Ministry of Agriculture,
Forestry and Fisheries

Kingdom of Cambodia

CLIMATE-FRIENDLY AGRIBUSINESS VALUE CHAINS SECTOR PROJECT (CFAVC)

ADB Loan No. 3661-CAM (COL)/8346-CAM (EF)
Grant No. 0579-CAM (EF)
Contract No. SER 001: Project Implementations Consulting (PIC), Package CS1
&
Contract No SER 002: Capacity Building and Climate Smart Agribusiness Consulting Team, Package CS2

INCEPTION REPORT

January 15 2020

AGRICONSULTING EUROPE SA
in JV with SBK Research and Development

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AESA	Agriconsulting Europe S. A
ASEAN	Association of Southeast Asian Nations
BPCR	Borrower's Project Completion Report
CAMGAP	Cambodia Good Agricultural Practice
CARDI	Cambodia Agricultural Research and Development Institute
CFAVC	Climate Friendly Agribusiness Value Chains Sector Project
CRM	Certified reference materials
CSA	Climate Smart Agriculture
CS1	Project Implementation Consultant (PIC)
CS2	Capacity Building and Climate Smart Agriculture Consultant
CS4	Information and Communication Technology Platform
CS5	Feasibility and Detailed Engineering Design Consultant
CSR	Corporate social responsibility
DMF	Design and Monitoring Framework
DTL	Deputy Team Leader
EA	Executing Agency
ELC	Economic land concessions
FAO	Food and Agriculture Organization
FWUC	Farmer water user communities
FWUG	Farmer Water User Groups
GAP	Good agricultural practice
GCF	Green Climate Fund
GDA	General Directorate of Agriculture
GDAHP	General Directorate of Animal Health and Production
GHG	Greenhouse gases
GMAP	Gender Mainstreaming Action Plan
GMO	Genetically modified organism
GMS	Greater Mekong Sub-region
ha	hectare
IA	Implementing Agency
ICA	International Cooperative Agribusiness Training Specialist
ICT	Information and Communication Technology
IGAP	International GAP, CSA and SRP Training Specialist
IGF	International Green Financing Specialist
IMC	Inter-Ministerial Committee
IPV	International Photo-Voltaic Specialist
IRRI	International Rice Research Institute
ISC	International Seed Commercialization and Intellectual Property Specialist
ISO	International Standards Organization

km	Kilometer
kW	Kilo-watt
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MEF	Ministry of Economics and Finance
MFI	Micro-finance Institution
MOC	Ministry of Commerce
MOE	Ministry of Environment
MOWRAM	Ministry of Water Resources and Meteorology
MRD	Ministry of Rural Development
NAL	National Agricultural Laboratory
NAM	National Agricultural Machinery Operations and Maintenance Training Specialist
NBP	National Biodigester Program
NBO	National Biofertilizer and Organic Fertilizer Testing Specialist
NCO	National Laboratory Coordinator
NFD	National Farmer Demonstration Specialist
NFW	National Farmer Water User Community Training Specialist
NGAP	National GAP for Tropical Fruit Specialist
NGF	National Green Financing Specialist
NGM	National GMO and Phytotoxin Analysis Specialist
NGO	Non-government Organization
NIS	National ISO17025 Accreditation Compliance Specialist
NLC	National Laboratory Commercialization Specialist
NPP	National Public Private Partnership Specialist
NPV	National Photo-Voltaic Specialist
NSC	National Standard Council
NTI	National Tissue Culture Development Specialist
NTC	National Training and Capacity Building Specialist
O&M	Operation and Maintenance
PADC	Provincial Agricultural Development Center
PAM	Project Administration Manual
PBL	Plant Biotechnology Laboratory
PCR	Polymerase chain reaction
PD	National Project Director
PDAFF	Provincial Departments of Agriculture, Forestry and Fisheries
PIC	Project Implementation Consultant
PM	National Project Manager
PMU	Project Management Unit
PPIU	Provincial project implementation Unit
PPP	Public Private Partnership
PPTA	Project Preparation Technical Assistance
PV	Photo-voltaic
REDD+	Reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries

RGC	Royal Government of Cambodia
SRP	Sustainable rice platform
TA	Technical Assistance
TC	Technical Committee
TL	Team Leader
TOR	Terms of Reference
WG	Working Group

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1 EXECUTIVE SUMMARY

1.1 General

This Inception Report is the combined Inception Report of the Consultancy Packages CS1 and CS 2 of the Climate-Friendly Agri-business Value Chains (CFAVC) Sector Project. CS 1 is the main Project Implementation Consultants (PIC), while CS 2 is the consultant for team for Capacity Building and Climate Smart Agribusiness.

The main aim of the CFAVC project is to improve, in some selected agricultural production centers with high potential, the main constraints in all stages of the agricultural production and –marketing process, comprising on-farm crop-production and off-farm harvesting, storage, processing and finally the marketing stage, to the benefit of male and female value chain actors. With regards to the crop-production stage the project will improve quality of seeds and supply of irrigation-water, while with regards to the harvesting/ storage/processing stages laterite roads from the schemes to the AC would be constructed and the ACs provided with various processing equipment and training. Finally, for the marketing process concrete roads will be constructed from ACs to markets. In addition, for all stages relevant Institutional strengthening and training are foreseen. An integral part of CFAVC is the introduction of renewable energy, and gender mainstreaming through all components.

The combining of these Inception Reports in one report has happened at the request of the ADB Project Officer, Dr. Srinivasan Ancha, during the 'Start-off' Teleconference on November 5, 2019, with as aim than this Combined Inception Report would provide an overall view of the activities of all 3 participating IAs, viz. MAFF, MOWRAM and MRD, and to this end also the work-program of the CS 2 team (Capacity Building and Climate Smart Agribusiness Consulting Team) is included in this Report. This Inception Report includes updates to all major project features, such as a) Work Plan, b) Procurement plan, c) Disbursement Prognosis and d) PPMS. The CS5 Team mid December 2019 issued their own Inception Report.

1.2 Main Issues of the Inception Period

This inter-related concept of improving the various steps of agricultural value-chain has so far insufficiently been understood by the 3 involved departments. This might also be caused by the fact that the concept of geographical clustering was not introduced by the PPTA team. It is hoped that in the Inception Workshop this concept can be made operational to complete the selection of the agricultural production centers to be improved under this project. This lack of attention for the value chains of the various agricultural products is the lack of specific value-chain experts.

A second main conclusion of this Inception Phase is that for the proposed selection criteria for the various civil works items (gravity irrigation schemes, ponds, AC improvement) were never applied on the nominated schemes. For the gravity irrigation schemes an initial screening was done during this Inception Phase.

A third major issue is that, also because of the delays in starting-up of the CFAVC project and changes in the market of renewable energy in Cambodia, the proposed program for Renewable Energy may seem to already be outdated and in need of revision.

2 OBJECTIVES, ACTIVITIES AND RESULTS

2.1 Overall objective

The **Impact** of the Project will be the improvement of agricultural competitiveness, which will be reflected in enhanced productivity, climate resilience, quality and safety, value addition, and rural household incomes.

The Outcome **of the Project will be the development of resource-efficient gender responsive agribusiness value chains in the Project area[1].**

2.2 Value Chain Concept

The essence of a value-chain project is both the processes of crop-production and that of the post-harvest/processing in one regional area are improved. With improved seeds, improved irrigation, improved crop husbandry, improved rural roads, improved agricultural processing and storage, improved processing of agriculture waist into bio-energy, improved access to markets, and the promotion of equal opportunities for work and livelihood options for male and female farmers, a situation is created in which farmers can participate in, and benefit from project interventions, and make sufficient profit to raise their families. **Table 1** shows in simple manner the combined crop-production and post-harvest phases and how the CFAVC project will intervene to smoothen and facilitate the process.

Table 1: CFAVC Interventions during Value Chain Process

Activity		1	2	3	4	5
		Pre-plant	Crop-growth	Harvest	Storage and Processing	Marketing
On-Farm	Inputs	New varieties	Drip Irrigation			
	Training/ Institutional		Good Farming practices/ Contract-farming/ Climate-risk screening/ Organic fertilizer standards/Green finance			
Water	Civil works		Irrigation and Drainage infrastructure			
	Training/ Institutional		FWUC empowerment			
Off-farm	Civil Works/Equipment		Bio-digesters Compost huts	Laterite roads	Agriculture Cooperatives Engineering Workshops	Concrete roads
	Training/ Institutional				Farm product certification	PPP initiatives

[1] The design and monitoring framework (DMF) is shown in **Table 2**

2.3 Project Back ground

Over the past 5 years, Cambodia has been one of the fastest-growing economies in Southeast Asia. The Cambodian economy grew by 6.9% in 2017, slightly less than in the previous year. Cambodia has achieved remarkable economic development since the late 1990s, enjoying an average annual growth rate of 7.7%. This economic progress helped reduce the poverty rate from 47.8% in 2007 to 13.5% in 2014, although more than 70% of Cambodians still live on less than $3 a day. In July 2016, the World Bank officially revised the status of Cambodia's economy to lower middle-income from lower-income status. Cambodia's growth model of attracting foreign direct investment through inexpensive, low-skilled, and abundant labor has delivered recent economic expansion, but may not be viable for much longer. Productivity growth has been low, while labor costs and skills shortages are increasing.

Sustaining high growth will require revitalization of agriculture, diversification of the economy, and greater value-added production. This transformation will require ongoing structural reforms; in particular, addressing high electricity and logistics costs and skills shortages. To achieve economic growth on a broader and sustainable basis, substantial constraints in the agricultural value-chains need to be removed. In terms of agriculture and natural resources, while Cambodia is endowed with ample land and water resources favorable for crop production, the efficient use of these resources is sub-optimal due to limited capacity in agricultural land management and underinvestment in increasing total productivity.

2.4 Strategic Framework

The RGC policy framework is set out in the *Rectangular Strategy for Growth, Employment, Equity, and Efficiency, Phase IV 2018-2023,*[2] the *National Strategic Development Plan, 2014–2018,*[3] and *the Industrial Development Policy 2015–2025* [4].

The strategic goal of RGC[5] is to strengthen the role of the agricultural sector to generate employment, ensure food security, reduce poverty, and develop rural areas. This as the agricultural sector accounts for around 41.5% of total employment. Cambodia produces more food than domestic demand and has also produced and exported many kinds of agricultural products, particularly exported more than 600,000 tons of rice in 2017 and Cambodian rice has gained a reputation on the international market. Moreover, rural areas have achieved remarkable progress through the construction of road infrastructure, irrigation system, electricity connections, access to clean water and sanitation.

However, the agricultural sector continues to face several severe challenges including low productivity, low quality of agricultural inputs, technical services that are yet fully responsive to demands, the agricultural products supply chains are not yet responsive to market demands, livestock farming and aquaculture are still limited, mechanisms facilitating export are not comprehensive and complementary, continued import of agricultural products that can be supplied domestically, sanitary and phytosanitary system need to be strengthened, lack of mechanism providing agricultural market information linking to growing and cultivation plans, research and development (R&D) has still to be fully developed, and agricultural land has not reached its full potential. Along with these, rural development challenges include the need for improving the quality and maintenance of rural infrastructure, access to clean water, and rural sanitation.

