Green Climate Fund (GCF) Proposal

Integrated climate risk management for strengthened resilience to climate change in Buner and Shangla Districts of Khyber Pakhtunkhwa Province, Pakistan

OPERATION & MAINTENANCE PLAN

1. Background

This Operation and Maintenance (O&M) plan is developed in consultation with relevant project stakeholders and contains detailed procedures for carrying out activities necessary to guarantee the proper functioning, productivity, and durability of most common equipment, infrastructures, and systems requiring standard operating procedures and timely management. The plan will serve as a written commitment by project stakeholders and executing entities to ensure that all project assets, that are going to be purchased, built, or rehabilitated, by WFP, the Planning and Development (P&D) Department of the Government of Khyber Pakhtunkhwa Province and GCF will remain in continued compliance with applicable regulations (health and safety) during and after the implementation timeline. The plan outlines important considerations and needs for the operation, instrumentation/calibration, monitoring, inspection, and maintenance per relevant project components and related activities. Where applicable, the plan will specify key operating parameters, limits, maintenance procedures, schedules, data collection, and necessary documentation methods. The terms "O&M" used in this document shall include operation, ground maintenance, general repairs, and replacement activities. The O&M for relevant project asset shall be presented in terms of similar type/category of assets project for which significant project funds will contribute to their realization. For each category of targeted assets, the O&M will outline (i) assets' relevance, (ii) main challenges/threats and other factors that can deteriorate/degrade assets, and (iii) a set of good pro-active/preventative practices/mechanism/strategies to enable assets to withstand identified challenges/threats and remain in good and safe working conditions.

A smooth exit strategy for the project regarding equipment and infrastructure will be ensured through the development of detailed operation and maintenance (O&M) plans for the hydrometeorological instrumentation procured and the small-scale flood protection and agricultural livelihoods assets created in the project. In addition to the technical manuals from the original equipment manufacturers (OEMs), this will include protocols on calibration, routine maintenance, and repair where necessary. 5% of asset creation cost has been set aside as contingency for repairs and maintenance during project implementation to cover unforeseen expenses and ensure that equipment procured under the project is operational throughout the project's lifespan. To ensure continued operation after the project has concluded, respective

government counterparts will be engaged at project inception to ensure that budget for future maintenance (i.e., beyond the project lifespan) is proactively planned for and allocated well ahead of time.

2. Operation and maintenance plan for automated weather stations and manual rain-gauges

Involved in the early stages of consultations for the proposal development, the Pakistan Met Department (PMD) and the Federal Flood Commission (PMD) will provide reliable climate data to inform agricultural production activities in the good year context and a basis for developing flood risk maps as an important tool to facilitate adaptation to climate risks. Project resources will be committed to enable PMD and FFC to customize weather and climate services and products to meet the resilience needs of the targeted communities. This project will further enhance PMD capacity to continue to build upon its existing database. Project funds will enable the PMD to enhance the efficiency of its current Automatic Weather Stations (AWS) network. Instruments such as Rain Gauges and runoff measuring stations will complement weather data by providing additional localized data.

Description and Relevance of asset	Challenges/Threats against asset	Targets and recommended /good practices
Automated Weather Station (AWS) is composed of various sophisticated equipment and sensitive instruments designed to measure atmospheric conditions such as temperature, atmospheric pressure, direction, and speed of winds. AWS are useful for forecasting weather events and broadcasting climate information. Potential products and services to be provided by AWS include real-time and spatial data to generate rainfall forecasts & temperature forecasts	The following are elements that can damage and or alter the performance of AWS. They include dust, lightning, debris, fires, and other landscape related hazards, and telecommunication networks disturbances.	The project plans to support the operation and maintenance **of 2 new AWS, one per project district.** The PMD will include in the O&M toolbox for AWS across project targeted regions: - Secured fencing and general ground maintenance - Updated training manuals and technical brochures on good practices - Calendar for inspecting, cleaning, and servicing when applicable: solar radiation shields, solar panels, batteries, wind, temperature, and humidity sensors - Weather-proofing communication terminals and other digital data management devices. Estimated lifespan of asset with proper maintenance: 10 years Estimated maintenance cost, included in project finance: 3% Annual Maintenance Cost.
Manual rain-gauges are instruments designed to measure with precision and accuracy the amount of rainfall in the area where they are installed.	The following are elements that can damage and alter the performance of manual rain gauges. They include Soil and dust build up, leaves, debris, and insects.	The project plans to procure **5 units per district where the project will be implemented**. Prior to their installation, WFP and PMD will develop a simple step by step illustrated guide and conduct hands-on training and demonstration with community technical advisors on how install, collect information from, and maintain the device. While most are built to withstand severe weathers and elements, user must have a good understand of tips to keep the instrument safe for use. Parameters to look for carefully to avoid damaging these instruments include power source (proper voltage). Generally, no calibration is needed. Avoid moving the device frequently and prevent the device. Follow instruction in case device requires user to empty water collecting bucket. Estimated lifespan of asset with proper maintenance: 10 years Estimated maintenance cost, included in project finance: 3% Annual Maintenance Cost.
Runoff measuring stations are instruments designed to measure with precision and accuracy the amount of	The following are elements that can damage and alter the performance of runoff measuring stations. They include poor positioning in the river, debris,	The project plans to procure **5 units per district where the project will be implemented**. Prior to their installation, WFP and FFC will develop a simple step by step illustrated guide and conduct hands-on training and demonstration with community technical advisors on how install, collect information from, and maintain the device. While most are built to withstand severe weathers and elements, user must have a good understand of tips to keep the instrument safe for use. While an initial calibration will be

