations and the Food and Agriculture Organization of the United Nations. <https://unece.org/DAM/timber/publications/DP-72-flr-cca-en.pdf>
- Vagit, I. (2025). *Tajikistan's Forests on the Brink of Extinction* [Times of Central Asia]. <https://timesca.com/tajikistans-forests-on-the-brink-of-extinction/>
- Verra. (2025). *VM0042 Improved Agricultural Land Management, v2.2 (VM0042 v2.2)*. Verra. <https://verra.org/methodologies/vm0042-improved-agricultural-land-management/>
- World Bank. (2020). *Costs of Environmental Degradation in the Mountains of Tajikistan*. World Bank.

CDM. 2013b. AR-TOOL14 – A/R Methodological tool. Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities. ar-am-tool-14-v4.1.pdf

CDM. 2013d. AR-TOOL12- A/R methodological tool:

FAO, 2025. Earth Map: A Novel Tool for Fast Performance of Advanced Land Monitoring and Climate Assessment DOI : 10.34133/remotesensing.000

Appendices

Appendix 1

Table 29. IPCC definitions of Agricultural Practices reflected in EX-ACT

Definitions cropland		Back
Long-term cultivated	Represents area that has been continuously managed for predominantly annual crops over 50 yrs.	
Perennial tree/woody crops	Long-term perennial tree crops such as fruit and nut trees, coffee and cacao.	
Full tillage	Substantial soil disturbance with full inversion and/or frequent (within year) tillage operations. At planting time, little (e.g., <30%) of the surface is covered by residues.	
Reduced tillage	Primary and/or secondary tillage but with reduced soil disturbance (usually shallow and without full soil inversion). Normally leaves surface with >30% coverage by residues at planting.	
No-till	Direct seeding without primary tillage, with only minimal soil disturbance in the seeding zone. Herbicides are typically used for weed control.	
Low carbon input	Low C input cropland systems are defined by one of the following conditions: (1) The crop residues of annual crops are removed or burnt without using organic amendments (e.g. manure) or (2) Low residue yielding crops are cultivated (e.g cotton, green maize, vegetables, tobacco) or frequent rotation with bare fallow without organic amendments, cover crops/green manures, and mixed crop/grass systems or (3) Annual crops with no mineral fertilization or N-fixing crops without irrigation, cover crops/green manures, vegetated fallows, high residue yielding crops and mixed crop/grass systems	
Medium carbon input	Medium C input cropland systems are defined by one of the following conditions: (1) annual cropping with cereals where all crop residues are returned to the field; or (2) the crop residues of annual crops are removed or burnt BUT organic amendments (e.g. manure) are applied or (3) low residue crops are cultivated (e.g cotton, green maize, vegetables, tobacco) or frequent rotation with bare fallow BUT using practices that increase C input above low residue varieties such as using organic amendments, cover crops/green manures, and mixed crop/grass systems or (4) annual crops with no mineral fertilization or N-fixing crops BUT using practices that increase C input by enhancing residue production such as irrigation, cover crops/green manures, vegetated fallows, high residue yielding. The crop residues of annual crops are neither removed nor burnt. It represents significantly greater crop residue inputs over medium C input cropping systems due to additional practices, such as production of high residue yielding crops, use of green manures, cover crops, improved vegetated fallows, irrigation, frequent use of perennial grasses in annual crop rotations, but without manure applied.	
High carbon input without organic amendments		
High carbon input with organic amendments	Represents significantly higher C input over medium C input cropping systems due to an additional practice of regular addition of animal manure.	
Residues retained	Crop residues are left on the field site to decompose and be re-incorporated in the crop's soil. Retaining of residues is usually associated with reduced or no-till practices.	
Residues exported	Crop residues are removed from the field site, in order to be used for other activities (e.g. feeding, energy production).	
Residues burnt	Crop residues are burnt.	

Table 30. Nitrogen Content of Synthetic fertilizers applied

Type of N-fertilizer	Nitrogen Content (%)
Urea	46%
Ammonium Phosphate	18%
Diammophoska	10%
Ammonium Nitrate	34%
Ammonium Sulphate	21%
NPK	15%
Manure & Compost	1,75%