[2] *Rectangular Strategy for Growth, Employment, Equity, and Efficiency Phase IV, 2018-2023* of the Royal Government of Cambodia of the Sixth Legislature of the National Assembly, Royal Government of Cambodia, Phnom Penh, September 2018
[3] *National Strategic Development Plan 2014–2018,* Royal Government of Cambodia, Phnom Penh, 2014.
[4] Government of Cambodia. 2015. *Cambodia Industrial Development Policy 2015–2025: Market Orientation and Enabling Environment for Industrial Development*. Phnom Penh.
[5] The text below is taken directly from *Side 1. Promotion of Agriculture Sector and Rural Development, Rectangular Strategy for Growth, Employment, Equity, and Efficiency Phase IV, 2018-2023* of the Sixth Legislature of the National Assembly, RGC, Phnom Penh, September 2018

Hence, in the Sixth Legislature of the National Assembly, the Royal Government will focus on:

(a) Promoting the development and implementation of **"Master Plan for Agriculture Sector Development towards 2030"** and **"Agriculture Sector Strategic Development Plan 2019- 2023"**
(b) Further promoting the preparation, enactment and enforcement of **"Law on Plants Protection and Sanitary and Phytosanitary"** and **"Law on Contract Farming"**
(c) Improving productivity, quality, and diversification through increasing investment in R&D of high value-added crops, livestock, and aquaculture;
(d) Promoting Model Farm development; promoting agricultural extension service; strengthening farmer cooperative management; preparing contract farming production mechanism; continuing to reduce the cost and improve quality of agricultural inputs; conducting studies on the establishment of agricultural insurance services; financial products for serving the agricultural production; and promoting the use of digital and smart technology.
(e) **Upgrading the processing industry through the promotion of private investment in agricultural products with high potential such as rice, cassava, mango, cashew nuts, banana, rubber, vegetables, etc. through the preparation of strategy for each type of crops**.
(f) Further promoting all kinds of vegetable farming to substitute imports and the establishment of vegetable wholesale market with high sanitation and standard.
(g) Promoting agricultural commercialization through further strengthening of the Sanitary and Phytosanitary, trade facilitation, additional investment in quality Laboratory for exportation as well as promoting production and consumption of domestic agricultural products.
(h) Fostering livestock and aquaculture through continued implementation of **"Law on Animal Health and Production", "Strategic Plan Framework for Livestock Development: 2016 – 2025"**, and **"National Aquaculture Development Strategy 2016-2030".**
(i) Strengthening the management of economic land concessions, continuing to promote the clearance of landmines and unexploded ordnance, and continuing to provide the social concession lands, especially to poor households for family-based farming.
(j) Rationalizing investment in irrigation systems by increasing attention to enhancing linkage with agricultural production together with regular maintenance and strengthened management of systems.
(k) Continuing to promote the rural development to be more vibrant by further investing in rural roads, small-scale irrigation system, expanding the coverage of electricity supply and access to clean water, upgrading sanitation, village and housing arrangement, as well as promoting the livelihood of people through the continued implementation of **"One Village-One Product Movement"** and **"New village Movement".**

2.5 Rationale, Impact and Outcome

Sector performance. Agriculture, including processing, transportation, and trade of farm products, is crucial for the Cambodian economy, accounting for 33.7% of the nation's gross domestic product. Crop production is the largest contributor (59.4%) to the sector's gross domestic product. Agriculture grew at 4.5% per annum between 2008 and 2012, driven by the expansion of cultivated land and high prices of farm products, but it slowed down between 2013 and 2016 (0.9% per annum) because of the loss of those drivers, extreme weather events, and rapid growth in other sectors, such as industry and services.[6] Nevertheless agricultural products are Cambodia's second largest export products, after the textile and garment, constituting $533 million (5.2% of total export) in 2016; however, agriculture exports are largely in raw form and their value addition occurs in other countries. To capture this forgone economic opportunity and diversify the economy, it is important to strengthen the value-chains of agricultural products.

[6] Government of Cambodia, Ministry of Planning. 2016. *National Institute of Statistics.* Phnom Penh.

Development constraints. The transition from a traditional subsistence to a modern commercial agriculture sector has been slow.[7] To accelerate the transition, several barriers related to infrastructure, capacity, and policy must be removed. Currently, agribusiness value-chains in Cambodia remain less developed, more fragmented, less resource-efficient, and less competitive than those in neighboring countries such as Thailand and Viet Nam. Most of the value addition to Cambodia's agricultural products occurs in Thailand and Viet Nam. This is mainly the result of:

(i) Poor production and post-harvest infrastructure leading to low productivity and high post-harvest losses (15% to 20%);
(ii) Limited capacity to deal with the impacts of climate change; and
(iii) An unfavorable policy environment for gender responsive agribusiness.

Farming remains mostly subsistence and rain-fed and many irrigation schemes function poorly, if at all. High energy costs and poor-quality road networks contribute to high production and distribution costs. Varieties grown are of low productivity and less resilient to the impacts of climate change. The labor shortage in rural areas has increased because of migration, but mechanization is limited. The drying, storage, and processing facilities at farm cooperatives are generally rudimentary, leading to poor quality of food products. Quality and safety standards remain weak. Private investments in agriculture are low in the absence of sound agribusiness policy frameworks for public–private partnerships (PPPs). Market liberalization and changing global trade rules that require stringent quality and food safety standards also make it hard for Cambodian farmers to access competitive markets.

Cambodia's agriculture sector is highly vulnerable to impacts of climate change. High risks of flood and drought combined with poverty and low adaptive capacity makes Cambodia one of the most vulnerable countries in the world.[8] Weather patterns have been unpredictable of late but essentially result in longer dry seasons and droughts, and rainy seasons that start late but are more intense. Climate projections to 2050 suggest that Cambodia will experience changes in temperature and rainfall with significant adverse impacts on farming communities and ecosystems. Farm residues are mostly used as fuel for cooking or burnt in the open, leading to increased greenhouse gas (GHG) emissions. About 75% of households use firewood for cooking, of which about 88% comes from natural forests, partly contributing to forest degradation and deforestation. Reducing the reliance on firewood and fossil fuels is therefore critical.

Opportunities. Investments in agribusiness value chain infrastructure coupled with targeted capacity strengthening and policy support are vital to tackling the above constraints, especially for vulnerable groups, such as poor female farmers. Intensified crop production with irrigation and efficient water management, improved production and postharvest infrastructure with better connectivity to cooperatives and markets, and adoption of climate-smart agriculture (CSA) production practices and climate-resilient varieties will enhance food security, reduce postharvest losses, and help farmers to better cope with climate change. Integration of renewable energy options can enhance competitiveness by reducing energy costs. Farm mechanization can help manage labor shortages, and also free up displaced farmers for other livelihood opportunities, while support to cooperatives can encourage farmers to work together to enhance their bargaining power and farming incomes.

2.6 ADB Value Addition

The CFAVC project includes ADB-innovations such as improved design standards of rural infrastructure to make it climate resilient and more sustainable, and enhance regional connectivity and trade along the GMS transport corridors. It will make additional funds available to improve climate resilience of economic infrastructure. The project will expand the use of advanced technologies such as laser land levelling, and information and communication technologies (ICT) to improve resource use efficiency and reduce GHG emissions. By providing

[7] World Bank. 2015. *Cambodian Agriculture in Transition: Opportunities and Risks*. Washington DC.
[8] Verisk Maplecroft. 2018. *Climate Change Vulnerability Index*. https://maplecroft.com/about/news/ccvi.html

targeted gender responsive capacity building and policy support to stakeholders along the value chain, the project will enhance crop production and productivity in project areas, diversify livelihood options, especially for poor women, and assist smallholders' transition from subsistence to commercial agriculture. By improving the testing capacity for quality and safety, the project will significantly enable broader access by project beneficiaries to high-value (export) markets within and beyond the GMS. Using cooperatives as an entry point, the project will foster PPPs and encourage the private sector to invest in input and output markets, and marketing. The government prioritized rice, maize, cassava, and mango in Kampong Cham, Kampot, Tboung Khmum, and Takeo provinces.[9] The project will promote economic integration through harmonization of standards and complement initiatives on trade and agriculture.9 It will also complement planned projects on irrigation and agricultural value chains.

Lessons. The project design incorporates lessons from ADB and other development partner-funded programs such as the (i) climate-resilient rice commercialization program and (ii) the strategic program for climate resilience. Lessons call for (i) improving climate resilience of critical rural infrastructure, (ii) strengthening capacity of farmers in CSA and of agribusinesses in climate-friendly technologies and practices, and (iii) supporting an enabling gender responsive policy environment for climate-friendly agribusinesses. Many projects have focused on only one of these issues, and no other development partner has yet designed a project in an integrated manner.

Strategic fit. The project is aligned with the Agriculture Sector Strategic Development Plan 2014-2018; National Climate Change Action Plan (2016–2018); National Strategic Plan on Green Growth (2013–2030); the GMS Regional Investment Framework 2022; ADB's country partnership strategy, 2014–2018 for Cambodia; and was included in the country operations business plan, 2018–2020 for Cambodia.[10] The project is consistent with ADB's Operational Plan for Agriculture and Natural Resources, which aims to increase value addition and expand partnerships with the private sector in productivity enhancement, agro-processing, and retailing.[11]

2.7 Outputs

The three outputs of the project are listed below.

Output 1: Critical agribusiness value chain infrastructure improved and made climate resilient. This output bridges gaps in infrastructure to enhance the competitiveness of the value chains of rice, maize, cassava, and mango in target provinces. It involves rehabilitation and modernization of rural infrastructure to increase production and resource efficiency, reduce postharvest losses, and enhance quality and value chain links while reducing green-house gas (GHG) emissions and increasing climate resilience.

Key activities involve:

- Rehabilitation irrigation and water management infrastructure (off-farm irrigation systems, on-farm water rainwater harvesting ponds, and drip irrigation) to climate-resilient condition;
- Upgrading agricultural cooperatives' value chain infrastructure (drying, processing and storage facilities);

[9] ADB provided project preparatory technical assistance for the Climate-Friendly Agribusiness Value Chains Sector Project. The government selected target provinces and commodities based on their proximity to transport corridors, agribusiness potential, climate vulnerability, and government priorities.
[10] Government of Cambodia, Ministry of Agriculture, Forestry, and Fisheries. 2015. *Agriculture Sector Strategic Development Plan, 2014–2018.* Phnom Penh; Government of Cambodia, National Council on Green Growth. 2013. *National Strategic Plan on Green Growth (2013–2030)*. Phnom Penh; ADB. 2017. *Greater Mekong Sub-region Economic Cooperation Program: Regional Investment Framework 2022.* Manila; ADB. 2014. *Country Partnership Strategy: Cambodia, 2014–2018*. Manila; ADB. 2017. *Country Operations and Business Plan: Cambodia, 2018–2020*. Manila.
[11] ADB. 2015. *Operational Plan for Agriculture and Natural Resources: Promoting Sustainable Food Security in Asia and the Pacific in 2015–2020.* Manila.

- Improving the connectivity of farms to cooperatives and markets through climate-resilient farm road networks;
- Strengthening the infrastructure for agricultural quality and safety testing; and
- Promoting renewable energy (bio-digesters and use of solar energy in target cooperative areas).

Output 2: Climate-smart gender responsive agriculture and agribusiness promoted. Under this Output a total of 4 activities will be implemented:

- The project will support the Cambodian Agricultural Research and Development Institute to produce, multiply, and distribute climate-resilient varieties of rice and maize and to improve weaning and acclimatization of mango and cassava.
- The project will train at least 40,000 farmers (of which 16,000 are women) on CSA practices, demonstrate laser land levelling, and construct and upgrade four farm mechanization workshops and four agribusiness training facilities.
- For each gravity irrigation scheme developed Operation and Maintenance capabilities will be established.
- In the participating provinces agricultural development centers and engineering workshops will be made fully operational

Output 3: Enabling environment for climate-friendly gender responsive agribusiness enhanced. Under this Output a total of 5 activities will be implemented:

- The project will support the Ministry of Agriculture, Forestry, and Fisheries (MAFF) and the Ministry of Commerce in creating a favorable gender responsive policy environment for agribusiness to mobilize the private sector participation through public-private partnerships (PPPs) and contract farming.
- The project will provide support for farm product certification, quality, and resilience standards, including Cambodia's good agricultural practice and organic fertilizer standards.
- The project will support cooperatives in becoming sustainable agribusiness ventures by linking up with the private sector and by establishing crop-centric PPP forums.
- The project will raise financial institutions' awareness on green finance and the integration of environmental and climate risk screening criteria into credit application and reporting procedures.
- Using information and communications technology (ICT), the project will provide weather, market, and agronomic information to create an environment for more effective climate risk management.

Figure 1: Project Location

Table 2: Design and Monitoring Framework

Impact the Project is Aligned with Agricultural competitiveness improved (Agriculture Sector Strategic Development Plan, 2014–2018)[12]			
Results Chain	**Performance Indicators with Targets and Baselines**	**Data Sources and Reporting Mechanisms**	**Risks**
Outcome Productive and resource-efficient agribusiness value chains developed in project areas	**By 2026** a. At least 15% increase in yields (2017 baseline: rice 2.7 tons/ha, maize 4 tons/ha, cassava 20 tons/ha and mango 15 tons/ha). b. GHG emissions reduced by 240,000 tons of CO2 (2017 baseline: 0 tons reduced as a result of the project). c. At least 50 agribusinesses become more resource-efficient in terms of water savings (5%–10% efficiencies); energy savings (20%); and reduction in postharvest losses (10%) (2017 baseline: 0).	a. MAFF agricultural census b. UNFCCC reports c. PPMS reports	Declining demand for Cambodian products as competition from external markets and stringent requirements for quality and safety from importers
Outputs 1. Critical agribusiness value chain infrastructure improved and made climate resilient	**By 2024** 1a. 27 irrigation and water management systems targeting 15,000 ha and 25,000 households (with at least 50,000 women) rehabilitated and made climate-resilient (2017 baseline: 0). 1b. 800 on-farm rainwater harvesting ponds commissioned (2017 baseline: 0). 1c. At least 250 km of farm roads upgraded to climate resilient standards to improve connectivity of farms to cooperatives and markets (2017 baseline: 0). 1d. 80 agricultural co-operatives[13] have integrated adaptation measures in postharvest infrastructure investments (2017 baseline: 5). 1e. Crop product quality and safety testing infrastructure in National Agricultural Laboratory upgraded to test 1,500 samples (2017 baseline: 700) and generate service income of more than $75,000 (2017 baseline: $0). 1f. 12,000 additional bio-digesters and 6,000 compost huts made operational, benefiting at least	1a–1f PPMS Annual progress reports 1a-1b. MOWRAM annual report 1c. MRD annual report 1d–1f. MAFF Annual progress reports	Capacity constraints to infrastructure design and procurement Climate change impacts may adversely impact project investments. Limited attention to O&M of

[12] Government of Cambodia, MAFF. 2016. *Agricultural Sector Strategic Development Plan, 2014–2018.* Phnom Penh; RGC, Council for Development of Cambodia. 2015. *Cambodia Industrial Development Policy, 2015–2025.* Phnom Penh; RGC, National Climate Change Committee. 2015. *Cambodia Climate Change Strategic Action Plan, 2014–2023.* Phnom Penh.
[13] Preferential support given to agricultural cooperatives with majority of female members.