runoff at a location in the river catchment where they are installed	river flow alteration, water diversions, soil build up, leaves.	prepared, no calibration is needed for further maintenance unless river geometry changes significantly. Recurring maintenance such as debris removal and proper power source checking are required. Estimated lifespan of asset with proper maintenance: 10 years Estimated maintenance cost, included in project finance: 3% Annual Maintenance Cost.

3. Operation and maintenance plan of climate-resilient agricultural livelihoods and agroforestry assets

The project seeks to enable targeted rural communities to develop strong adaptation capacities to address the impacts of climate change. Project will invest in sustainable and climate-resilient agricultural livelihoods and agroforestry practices throughout targeted communities. The O&M under this project component will guide the development, management, and evaluation of the following assets and assets to be developed under the community-based participatory planning processes.

Asset description & Relevance	Challenges/Threats against assets	Targets and recommended /good practices/systems
Strengthening of climate-resilient agricultural techniques and subsequent improvement of farmers' resilience to climate shocks	Floods and dry spells increasing land degradation and soil losses, deforestation, bushfires, and Slash& burn methods of clearing and preparing land, excessive soil tilling, over-grazing, hunting, residue burning and other unsustainable farming practices	The project plans to encourage and promote the adoption of best practices that can help smallholder famers and targeted rural communities restore the adaptive capacity of land ecosystems while increasing their resilience to climate shocks. **Land restoration through agricultural livelihood activities:** o Training in conservation agriculture practices o Plant species selection and design/layout of the project to be done in a participatory manner with the communities o Seeds/seedlings to be acquired from authorized/certified sources o Planting to be done at the appropriate stage of plant cycle of development o Care will be taken to respect the planting depths, spacing, and orientation prioritizing the promotion of agroecological practices
Small-Scale irrigation infrastructure	Soil and dirt build up, leaves, debris, and insects, rusting or breakage of moving parts Floods resulting in erosion or overtopping, poor maintenance resulting in asset failure, drought	Seasonal maintenance such as removal of encroaching shrubs, inspection and remediation of weak spots will ensure continued functionality throughout the lifespan of the structure. Additional inspection and maintenance after flood events will ensure continued functionality of the asset. Continued maintenance will be in the responsibility of the community following a handover at the end of the project. During design stages, WFP and FFC will develop a simple step by step illustrated guide and conduct hands-on training and demonstration with community technical advisors on how install, operate and maintain the infrastructure.
Reforestation of deforested catchment areas	Floods, heavy rainfalls, erosion, drought, extreme heat, evaporation, strong winds, soil erosion, topography	Project plans to encourage and promote the adoption of best practices that can help targeted rural communities restore the adaptive capacity of forest ecosystems while increasing their resilience to climate shocks. The following are priority activities under the O&M plan: **Land restoration through tree planting**:

		○ Plant species selection and design/layout of the project to be done in a participatory manner with guidance from the provincial planning and development department and the buy-in from communities ○ Seeds/seedlings to be acquired from authorized/certified sources ○ Tree nurseries set and management to follow standard horticultural and agroforestry crops protocol ○ Planting to be done at the appropriate stage of plant cycle of development ○ Care will be taken to respect the planting depths, spacing, and orientation prioritizing the promotion of agroecological practices ○ A dedicated team to ensure proper care of planted seedlings (watering, fertilizing, pruning, protection from human and animal devastation, create fire buffer around the plantation) ○ Maintenance and fencing of trees to be provided by community-based committees

4. Operation and maintenance plan of small-scale flood protection infrastructure

The project seeks to enable targeted rural communities to develop strong adaptation capacities to address the impacts of climate change. The project will establish small scale flood protection infrastructure. The O&M under this project component will ensure continued functionality of the structures throughout the asset lifespan.