	80,000 persons, including at least 50% women, due to better household air quality (2017 baseline beneficiaries: 11,468 persons, incl. 5,721 women).		Agribusiness infrastructure
2. Climate-smart agriculture and agribusiness promoted	2a. Three additional climate-resilient varieties of rice and maize released (2017 baseline: 0). 2b. 40,000 farmers (of whom 16,000 are women) trained in CSA and agribusiness development skills, of which 50% are SRP compliant with direct links to millers and exporters (2017 baseline for SRP compliance: 0). 2c. 27 FWUCs or FWUGs made operational and 500 FWUC/FWUG members (of which 30% women) developed capacity to operate and maintain their irrigation schemes (2017 baseline: 0). 2d. Four provincial agricultural development centers and four engineering workshops made fully operational to provide agribusiness services and strengthen farmer value chain links (2017 baseline: 0).	2a–2d. PPMS Annual progress reports	
3. Enabling environment for climate-friendly agribusiness enhanced.	3a. Climate-smart and gender-responsive agribusiness policy for target commodities, including a PPP framework focusing on agribusinesses, formulated (2017 baseline: 0)[14]. 3b. Cambodia good agricultural practice for tropical fruit and organic fertilizers endorsed as national standard for tropical fruit and organic fertilizers (2017 baseline: 0). 3c. 50 staff, including 30% women, from financial institutions trained in CSA and green finance (2017 baseline: 0).3d. 30 agribusinesses, including 30% led or owned by women[15], trained on green finance and CSA (2017 baseline: 0). 3d. 80 agricultural co-operatives have integrated adaptation measures in postharvest infrastructure investment. 3e. 20,000 households, including 20,000 women, provided with information on climate risk-sharing instruments (2017 baseline: 0). 3f. ICT platform for climate-friendly agribusiness established in Kampong Cham Province (2017 baseline: 0).	3a–3f. PPMS annual Progress reports	
Key Activities with Milestones			
Output 1: Critical agribusiness value chain infrastructure improved and made climate-resilient			
1.1 Construct representative subproject for irrigation and confirm implementation plans for rehabilitating or developing critical infrastructure for priority value chains (Q1–Q4 2019).			

[14] As women are more vulnerable to the impacts of climate change, any policies developed for public-private partnerships or contract farming arrangements for promoting agribusinesses under Output 3 are responsive to the needs, constraints, and vulnerabilities of women. The detailed gender analysis of the value chains proposed in the gender action plan is expected to inform this process.
[15] Enterprises led or owned by women are enterprises with at least one of the following: (i) at least 50% of senior managers are women, (ii) at least 50% of enterprise ownership is controlled by women, or (iii) at least 50% of the staff are women

1.2 Confirm land availability, locations, suitability, and connectivity for siting processing, storage, marketing, and logistics infrastructure (Q1 2019–Q1 2020). 1.3 Undertake detailed design, tender, and construct critical production and post-harvest infrastructure to climate-resilient condition (Q2 2019–Q3 2024). 1.4 Establish management systems for O&M of infrastructure (Q1 2022–Q3 2023)
Output 2: Climate-smart agriculture and agribusiness promoted
2.1 Deploy climate-resilient varieties of rice and maize (Q2 2019–Q2 2024) [G/CD]. 2.2 Conduct training for farmers, SMEs, and private sector on CSA (Q2 2019–Q2 2024) [G/CD]. 2.3 Establish or upgrade mechanical workshops and training facilities (Q3 2019–Q2 2020).
Output 3: Enabling environment for climate-friendly agribusiness enhanced
3.1 Assist in formulating climate-smart agribusiness support including policy and regulations, and advice on agronomy, markets, and links between farmers and the private sector (Q2 2019–Q4 2022) [G/CD, GE]. 3.2 Conduct training on climate risk management and green finance, including structuring of public–private partnerships in agribusiness (Q2 2019–Q1 2024) [G/CD, PSD]. 3.3 Establish ICT platform for climate risk management (Q3 2020–Q2 2024) [G/CD, PSD].
Project Management Activities
Mobilize project implementation consultants (Q4 2019). Establish PPMS, and conduct needs assessment for specific project management skills (Q2 2019). Provide training courses to project staff on project management, procurement, financial management, gender, and social and environment safeguards (Q4 2018–Q3 2024).
Inputs
ADB: $90,000,000 (loan) Green Climate Fund: $40,000,000 ($10,000,000 loan and $30,000,000 grant) Government: $7,376,000 Beneficiaries: $3,664,000

2.8 Project Implementation Period

The various Project financing agreements were concluded on 6 July 2018 and will terminate, unless extended, on 31 March 2025 with physical completion planned for 31 December 2024. An updated Project Implementation Plan based upon Table 2 of the Project Administration Manual (PAM)[16] is given in Annex 1.

2.9 Organization and Staffing

2.9.1 PSC

A Project Steering Committee (PSC), chaired by the Minister of MAFF, vice-chaired by MEF with representatives (at the level of Under Secretary of State or above) of MOWRAM, MRD, MOC, MIH and MOE, has been established to provide oversight, coordination and policy guidance in all aspects of project implementation, except land acquisition and resettlement which is the responsibility of the Inter-Ministerial Resettlement Committee (IRC), and late November 2019 a meeting was conducted while another meeting is planned for late January 2020 to discuss the outcome of the Inception Workshop. Occasionally other ministries are invited to attend as observers when specific issues of their concern are for discussion. To make decisions quickly, it is recommended that the various steering committee members will be at least the rank of Secretary of State or Under-Secretary of State. The PSC should meet quarterly during the first year of the project implementation and semi-annually for subsequent years.

2.9.2 Executing Agency

MAFF is the executing agency (EA) and chairs the Project management unit (PMU) with members of all participating agencies, which is responsible for overall project management, procurement and financial management. The PMU advises the PSC of project progress and constraints. Project implementation consultants (PIC) and other technical specialists as well as service providers including government staff as resource persons support the PMU and the PPIUs and will carry out a range of capacity building, training activities, pilot demonstrations and detailed engineering designs.

2.9.3 Implementing Agencies

As strengthening the competitiveness of agricultural value chains will require cooperation from multiple institutions the Implementing Agencies are the Ministries of MAFF, MOWRAM and MRD. Within MAFF implementation departments will include a) the General Directorate of Agriculture (GDA with the Department of Rice, Department of Industrial Crops and Department of Agroindustry): b) National Agricultural Laboratory, c) Department of Agricultural Engineering (DAEng), d) Department of Agricultural Cooperative Promotion (DACP) e) the General Directorate of Animal Health and Production (GDAHP) and f) CARDI, At provincial level, PDAFF, PDWRAM and Provincial Department of Rural Development (PDRD) are key agencies working with guidance and technical support from relevant national departments. Provincial Project Implementation Unit (PPIU) have been established in each of the four targeted provinces. The PPIU are chaired by the director of PDAFF, and comprise representatives of PDWRAM and PDRD, and PDAFF staff related to cooperatives, agricultural extension, and animal health and production. PDWRAMs are responsible for coordinating all field activities with FWUCs, while PDRDs are responsible for all roads and connectivity to agricultural cooperatives.

A Public-Private Partnership Inter-Ministerial Committee (PPP IMC) will be formed, chaired by MEF, and having a maximum of 10 representatives solely to review potential PPP

[16] RGC: *Climate-Friendly Agribusiness Value Chains Sector Project, Project Administration Manual*, ADB, June 2018

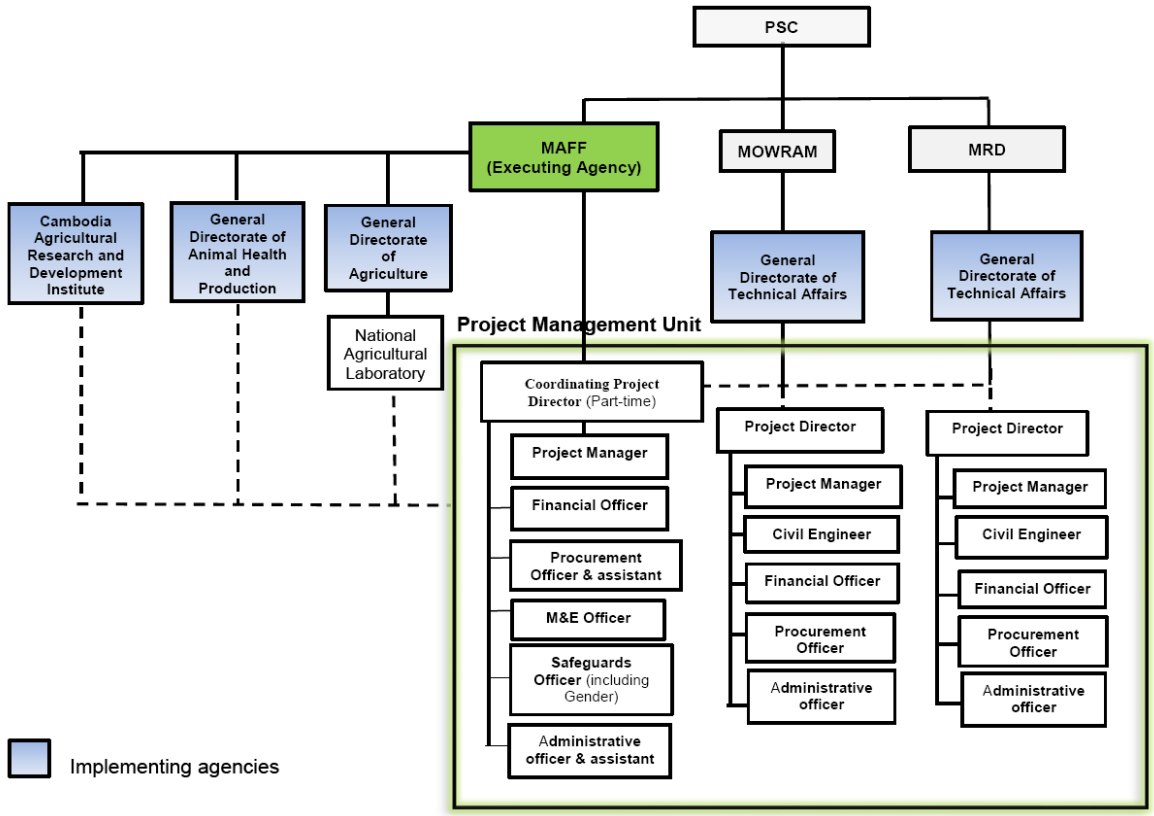
agribusiness projects and will meet once every two months. The private sector related to the value chains will have an input though the business forums, federations and associations that will provide feedback and information to the proposed PPP IMC and on to the steering committee. The forums, federations and associations can circumvent the IMC for non-PPP initiatives.

The CSA policy activity will be led by the Working Group that comprises representatives from MAFF, MEF, MOC, MIH and MOE. As MEF is the EA of ADB's Rice Commercialization project which has sponsored a feasibility study on how best to approach and implement crop insurance activities, MEF will also provide assistance in the crop insurance initiative as well as the green finance initiatives. MEF is also working on and being supported by ADB on PPP initiatives.

CARDI and the International Rice Research Institute (IRRI) will be responsible for the climate resilient variety development activities, but field demonstrations and trials will include full coordination with PDAFF.

The CFAVC project organization is shown in the Figure 2 below.

Figure 2: CFAVC Project Management Organization



2.9.4 Key Persons Involved in Implementation

Executing Agency	
Ministry of Agriculture, Forestry and Fisheries	Part-time Project Director Name: Dr Sam Chhom Sangha Position: Deputy Secretary General Telephone: +855-17826161 Email address: sc.sangha72@gmail.com Office Address: 200 Blvd Norodom, Beong Kang Kong I Khanchamkarmon, Phnom Penh
	Full-time Project Manager Ngin Kosal Position: Deputy Director, Department of Agricultural Engineering Telephone: +855-12912037 Email address: ngin.kosal@yahoo.com.au Office Address: 200 Blvd Norodom, Beong Kang Kong I Khanchamkarmon, Phnom Penh
National Technical Departments	
MAFF - Department of Agricultural Cooperative Promotion	Director Mr Chea Saintdona Tel: 017 636464
MAFF - Department of Agricultural Engineering	Director Mr Ngin Kasal Tel: 012 828883
MAFF - National Agricultural Laboratory	Director Mr. Neou Ratana Tel: 012 989 936/ 012 4344 48
MAFF - Cambodia Agricultural Research and Development Institute (CARDI)	Director Ouk Makara Tel: 011 911165/023 6319692
MAFF – General Directorate of Animal Health and Production	Deputy Director General Dr Suon Sothean Tel: 012 714 682
MOWRAM - PMU Director	H.E. Chann Sinath Under-Secretary of State Tel: 012 528777 Email address: channsinath78@gmail.com Office address: Preah Monivong Boulevard # 93 Phnom Penh
MRD – PMU Director	H.E. Dr. Chan Darong Director General, General Directorate of Technical Affairs Tel: 012 599-599 Email address: darongchan@gmail.com Office address: Corner Road #169 and Soviet Boulevard, Phnom Penh
Asian Development Bank	
Environment, Natural Resources and Agriculture Division Southeast Asia Department	Dr. Jiangfeng Zhang Director Telephone No. +632-632-6234 Email: jzhang@adb.org
Project Officer	Dr. Srinivasan Ancha Principal Climate Change Specialist Telephone No. +632-632-4786 Email address: asrinivasan@adb.org

2.9.5 Management Roles and Responsibilities

Table 2.4 shows for all involved Government Parties their management role and responsibilities.

Table 2.4: Management Roles and Responsibilities

Position	Job Description	Requirements
Ministry of Agriculture, Forestry and Fisheries		
National Coordinating Project Director (part time)	The PMU Coordinating Project Director reports to the PSC on the overall supervision and implementation of the project and ensures that the PSC and ADB are kept informed of project developments, issues and progress. The Director oversees and coordinates the work of PMU staff, and the recruitment and performance of international and national consultants, ensuring budgets and work plans are approved and executed on time and on target. The Director supervises and approves all project activities and expenditures.	A senior government official with at least 12 years' project management experience with preference to ADB project implementation. Master's degree or equivalent and competence in spoken and written English.
National Project Manager	The National Project Manager reports to the Coordinating Project Director, ensuring effective coordination among project stakeholders on implementation, administrative and finance aspects. The main duties involve preparing and implementing detailed annual work plans and budgets, coordinating all administrative/finance/procurement matters, managing project account to ensure timely disbursement for project activities, managing consultant recruitment and procurement, managing project fixed assets, and oversee implementation of the Project Performance Management System (PPMS). S/he reviews and endorses budget requests of Provincial Project Implementation Units (PPIUs) for onward submission for approval of the Project Director and will liaise with the National Technical Departments/Focal points of MOWRAM and MRD and will be supported by PIC.	A senior government official with at least 10 years project management experience A Master's degree or equivalent and competence in spoken and written English.
Financial Officer	The PMU Financial Officer will report to the Project Manager, overseeing the day-to-day financial management of the project and will be supported by the procurement officers and National Finance consultant. S/he will (i) facilitate the establishment of the necessary accounts at the PMU, MOWRAM, MRD and the PPIUs; (ii) establish the required accounting, withdrawal approval and audit systems and procedures; (iii) set up accounting software in line with project requirements; (iv) establish a system for safekeeping of tender documents, minutes of committee meetings, contracts and financial and audit reports; (v) prepare financial projections against the work plans; (vi) carry out a financial management training program for relevant PPIU staff; (vii) provide ongoing training and coaching to PPIUs as needed; and (viii) supervise the preparation of regular financial reports for transmission to the EA and the ADB.	A government official with formal accounting qualifications and at least 5 years previous experience in financial management of internationally financed projects, preferably projects financed by ADB or World Bank. Bachelor's degree or equivalent. Competence in spoken and written English.
Procurement Officer	The Procurement Officer reports to the Project Manager and work closely with the National Procurement Consultant ensuring all project procurement activities are undertaken in accordance with ADB's Procurement Guidelines. The procurement officer will be supported by a procurement assistant.	At least 5 years previous experience as procurement officer on ADB or internationally financed projects and good command of spoken and written English.

Safeguards Officer	The Environment, Safeguards, and Gender Officer reports to the Project manager and works closely with the PIC, ensuring implementation and monitoring of gender, social and environmental safeguards in accordance with ADB's SPS 2009. The Safeguards Officer will work closely with the international and national safeguards consultants on institutional strengthening and capacity building, updating IEEs/EMPs, RPs, IPP, and GAP preparing quarterly reports on safeguards compliance. Preparing quarterly reports on safeguards compliance.	A degree in environment / social science and at least 3 years work experience in related field, preferably on internationally supported projects. Good command of spoken and written English.
M&E Officer	The M&E Officer reports to Project Manager ensuring the project M&E system is established, updated, monitored, and reported.	At least 3 years previous experience working as M&E officer on ADB or internationally financed projects. Ability to use Microsoft programs and good English ability.
Administrative Officer	The Office Assistant provides logistical support to the senior staff as needed. Frequently interacting with senior government officials, PPIU staff members and the consultants and acts as P.A. to the Project Manager.	At least 3 years previous experience working on ADB or internationally financed projects. Ability to use Microsoft programs and good English language ability.
Ministry of Water Resources and Meteorology (MOWRAM) – General Directorate of Technical Affairs		
MOWRAM Project Director	The MOWRAM Director will ensure effective coordination among project stakeholders on implementation, administrative and finance aspects. The main duties involve preparing and implementing detailed annual work plans and budgets, coordinating all engineering/admin/finance/ procurement, managing the project account to ensure timely disbursement for project activities, managing project fixed assets, and oversee implementation of the Project Performance Management System (PPMS). S/he reviews and endorses budget requests of Provincial Project Implementation Units (PPIUs) for onward submission for approval and will liaise with the National Technical Departments of MAFF and MRD and will be supported by PIC.	A senior government official with at least 10 years project management experience A Master's degree or equivalent and competence in spoken and written English.
National Project Manager	The National Project Manager reports to the Project Director, ensuring effective coordination among project stakeholders on implementation, administrative and finance aspects. The main duties involve preparing and implementing detailed annual work plans and budgets, coordinating all administrative/finance/procurement matters, managing project account to ensure timely disbursement for project activities, managing consultant recruitment and procurement, managing project fixed assets, and oversee implementation of the Project Performance Management System (PPMS). S/he reviews and endorses budget requests of Provincial Project Implementation Units (PPIUs) for onward submission for approval of the Project Director and will liaise with the Coordinating Project Director under the MAFF and with the Project Director of the National Technical Department of MRD.	A senior government official with at least 10 years project management experience A Master's degree or equivalent and competence in spoken and written English.
Civil Engineer	Reporting to the MOWRAM Project Director and working closely with the finance and procurement officers, the engineer will review the concept designs for works and preliminary cost estimates for each irrigation project (based on the survey results; work with contracted engineers to prepare feasibility designs and drawings needed for draftsman/AutoCad operators' tasks. S/He will, review the bill of quantities, costings as	The engineer will have at least 5 years previous experience in the design and monitoring of water management and irrigation systems on ADB or internationally financed projects and good command of spoken and written English

	well as the determination of minimum material standards/technical specs per government standards and supervise the work of contractors during infrastructure development. The Engineer will ensure that the FWUCs or FWUGs receive sufficient training for the O&M of the completed schemes.	
Financial Officer	The MOWRAM Financial Officer will report to the MOWRAM Project Director, overseeing the day-to-day financial management of the MOWRAM project activities and will be supported by the procurement officer and National Finance consultant S/he will (i) facilitate the establishment of the necessary account at the PMU and the PPIUs; (ii) establish the required accounting, withdrawal approval and audit systems and procedures; (iii) set up accounting software in line with project requirements; (iv) establish a system for safekeeping of tender documents, minutes of committee meetings, contracts and financial and audit reports; (v) prepare financial projections against the work plans; (vi) carry out a financial management training program for relevant PPIU staff; (vii) provide ongoing training and coaching to PPIU's as needed; and (viii) supervise the preparation of regular financial reports for transmission to the PMU EA and the ADB.	A government official with formal accounting qualifications and at least 5 years previous experience in financial management of internationally financed projects, preferably projects financed by ADB or World Bank. Bachelor's degree or equivalent. Competence in spoken and written English.
Procurement Officer	The Procurement Officer reports to the Project Director and work closely with the National Procurement Consultant ensuring all project procurement activities are undertaken in accordance with ADB's Procurement Guidelines.	At least 5 years previous experience as procurement officer on ADB or internationally financed projects and good command of spoken and written English
Administrative Officer	The Office Assistant provides logistical support to the senior staff as needed. Frequently interacting with senior government officials, PPIU staff members and the consultants and acts as P.A. to the Project Manager.	At least 3 years previous experience working on ADB or internationally financed projects. Ability to use Microsoft programs and good English language ability.
Ministry of Rural Development - General Directorate of Technical Affairs		
MRD Project Director	The National Project Manager reports to the Project Director, ensuring effective coordination among project stakeholders on implementation, administrative and finance aspects. The main duties involve preparing and implementing detailed annual work plans and budgets, coordinating all admin/finance/procurement, managing project account to ensure timely disbursement for project activities, managing consultant recruitment and procurement, managing project fixed assets, and oversee implementation of the Project Performance Management System (PPMS). S/he reviews and endorses budget requests of PPIUs for onward submission for approval of the Project Director and will liaise with the National Technical Departments/Focal points of MOWRAM and MAFF and will be supported by PIC.	A senior government official with at least 10 years project management experience A Master's degree or equivalent and competence in spoken and written English.
National Project Manager	The National Project Manager reports to the Project Director, ensuring effective coordination among project stakeholders on implementation, administrative and finance aspects. The main duties involve preparing and implementing detailed annual work plans and budgets, coordinating all administrative/finance/procurement matters, managing project account to ensure timely disbursement for project activities, managing consultant recruitment and	A senior government official with at least 10 years project management experience A Master's degree or equivalent and competence in spoken and written English.

	procurement, managing project fixed assets, and oversee implementation of the Project Performance Management System (PPMS). S/he reviews and endorses budget requests of Provincial Project Implementation Units (PPIUs) for onward submission for approval of the Project Director and will liaise with the Coordinating Project Director under the MAFF and with the Project Director of the National Technical Department of MOWRAM.	
Civil Engineer	The civil/roads engineer will report to the PRD Project Director and work closely with the financial and procurement officers. In collaboration with commune and local authorities oversee the tender procedures for rural road rehabilitation and assist in the evaluation of tenders. S/He will work with the contractors to ensure full compliance with the proposed work and is according to schedule as per the work plan and elaborate progress reports. The engineer will ensure that the local community is trained in the repair and maintenance of the roads through the use of MRD staff or outsourcing.	The engineer will have at least 5 years previous experience in the design and monitoring of rural road planning and development on ADB or internationally financed projects and good command of spoken and written English.
Financial Officer	The Financial Officer will report to the PRD Project Director, overseeing the day-to-day financial management of the project and will be supported by the procurement officers and National Finance consultant. S/he will (i) facilitate the establishment of the necessary accounts at the MRD and the PPIUs; (ii) establish the required accounting, withdrawal approval and audit systems and procedures; (iii) set up accounting software in line with project requirements; (iv) establish a system for safekeeping of tender documents, minutes of committee meetings, contracts and financial and audit reports; (v) prepare financial projections against the work plans; (vi) carry out a financial management training program for relevant PPIU staff; (vii) provide ongoing training and coaching to PPIUs as needed; and (viii) supervise the preparation of regular financial reports for transmission to the EA and the ADB.	A government official with formal accounting qualifications and at least 5 years previous experience in financial management of internationally financed projects, preferably projects financed by ADB or World Bank. Bachelor's degree or equivalent. Competence in spoken and written English.
Procurement Officer	The Procurement Officer reports to the MRD Project Director and works closely with the National Procurement Consultant ensuring all project procurement activities are undertaken in accordance with ADB's Procurement Guidelines.	At least 5 years previous experience as procurement officer on ADB or internationally financed projects and good command of spoken and written English
Administrative Officer	The Office Assistant provides logistical support to the senior staff as needed. Frequently interacting with senior government officials, PPIU staff members and the consultants and acts as P.A. to the Project Manager.	At least 3 years previous experience working on ADB or internationally financed projects. Ability to use Microsoft programs and good English language ability.
PPIU Job Descriptions		
Provincial Project Implementation Unit Director	The PPIU Director oversees implementation of project activities at provincial level. Main duties include leading preparation of the provincial project work plan and budget, coordinating with related government agencies and development partners in the implementation of civil works subprojects and capacity building activities, ensuring compliance with provincial policies and regulations, supervising and approving all project activities and PIU expenditures.	The Director PDAFF
PPIU Deputy Director Water Management	The PPIU Deputy Director reports to PPIU Director ensuring effective implementation of project activities in relation to water management rehabilitation activities	PDWRAM Government Official