Asset description & Relevance	Challenges/Threats against assets	Targets and recommended /good practices/systems
Small-scale flood protection infrastructure such as small dams and diversions	Floods exceeding the design size resulting in erosion or overtopping, poor maintenance resulting in asset failure	In parallel with the design of the assets, operations and maintenance plans will be established jointly with the communities and the provincial disaster management authorities. Seasonal maintenance such as removal of encroaching shrubs, inspection and remediation of weak spots will ensure continued functionality throughout the lifespan of the structure. Additional inspection and maintenance after every flood event will ensure continued functionality of the asset. Continued maintenance will be in the responsibility of the community, and under the supervision of the provincial disaster management authority, following a handover at the end of the project.

5. Operation and maintenance plan of other assets established under the LCCAP

The project seeks to enable targeted rural communities to develop strong adaptation capacities and during project implementation develop local climate change adaptation plans by means of community base participatory planning. The adaptation actions identified under these plans will have operation and maintenance protocols that will be developed during the design stage with the community stakeholders.

6. Maintenance Schedule

Description of asset	Maintenance Schedule	Tasks and Responsibilities, Financing
Automated Weather Station (AWS) is composed of various sophisticated equipment and sensitive instruments designed to measure atmospheric conditions such as temperature, atmospheric pressure, direction, and speed of winds. AWS are useful for forecasting weather events and broadcasting climate information. Potential products and services to be provided by AWS include real-time and spatial data to generate rainfall forecasts & temperature forecasts	**Every 6 months, early spring, early autumn (before Snowmelt, before monsoon)**	**Who:** Trained staff from the provincial or national met department or Service Provider **Tasks:** - Check for functionality, corrosion or leakages, update & cleaning of Power supply, data relay and storage - Check for functionality, replacement, servicing, updating & cleaning of sensors - Check soundness of construction, connections, seals, screws, and fix and replace structure, fencing, etc. as needed **Cost:** - 5% of procurement cost
Manual rain-gauges are instruments designed to measure with precision and accuracy the amount of rainfall in the area where they are installed.	**Twice a year and after severe weather events**	**Who:** Trained staff from the provincial or national met department or service provider **Tasks:** - Ideally quick check will be completed regularly as part of collecting the reading - Check for functionality, update & cleaning of Power supply - Check for functionality, replacement, servicing, updating & cleaning of sensors - Check soundness of construction, connections, seals, screws, and fix and replace structure, fencing, etc. as needed **Cost:** - 3% of procurement cost
Runoff measuring stations are instruments designed to measure with precision and accuracy the amount of runoff at a location in the river catchment where they are installed	**Once a year and after severe weather events**	**Who:** Trained staff from the provincial or national met department or service provider **Tasks:** - Check for functionality, update & cleaning of Power supply, data relay and storage - Check for functionality, replacement, servicing, updating & cleaning of sensors - Check soundness of construction, connections, seals, screws, and fix and replace structure, fencing, etc. as needed **Cost:** - 3% of procurement cost

Small-Scale irrigation infrastructure	**Once a year – before planting/irrigation season** **After flooding, landslide or other severe weather events, and as needed**	**Who:** Trained community members **Tasks:** - Check for embankment sagging/slipping , loose parts, erosion, sediment/gravel/trash deposits, animal burrows, roots of big trees, reconstruct as necessary - ensure flow cross-section through removal of oversized vegetation, removal and proper disposal of gravel/sediments/trash collected - Check functionality of any movable elements, e.g. control gate, fix and replace as necessary - Ensure connection of pipeline, irrigation infrastructure, check for leaks, punctures, etc. Replace as necessary **Cost:** - 2% of procurement cost plus any replacement of elements beyond average wear and tear
Reforestation of deforested catchment areas and land restoration	**Once annually**	**Who:** Trained community members and/or P&D Department **Tasks:** - Walkthrough and spot-checking - Check growth and quality of seedlings, if there are empty patches - Check for invasive species - Check for landslides, sinks, etc. - Incl. photographic documentation **Cost:** - 2% of construction cost
Small-scale flood protection infrastructure such as small check dams and diversions	**Once a year – before spring snow melt and/or before monsoon season** **After flooding, landslide or other severe weather events, and as needed**	**Who:** trained community members and/or (recurringly) P&D Department **Tasks:** - Check for embankment sagging/slipping , loose parts, erosion, sediment/gravel/trash deposits, animal burrows, roots of big trees, reconstruct as necessary - ensure flow cross-section through removal of oversized vegetation, removal and proper disposal of gravel/sediments/trash collected - Check functionality of any movable elements, e.g. control gate, fix and replace as necessary **Cost:** - 5% of cost, in case of significant works