Systems	and FWUC capacity building. Main duties include assisting PPIU Director in coordinating development of provincial work plan and budget, coordinating with related government agencies and development partners in the implementation of civil works subprojects and capacity building activities, supervising and reviewing design engineers work and following up and monitoring field implementation, and consolidating and reporting project benefit monitoring and evaluation. S/he will be responsible for the monitoring and evaluation within the water management systems for social safeguards and social development as well as gender.	
PPIU Deputy Director Farm and Rural Roads	The PPIU Deputy Director reports to PPIU Director ensuring effective PDRD Government implementation of project activities in relation to rural farm roads and Official track and storage unit market connectivity. Main duties include assisting PPIU Director in coordinating development of provincial work plan and budget, coordinating with related government agencies and development partners in the implementation of civil works subprojects and capacity building activities particularly for O&M, supervising and reviewing design engineers work and following up and monitoring field implementation, and consolidating and reporting project benefit monitoring and evaluation. S/he will be responsible for the monitoring and evaluation within the rural roads network for social safeguards and social development as well as gender.	PDRD Government Official
PIU Cooperative Promotion and Development	The officer reports to PPIU Director ensuring effective implementation of project activities in relation to agricultural promotion and storage unit implementation. Main duties include assisting PPIU Director in coordinating development of provincial work plan and budget, coordinating with contractors, related government agencies and development partners in the implementation of civil works subprojects and capacity building activities particularly for O&M, supervising and reviewing design engineers work and following up and monitoring field implementation, and consolidating and reporting project benefit monitoring and evaluation. The coordinator will also be responsible for the monitoring and evaluation within the agricultural cooperative activities for social safeguards and social development as well as gender.	Provincial officer with agricultural cooperative development responsibilities
PPIU Agricultural Extension	The officer reports to PPIU Director ensuring effective implementation of project activities in relation to on-farm irrigation, extension and training activities. Main duties include assisting PPIU Director in coordinating development of provincial work plan and budget, coordinating with contractors, related government agencies and development partners in the implementation of civil works subprojects and capacity building activities particularly for O&M, CSA, and other standards as well as mechanization and use of agricultural machinery following up and monitoring field implementation, and consolidating and reporting project benefit monitoring and evaluation. The coordinator will also be responsible for the monitoring and evaluation within the on-farm irrigation and capacity building activities for social safeguards	Provincial officer with agricultural responsibilities, with experience in capacity building and on-farm irrigation technologies

	and social development as well as gender.	
PPIU Animal Health and Production	The officer will report to PPIU Director ensuring effective implementation of project activities in relation to biodigesters and bio slurry and standards compliance. Main duties include assisting PPIU Director in coordinating development of provincial work plan and budget, coordinating with related contractors/builders, government agencies and development partners in the implementation of civil works subprojects and capacity building activities particularly for O&M, biodigesters and use of compost huts, supervising and reviewing design engineers work and following up and monitoring field implementation, and consolidating and reporting project benefit monitoring and evaluation. The coordinator will also be responsible for the monitoring and evaluation within the remit of biodigesters and bio-gas for social safeguards and social development as well as gender.	Provincial Officer with responsibility for biodigesters and bio-slurry use

ADB = Asian Development Bank; MAFF = Ministry of Agriculture, Forestry and Fisheries; MOWRAM = Ministry of Water Resources and Meteorology; PDAFF = Provincial Department of Agriculture, Forestry and Fisheries; PDRD = Provincial Department of Rural Development; PDWRAM Provincial Department of Water Resources and Meteorology; PMU= project management unit; MRD = Ministry of Rural Development; PPIU = provincial project management unit; PIC = project implementation consultants.

2.10 Consulting Services Set-up

Project Implementation will be supported by a total of 5 Technical Assistance packages and 1 External Audit package. The main support is provided by the Project Implementation Consultants (PIC) which is referred to as CS1. The additional packages are focused on specific topics, i.e. CS 2 on capacity building and the enabling environment, CS3 on rice seed production and distribution, CS4 on ICT development and CS5 on Feasibility Study and Detailed Engineering Design for the irrigation system and the roads. For details on the composition of these 5 packages reference is made to Table 7.

2.10.1 CS 1: PIC

The PIC team has 3 offices, with the main team in MAFF and secondary teams in MOWRAM and MRD, with staffing shown in Table 3. The detailed tasks of the PIC consultant are as follows:

(i) Support, strengthen, coordinate and guide PMU, the provincial project implementation units (PPIUs), implementing agencies and contractors in the design and operation of the infrastructure related to (a) water management and irrigation, (b) cooperative stores, (c) the provincial agriculture development centers, and (d) mechanization workshops.
(ii) Detailed planning of yearly activities in all aspects of the agreed and foreseen implementation schedules;
(iii) Review feasibility studies and detailed engineering designs for subprojects prepared by the feasibility study and detailed engineering design consulting team;
(iv) Supervise construction of the irrigation and road civil works in conjunction with the civil engineers assigned in the PMU under MOWRAM and MRD;
(v) Provide necessary gender responsive capacity building training;
(vi) Assist farmers water user groups, PDRWAMs and cooperatives in establishing operation & maintenance systems for all infrastructure;
(vii) Assist PMU, PPIU and implementing agencies in the procurement of works, goods and services including contract management;
(viii) Carry out environmental and social due diligence of each subproject;

(ix) Assist in the preparation of safeguard documents in compliance with the land acquisition and resettlement framework (LARF), environmental assessment and review framework (EARF), ethnic minority development framework (EMDF) and gender action plan (GAP);
(x) Prepare quarterly progress reports; annual progress reports, project performance monitoring system (PPMS), safeguard monitoring reports and gender action plan monitoring reports;
(xi) Plan and develop the safeguards monitoring and evaluation systems; and
(xii) Any other activities for delivering the envisaged outputs of the project and achieving desired outcome.

Table 3: Staffing Project Implementation Consultant Services (CS1)

Experts	International	National
Project Management & Rural Infrastructure Specialist & Team Leader (1) / Deputy Team Leaders (3, 1 for MAFF, MOWRAM and MRD sub teams)	18	90
Procurement Specialists (1 international and 3 nationals)	6	54
Financial Management Specialists (4 individuals)	0	152
Social Development & Gender Specialist	6	50
Social Safeguards Specialist	8	60
Environment & Climate Change Specialist	8	50
PADC Operations & Management Specialist	4	0
Mechanization Workshop, Operations & Management Specialist	4	0
Water Management and Irrigation Engineer - approval of DED and construction supervision (4 individuals)	0	114
Cooperative Storage & Rural Roads Engineer - approval of DED and construction supervision (4 individuals)	0	136
Total	**54**	706

2.10.2 CS 2: Capacity Building and Training

The package CS 2, with staffing shown in Table 4, has 5 main tasks as follows:

a. **Capacity building and training** will support on farm and formal training for male and female actors/target groups within the scope of the project and the management of training resources in coordination of output 2.
b. **National Agriculture Laboratory Support**–to assist the Plant Bio-Technology Laboratory in (i) developing a GMO and plant toxin analytical capability; (ii) improving the organic and bio-fertilizer testing unit in being able to undertake quality analysis of those types of fertilizers which are produced in the country and that of imported proprietary brands; (iii) introducing cassava tissue TC capability to support private sector enterprises in developing TC businesses; (iv) supporting the ISO17025 accreditation process; and (v) advising the laboratory in transitioning to a commercial enterprise for partial cost recovery. In the four provinces, the implementation of rapid testing for pesticide residue and plant toxins as part of risk management procedures will be undertaken.
c. **Renewable energy**- to advise agribusiness to reduce energy costs and support those that are prepared to invest in solar energy (i) through sponsoring feasibility studies on the potential for photo voltaic (PV) energy to reduce energy cost among agribusinesses in the value chain; (ii) the possible selection of 10 agribusinesses that have the potential to reduce cost with PV and that show interest and commitment; and (iii) the linking of such agribusiness with the green financing interventions that are occurring in the country.

d. **Strengthening the Enabling Environment –** providing gender responsive policy support to RCG technical working groups in Agribusiness Policy, CSA Standards, the PPP framework and biodigester standards.
e. **Green Financing** - To promote green finance for climate smart agriculture (CSA) and agribusiness, further develop and implement incentives for private sector participation in climate friendly agribusiness financing and piloting crop insurance.

Table 4: Staffing Capacity Building and Climate Smart Agriculture Consulting Firm (CS2)

Experts	**International**	**National**
Policy & Standards Advisor/Team Leader	7	36
Seed Commercialization& Intellectual Property Specialist	5	**0**
GAP, CSA & SRP Training Specialist	9	0
Cooperative Agribusiness Training Specialist	6	0
Photo-voltaic Specialist	4	12
Bio-slurry Specialist	4	34
Bio-digester Standards Specialist	3	0
Green Financing Specialist	10	36
Laboratory Commercialization Specialist	0	3
ISO 17025 Accreditation Compliance Specialist	0	7
Training & Capacity Building Specialist	0	60
Farmer Demonstration Specialist	0	62
GAP for Tropical Fruit Specialist	0	19
FWUC Training Specialist	0	37
Agricultural Machinery O&M Training Specialist	0	54
Public Private Partnership Specialist	0	30
Bio-fertilizer & Organic Fertilizer Testing Specialist	0	4
Tissue Culture Development Specialist	0	3
GMO & Phytotoxin Analysis Specialist	0	3
National Laboratory Coordinator	0	46
Total	**48**	**446**

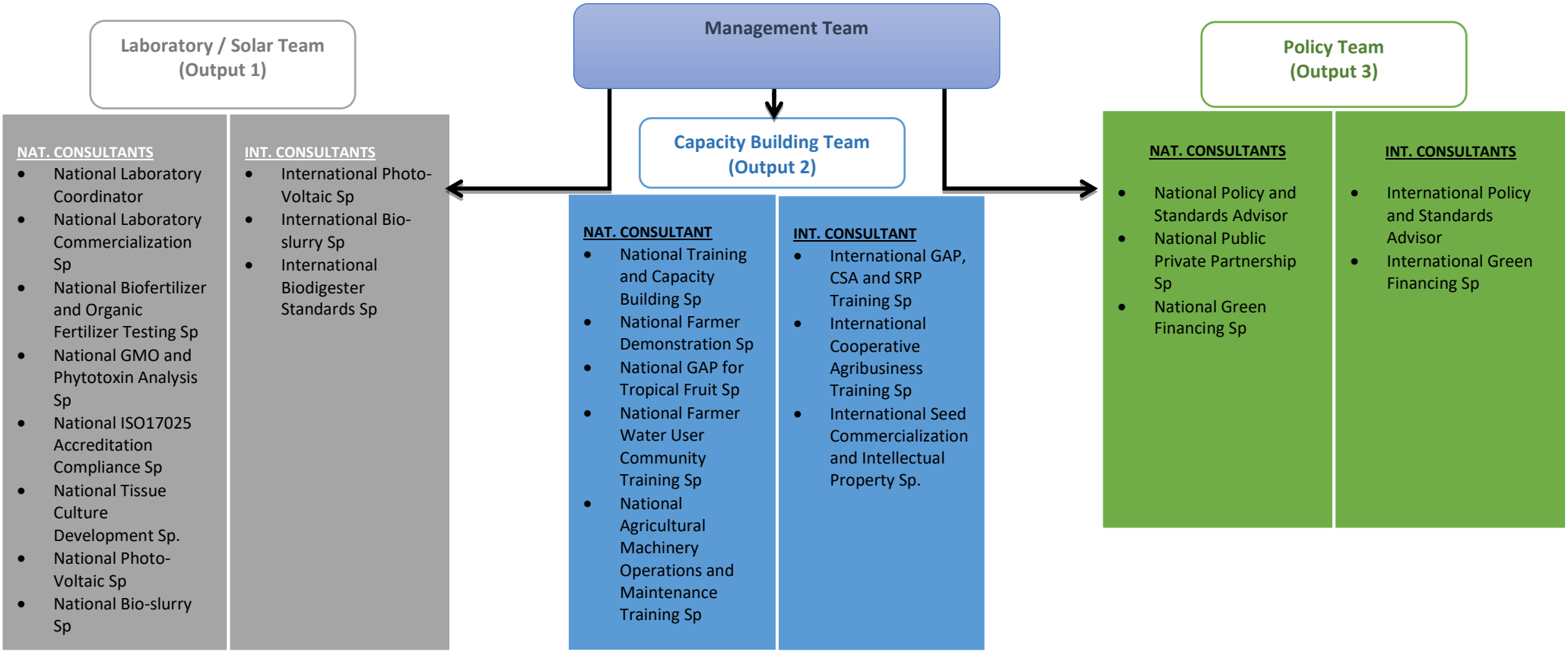
The Capacity Building and Climate Smart Agriculture Team (CS02) have 3 sub-teams and are organized as shown in Figure 3 below.

2.10.3 CS 3: Seed Multiplication

The main tasks of the CS 3 consulting package, with staffing shown in Table 5, will be:

- Support large scale seed multiplication of climate resilient varieties for each target crop in target provinces and distribution of quality seed to farmers.
- Recommend standards for seed certification procedures for different grades of seed, and seed certification procedures for the approval of and implementation by the government.
- By 2024, at least two climate resilient rice varieties and one climate resilient glutinous maize variety would be released for commercial production; and that CARDI would be able to achieve partial cost recovery in variety development and foundation seed supply with the corresponding legal framework in p
- Develop seed quality standards, seed certification standards for different classes of seeds for the four crops and maintain such standards in the quality seed production in the current project.
- Development and dissemination of climate smart agriculture (CSA) practices including improved land-water-nutrient management and crop establishment practices.
- Dissemination of mechanized cultivation practices that have reduced risk and drudgery and generate avenues for employment for youth and women farmers. The project will work closely with CARDI and other key institutions as well as private-sector partners for the deployment of the climate resilient varieties and technology of different crops.
- Reduce postharvest losses during harvesting, drying, storage, and processing through implementation of modernized post-harvest practices, capacity development and training on postharvest technology, and the development of linkages between the public and private sector.

Figure 3: Set-up of CS2 Team



2.10.4 CS 4: ICT

The tasks of the CS 4 ICT package, with staffing as shown in Table 5, are the following:

- Software development for 3 modules:
  - Module 1: Information advisory systems such as market information systems and weather information services;
  - Module 2: Digital technologies for climate smart agriculture practices that support precision farming activities; and
  - Module 3: Information systems to monitor and manage climate risk management activities
- Provision of ICT infrastructure (hardware) and communication services,
- Policy and data exchange standards development, training and support services, and equipment
- Piloting of a process and facility to provide agriculture product quality testing and information advisory services at field level
- Facilitate implementation of the provincial ICT platform, needed policies, data exchange standards, and cyber security protocols will be developed.
- Drafting of training modules, workshops and capacity building for use of ICT solutions will be incorporated to farmers and other stakeholders through provincial extension services network and agriculture cooperatives.
- Establish ICT platforms to support climate risk management components of the Agribusiness project.

Table 5: Staffing Information and Communication Technology Platform (CS4)

Experts	International	National
Team Leader/ Project Manager	6	
Solution Architect	3	
e-Agriculture expert	6	18
Climate Smart Agriculture Expert	6	12
Climate Risk Management IT Specialist	6	
Coordinator / Deputy Team Leader		18
Total	**27**	**48**

2.10.5 CS 5: FS & DD

The tasks of the CS 5 package, with staffing as shown in Table 6, are the following:

a. Scheme Identification, Feasibility Studies and Detailed Engineering Design for Irrigation and

b. Feasibility Studies and Detailed Engineering Design for Rural Roads

Table 6: Staffing Feasibility and Detailed Engineering Design Consultant (CS5)

Experts	International	National
Team Leader/Irrigation Design Engineer	20	20
Hydrologist	2	4
Agriculturist	0	6
Road Design Engineer	0	20
Agricultural Economist	5	6
Environment Safeguards Specialist	2	10

Social Safeguards Specialist	2	0
Social Development and Gender Safeguard Specialist	0	4
Resettlement Specialist	0	6
AutoCAD specialist (4)	0	42
Procurement Specialist	0	4
TOTAL	31	122

Project implementation will be facilitated by five consultancy packages which are summarized on Table 7. Of these 5 so far 3 have been mobilized, viz. CS1, CS2 and CS 5.

Table 7: Consultancy Packages CFAVL

Package	Title	Inputs (person months)		Start date	End date
		International	National		
CS1	Project Implementation Consultant (PIC)	54	706	October 2019	September 2024
CS2	Capacity Building and Climate Smart Agriculture	48	446	September 2019	???
CS3	Crop Variety Development	Not known	Not known	Not yet	Not yet
CS4	Information and Communication Technology Platform	27	48	Not yet	Not yet
CS5	Feasibility and Detailed Design	31	122	November 2019	October 2024
Total		**160**	**1,322**		

3 VALUE-CHAIN Concept, Locations and Beneficiaries

3.1 Value-Chain Concept

The essence of a value-chain project is the both the processes of crop-production and that of the post-harvest/processing in one regional area are improved. With improved irrigation, improved rural roads, improved agricultural processing and storage, improved processing of agriculture waist into bio-energy, improved access to markets and the promotion of equal opportunities for work and livelihood options for male and female farmers, a situation is created in which farmers can more fully participate in, and benefit from project interventions, and make sufficient profit to raise their families. Table 2 shows in simple manner the combined crop-production and post-harvest phased and how the CFAVC project will intervene to smoothen and facilitate the process.

Road connectivity is a key factor affecting competitiveness of agricultural value chains, one of the key outputs of the project is improving the connectivity of a) farms to agriculture cooperatives and b) markets through climate-resilient farm road networks.

Therefore, the second component of the assignment is to assess the feasibility of suitable farm and market roads that will facilitate transportation of agricultural inputs from market to agriculture cooperatives and farms as well as transportation of agricultural produce from farms to cooperatives and markets. The Consultant will carry out the following activities to determine the feasibility of farm and market road subprojects ensuring that the subprojects are technically, environmentally, socially and economically feasible. Specific farm and market roads of prospective subprojects received from after interaction with MRD, are the roads, located and linked to irrigation subprojects, that will be studied for rehabilitation/ improvement.

3.2 Determination of Selected Agricultural Development Centers

From the relevant project documentation, it is obvious that the core-beneficiaries of this project are a total of the around 40,000 house-holds, (around 45% of which are female headed households) which represent 80,000 adults, which are involved in the various activities of the project as demonstrated in Tables 8 and 9 below. For more detailed information reference is made to Annexes 2, 3 and 4.

Table 8: Identified Agriculture Production Centers for Nominated Schemes

Locations			Value Chain Infrastructure		
Provinces	**Districts**	**Communes**	**Irrigation Schemes**	**Agriculture Cooperatives**	**Markets**
Kampot	Angkor Chey	Tani	Trapiang Run Reservoir	N/A	Tani
		Angkor Chey	Toek La'ak Reservoir	N/A	Tani
	Chumkiri	Sre Knoung	Prey Takoch Reservoir	Samaki Amatak	Chum Kiri
		Chress	Mlech Reservoir	Rasmey Samaki Amatak	Chum Kiri

Locations			Value Chain Infrastructure		
Provinces	**Districts**	**Communes**	**Irrigation Schemes**	**Agriculture Cooperatives**	**Markets**
	Chhuk	Sath Pong	Tapeang Boeung Reservoir	N/A	Chouk
	Tuek Chhu	Kandal	Kandourl Reservoir	N/A	Kampot
		Trapeang Pring	Prawoek Pong Reservoir	N/A	Kampot
Takeo	Tram Kak	Tra Peang Kranhoung	Prey Kdouch Reservoir	Trapeang Kranhoung	Trapeang Anderk
		Tra Peang Kranhoung	Kraing Ampil Reservoir	Trapeang Kranhoung	Trapeang Anderk
		Trapeang Thom	Trapeang Khorn Reservoir	N/A	Trapeang Anderk
		Tram Kak	O'Rumdoul Reservoir	N/A	Tram Kak
Kampong Cham	Batheay	Heal Lea & Sambo	O'Chrey Dam	N/A	Batheay
		Mae Pring	Kor Aet Reservoir	N/A	Batheay
	Prey Chhor	Beung Nay & Krouch	Teuk Char Reservoir	N/A	Prey Chhor
	Stung Trang	Preah Andong	O'Kamprok Feeding Canal	N/A	N/A
	Cham Kar Leu	Svay Teap	Pram Kumpheak Reservoir	N/A	N/A
Tbong Khum	O'Raing Ov	O'Raing Ov	Ta Khem/ Kbaal Teuk Reservoir	N/A	N/A
	Peam Chealaing	Prek Pdao	Boeung Kéth	Tob Nob Boeung Ka Aet	N/A
	Thmar Pich	Thmar Pich	Trapaing Tros Reservoir	Tob Nob Trapeang Tros	N/A
		Chikor	Tourl Pring Reservoir	N/A	N/A
	Kroch Chmar	Chouk	Tbong Damrei Reservoir	N/A	Kroch Mar
	Dambae	Saeda	Kampong Raing	Svay (Phum Srae Khach)	N/A

Table 9: Identified Agriculture Production Centers for Additional Proposed Scheme

Locations			Value Chain Infrastructure		
Provinces	**Districts**	**Communes**	**Irrigation Schemes**	**Agriculture Cooperatives**	**Markets**
Takeo	Kiri Vong	Phnom Den	Chrouk 1 & Plov Touk	Sahakor Kaksikam Sen Sok	Phnom Den
		Soam	Soam Canal	Ping Pong Soksenchey	Trapeang Anderk
		Prey Rumdeng	Prey Rumdeng	Prey Rumdeng Soksenchey	Kirivong
		Kampeng	Po Tasuy	Kampeng Sok Sen Sambo	Kirivong
	Koh Andet	Prey Yuthka	Kaeng Ta Yee	Bantic	Kampong Chrey
		Krapum Chouk	Canal 85	Ponleu Beng Krapom Chouk Cooperative	Kampong Chrey
		Rominh	Canal 42 (Pumping Station)	N/A	Kampong Chrey
		Thlea Prachum	Canal Sohang	Rolous Meas	Kampong Chrey
Kampong Cham	Batheay	Heal Lea & Sambo	O'Chrey Dam	N/A	Batheay
		Mae Pring	Kor Aet Reservoir	N/A	Batheay
	Prey Chhor	Beung Nay & Krouch	Teuk Char Reservoir	N/A	Prey Chhor

3.3 Beneficiaries

From the relevant project documentation, it is obvious that the core-beneficiaries of this project are a total of the around 40,000 house-holds, which represent 80,000 adults, which are involved in the various activities of the project as demonstrated in Table 10 below:

Table 10: Core Beneficiaries

	AC member	Bio-digesters and Compost huts	Training in CSA	Gravity Irrigation	Trained in Climate risk sharing instruments	Gender program
Households				25,000	20,000	
Farmers			40,0000			
Woman		40,000	16,000	50,000	20,000	
Persons		80,000				

4 Current Implementation Status OUTPUT 1: Critical Agribusiness Value Chain Infrastructure improved and made Climate resilient

4.1 Rehabilitation water management infrastructure (off-farm irrigation systems, on-farm rainwater harvesting ponds and drip irrigation.

4.1.1 Gravity Irrigation Schemes

4.1.1.1 DMF and PAM

For the performance indicator of rehabilitation of the gravity irrigation schemes the PAM has the same target as in the DMF of (*at least)* 27 irrigation and water management systems targeting (*at least*) 15,000 ha and 25,000 households to be made climate resilient, for a budget of $ 32,835,000, which corresponds to an unit cost of $/ha 2,120, which for heavy rehabilitation in the countries of South-East Asia is a realistic estimate (*excluding tertiary unit development*). The target size of each irrigation scheme is medium to small or in the range of 200 – 760 ha with some exceptions. Critical scheme features contributing to climate resilience include (i) enhanced storage capacity; (ii) improved regulation of flow rates, including adequate flow capacity of regulators and other structures to prevent or reduce scour; (iii) improved water allocation within the command area, including division of the command area into compartments to allow for orderly cultivation of a part of the area in case of water shortage; (iv) concrete lining of distribution canals to reduce the seepage losses; (v) enhanced flood resilience; and (vi) improved drainage and salinity control (in affected areas). In addition, climate resilience in infrastructure interventions can be enhanced by the following measures: (i) high overall efficiencies (high output per m^3 of water); (ii) optimal balance between water demand and water availability; (iii) limited reliance on pumping; (iv) predictable and reliable water allocation over time and within the scheme; and (v) effective cooperation between farmer water user groups (FWUGs) in terms of sharing knowledge about management options, covering both cultivation and water management.

The selection criteria in the PAM to be applied for each candidate gravity irrigation subproject to be accepted are**:**

1. Is an existing small to medium scale irrigation system with good balance between water demand and raw water availability;
2. The command area of the subproject should be sufficient to demonstrate climate change adaptation measures (improved technical design, enhanced water used efficiency, good agricultural practices, and improved water use governance), and to ensure that the subproject would be more climate resilient than its current status.
3. Should have strong political and community ownership in terms of commitment to implement climate change adaptation measures and ensure effective operations and maintenance (O&M);
4. Is not supported by other ongoing or proposed development projects financed by ADB or other development partners;
5. Has existing farmer water user group (FWUG) or farmer water user community (FWUC) or is ready for registration;
6. Should involve rehabilitation of both primary canals and distribution canal networks (secondary and tertiary canals) to ensure that water reaches the farms, with minimum water loss;
7. Has low irrigation efficiency and low water productivity, and scope for improvement, with sufficient water resources;
8. Should have viable economic returns (a minimum economic internal rate of return of 12%) and a realistic and technically viable O&M plan;

9. Should be category B or C for involuntary resettlement, environmental impact and ethnic minority;
10. Should have high potential for cluster (cooperative) development and include vulnerable communities, poor and women farmers as beneficiaries.
11. Should enhance capacity of the beneficiaries to operate and maintain irrigation schemes sustainably with little or no external intervention other than the normal extension services.

These selection criteria can be described as pretty tough for the nominated schemes some of which schemes in the flood zone of the Mekong river while the others rely on water from local seasonal reservoirs built during the Khmer Rouge regime which were not built on a solid design.

4.1.1.2 PPTA

a) Selection

In the PPTA phase a total of 22 irrigation schemes with a combined size exceeding the required 15,000 ha were nominated. From the PPTA documents it appears that a) these 22 were never properly screened against the 11 selection criteria as set out in the PAM while b) the proposed budgeting was also never screened as for 1 scheme in Kampong Cham province a rehabilitation budget of $/ha 122 is proposed which is not a serious rehabilitation program but rather a maintenance program. Also, the proposed budget for these 17,793 ha is only $ 14,502,700 which is less than 45 % of the available budget in the project for irrigation rehabilitation. As a result, have in this Inception period all proposed irrigation schemes been screened against the 11 selection criteria by a combined MOWRAM/CS1/CS 5 team for planning purposes. The details of this screening process are shown in Annex 2.

Table 11: Nominated Irrigation Subprojects

Ref	Name	Area (ha)	Estimated Cost (US$)	Costs/Ha
Kompot Province: Irrigation Subprojects				
1	Trapaing Run	100	526,000	5,260
2	Teok La'ak	100	600,000	6,000
3	Prey Takoch - Prawoek Pong	360	643,000	1,786
4	Malech	1,600	1,150,000	718
5	Trapaeng Boeueng	1,400	1,610,000	1,150
6	Kandal	650	650,000	1,000
7	Prawoek Pong	310	410,000	1,322
Tboung Khmum: Irrigation Subprojects				
8	Ta Khem Kbaal Teuk:	445	378,000	849
9	Trapaing Tros	600	456,800	761
10	K'Eth	1,120	475,000	424
11	Toul Pring	250	100,000	400
12	Two Community	1,000	300,000	300
Kampong Cham: Irrigation subprojects				
13	Ocherey	750	1,000,000	1,333
14	Teuk Char	4,900	600,000	122
15	5 Kumpheak	638	1,076,000	1,686
16	Kor aet	450	600,000	1,333
17	O Kamprok	455	760,000	1,670

Ref	Name	Area (ha)	Estimated Cost (US$)	Costs/Ha
Takeo Irrigation Subprojects				
18	Prey Kdouch	620	1,410,000	2,274
19	Kraing Empil	300	243,900	813
20	Sdok Sam	560	402,000	718
21	Trapaing Khorn	200	362,000	1,810
22	O'Rumdoul	985	750,000	761
	Total	**17,793**	**14,502,700**	**815**

Note: From PPTA

Figure 4: Location Nominated Schemes Kampot province

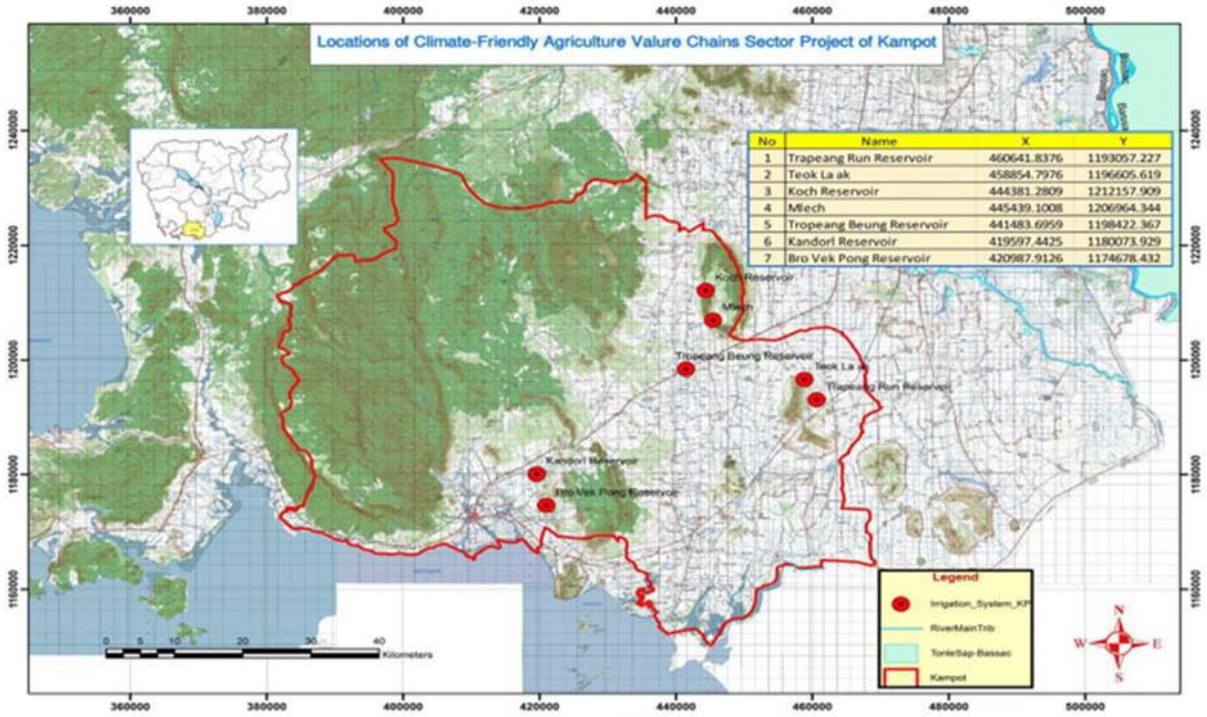


Figure 5: Located Nominated Schemes Takeo Province

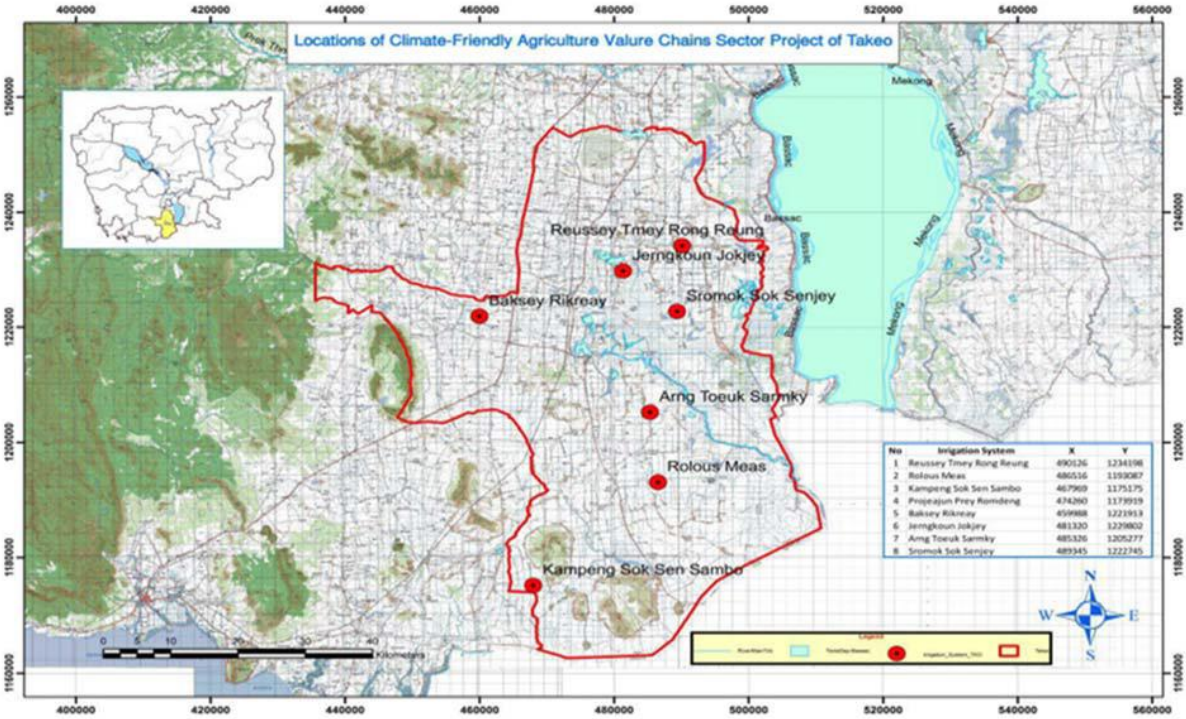


Figure 6: Location Nominated Schemes Tboung Khmu Province

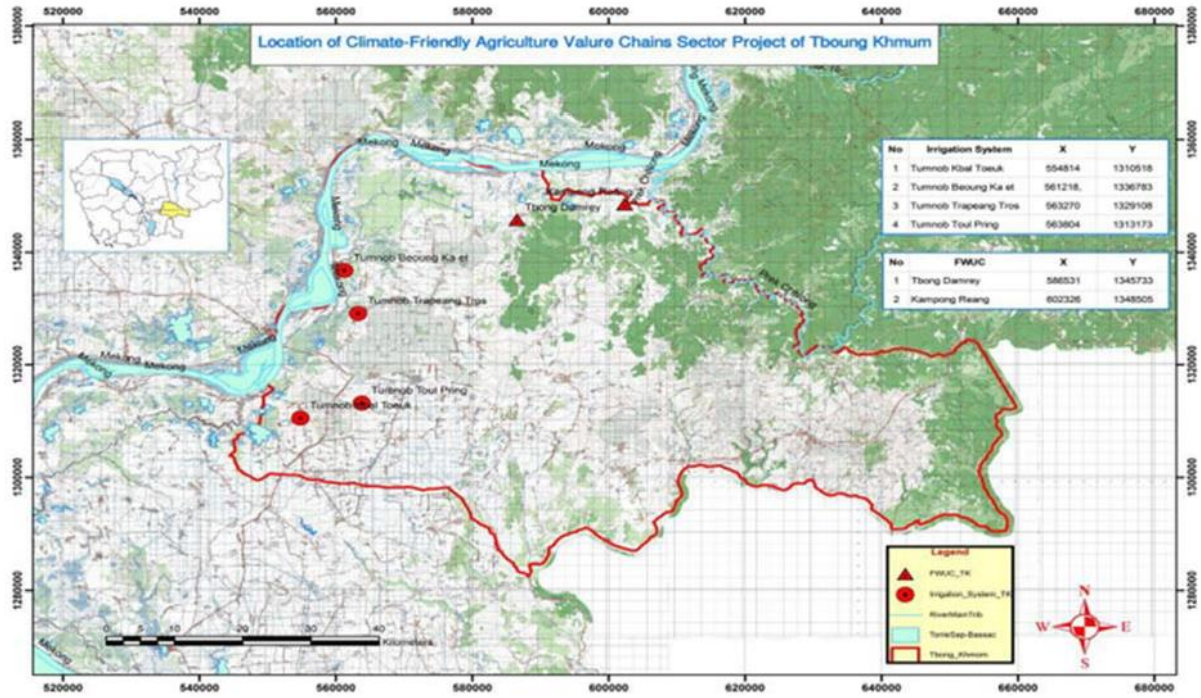
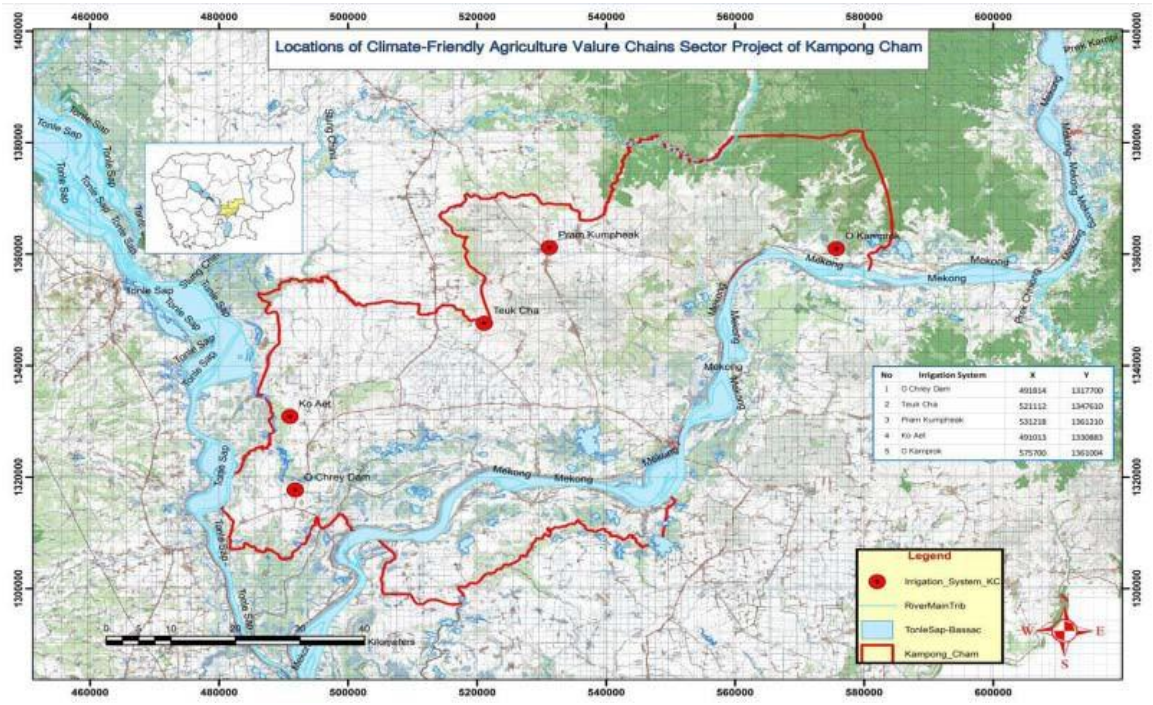


Figure 7: Location Nominated Schemes Kampong Cham Province



b) Assessment

With regards to these nominated schemes the following conclusions can be made:

- Some of the nominated schemes have a size far above or below the target size of 200 – 750 ha with the largest nominated scheme at 4,900 ha and the smallest 100 ha,
- It seems the nominated costs are only based on the repair/upgrade of the embankments and primary canals systems as also the nominated rehabilitation costs are on average only US/ha 815 with the lowest at US 122/ha which is maintenance category, while the available budget of US$/ha 2,120.
- There has been no inter-linking of these nominated irrigation schemes with the ACs in the neighborhood, which should process, store and market the scheme's agricultural production.
- Some of the nominated schemes are proposed to be dropped due to various reasons (see Table 12).

c) Advanced Procurement Scheme

In the PPTA phase one particular scheme was selected for advanced procurement, being the Trapaing Run scheme in Kampot province. A feasibility study report including a design and a DDR report on Land Acquisition and Resettlement were prepared by the PPTA team. This feasibility study report has conflicting amounts for the Investment levels, ranging from $ 526,000 to $ 895,000 which, as the scheme is only 100 ha large, amounts to investment levels much higher than the standard amount of S/ha 2,189. However still an EIRR of 13 % is claimed which seems not realistic. During the Pre-Inception ADB review mission in July 2018 both the EMP and the DDR reports of the DED report were not accepted by the ADB CARM. As a result, has procurement of these civil works not started yet.

4.1.1.3 CFAVC CS1/CS5 Activities

In the recent Inception phase a combined CFAVC CS1/CS 5 team and the IA MOWRAM initiated an exercise to screen the 22 nominated schemes against the 11 selection criteria. The main aim of this exercise is to divide the schemes in 3 groups, i.e. high priority, medium priority and low priority. High priority schemes are schemes with Category B or C class for Social Safeguard and Environment considerations, good water supply and high likely hood of high economic feasibility. These category B or C schemes should first be included in the DED process with procurement planned for 2020.The temporary outcome of these investigation is shown in **Table 12**. Some 4,050 ha in 10 schemes spread out over the 4 provinces are selected as High-Priority to go into the 2020 program while 3 schemes (1,970 ha) are proposed to be dropped. For more details reference is made to Annex 2.

Table 12: Ranking of 23 Nominated Irrigation Subprojects

Ref	Name	PRIORITY			TO BE DROPPED
		HIGH	MEDIUM	LOW	
		(ha)	(Ha)	(HA)	
Kompot Province: Irrigation Subprojects					
1	Trapaing Run	100			
2	Teok La'ak				100 convert to pond
3	Prey Takoch - Prawoek Pong	450			
4	Malech	800			
5	Trapaeng Boeueng		800		
6	Kandourl		600		
7	Prawoek Pong			70	
	sub-total	1,350	1,400	70	
Tboung Khmum: Irrigation Subprojects					
8	Ta Khem Kbaal Teuk:	445			
9	Trapaing Tros	450			
10	Boeung K'Eth				1,120 because in Engineering Force project
11	Toul Pring	100			
12	2 Community/Tbong Damrie		600		
13	2 Community/Kampong Raing		250		
	sub-total	995	850		
Kampong Cham: Irrigation subprojects					
14	Ocherey				750 because of Urban pressure
15	Teuk Char		2,800		
16	Pram Kumoheak	635			
17	Kor aet		450		
18	O Kamprok	320			
	sub-total	955	3,250		
Takeo Irrigation Subprojects					
19	Prey Kdouch	550			
20	Kraing Empil	200			
21	Sdok Sam		300		

Ref	Name	PRIORITY			TO BE DROPPED
		HIGH	MEDIUM	LOW	
		(ha)	(Ha)	(HA)	
22	Trapaing Khorn			50	
23	O'Rumdoul		210		
	subtotal2	750	510		
	Total	**4,050**	**6,010**	**190**	**1,970**

During the field surveys have 3 of the 4 provincial PDRAMs proposed a total of number of 12 additional/other sub-projects, which are shown in **Table 13**. For more details reference is made to **Annex 2**. These 12 schemes cover 10,340 Ha.

Table 13: Proposed Additional Irrigation Subprojects

Ref	Name	Details		
		Size (ha	Priority	Reason
Tboung Khmum: Irrigation Subprojects				
1	Chaom Tahoeng	1,500	High	
2	Canal Tadouk (Boeung Krachab	2,500	Low	Needs pumping
3	Trapaing Ampil	200	Medium	
Sub-total		4,200		
Kampong Cham: Irrigation subprojects				
4	Po Tatress	1,500	Medium	
Sub-total		1,500		
Takeo Irrigation Subprojects				
5	Chrouk1 + Phlov Touk	800	High	
6	Soam	400	low	
7	Po Tasuy	440	Medium	
8	Prey Romdeng	600	Low	
9	Kweang Ta Yee	550	High	
10	Pralay 85	850	High	
11	Pralay 42	650	Medium	Pumping
12	Pralay So Hang	350	Medium	
	subtotal	4,640		
	Total	**10,340**		

On 30 December 2019 a joint MOWRAM/PDWRAM/CS1/CS5 team visited the Trapiang Run scheme to review the field conditions and the proposed design together with the local village leaders (Commune head). During this visit all 3 existing canals were inspected by foot. The joint conclusions of this visit were:

a) the village leaders were never consulted in the PPTA design and do not agree to the newly proposed alignments
b) the topographic survey which was done seems to be limited to only the canal alignments but the field levels seem not to have been assessed.
c) A whole review of the field surveys and design is required.

4.1.2 Rain Water Harvesting Ponds

4.1.2.1 DMF and PAM

With regards to the performance indicator of commissioning the rainwater harvesting ponds the PAM has the same target as the DMF and a budget of US$ 9,552.000, which correspondents to US$ 11,940 per pond. Each pond will be used for supplementary irrigation not only for the target crops but will be used for more intensive horticulture and tree crop production and will be sited to collect surface run-off and have sediment traps to avoid excessive sedimentation. Selection criteria applied were/ will be:

(i) The recipient must be a smallholder willing to work with the project to implement climate resilient agricultural practices associated with surface water catchment;
(ii) The recipient must have a land title, or equivalent;
(iii) Preference is given to female headed households;
(iv) The plot of land has problems relating to excessive rainwater run-off or drainage channels or gullies running through the plot, both of which can be "tapped" to provide supplementary irrigation;
(v) The smallholder can show that there will be benefits to intensive agricultural production through using of the pond as a supplementary irrigation source;
(vi) The farmer commits not to sell or transfer the land to a third party during the life of the project, to ensure capital gain;
(vii) The farmer commits to contribute to necessary O&M of water catchment pond; and
(viii) If required, the farmer has no objection for his or her farm to be used as a training and demonstration location for the duration of the project.

4.1.2.2 PPTA

No feasibility study was prepared.

4.1.2.3 CFAVC CS1/CS5 review

During the CFAVC Inception period several proposed sites were visited in Takeo province but no further detailed activities were undertaken with regards to preparation of designs for ponds for the following 2 reasons: 1) the task to prepare the Designs for these ponds is not included in any of the consulting services ToRs, and 2) there seems to be disagreement which IA should construct these rainwater ponds.

4.1.3 Drip Irrigation for Mango Farms

4.1.3.1 DMF and PAM

The DMF does not mention the installation of drip-irrigation facilities and only mentions a 15 % increase in mango production as an outcome of the project. The PAM details that the project will support establishment of drip irrigation demonstration units on mango farmers' land mainly in Kampot and Takeo provinces[17] but does not specify a number. The COSTAB budgets for 14.74 drip irrigation systems. The demonstrations will be used for training of not only the recipient farmer but also for surrounding mango farmers and MAFF nominated

[17] The PAM specifies that these demonstration drip irrigation units will be located in the Kampot, Takeo and Kampong Speu province which borders Takeo and is the most important mango producing province in the east of the country, while recently MAFF has requested to also install one demonstration unit in Tboung Khmum province.

training of trainers. So far, there are no mango producers and marketing associations in the target provinces except in Kampong Speu. It is hoped that through meetings at the demonstrations and field days, a producers' association can be created in Takeo and Kampot. The demonstrations on drip irrigation will also involve the use of solar energy for pumping, wherever feasible. The use of solar energy is expected to reduce overall energy costs in operating the drip irrigation scheme. The budget for the drip irrigation installation is US 7,000/unit, for the tube well and water source connection US 3,500/unit, and for the Solar pumps US 9,000 unit, or combined US 19,500/demonstration unit excluding budget for the training at US$ 125,000. The selection criteria for drip irrigation demonstration sites are the following:

(i) The recipient must be a smallholder and not an absentee farmer;
(ii) The recipient must have a land title, or equivalent;
(iii) The recipient has marketing contacts that require Grade A fruit or has the potential of gaining such contracts;
(iv) The planted mango variety must be the Keo Romeat mango variety or other climate resilient varieties that are amenable to floral manipulation and have market potential
(v) The farm must have access to the water or water is available for a borehole and pond construction (if of sufficient size or replenishment to satisfy the water demands of irrigating mango);
(vi) The recipient must be willing to work with the project and accepts the technical innovation of drip irrigation and solar pumping;
(vii) The recipient commits not to sell or transfer the land to a third party during the life of the project, to achieve capital gain and; and
(viii) The recipient has no objection for his or her farm to be used as a training and demonstration location for the duration of the project.

4.1.3.2 PPTA

During the PPTA period a feasibility study was made for one 3.5-hectare site.

4.1.3.3 CFAVC CS1/CS5 review

During the CFAVC Inception period the site prepared by the PPTA team was visited but no activities were undertaken with regards to completion of the Design as: a) the task to prepare the Designs for the Drip Irrigation is not included in any of the Consultant's TORs and b) there seems to be disagreement which IA should construct these drip irrigation systems. The CS2 consultants have held meetings with GDA to discuss the selection of drip irrigation demonstrations and GDA is in the process of identifying proposed sites.

4.1.4 Land Levelling

The DMF does not mention any land levelling activities, but the PAM and the Costab under the chapter of Capacity Strengthening for CSA, Agribusiness and Mechanization includes an activity or Land Levelling in 4,000 ha with a budget of $ 2,279,000 at a unit cost of $ 500/ha. From the Costtsab it its not immediately clear which IA is assigned to implement this activity.

4.2 Upgrading agricultural cooperative value chain infrastructure (drying, processing and storage facilities)

4.2.1 DMF and PAM

The DMF states that 80 agricultural cooperatives will benefit from integrated adaptation measures in post-harvest infrastructure investments (2017 baseline: 5). The total budget for this activity is $ 9,953,000.

The PAM states that the project will support selected agricultural cooperatives by installing 50 (12 units), 100 (44 units) or 200 (24 units) ton cleaning, drying and storage units. The size of the storage will depend on the crop commodity or the trade that the cooperative deals in seed grain, grain for processing or cassava chips. The objectives of such support are to: (i) reduce post-harvest losses; (ii) manage the grain or cassava chip materials and its moisture content particularly in the rainy season; (iii) ensure a better price by providing delivery flexibility to processors within the value chain; and (v) encourage processors and buyers to form linkages with cooperatives to stabilize supply and demand. Storage units will be climate-proofed by considering current climate variability and projected climate change extremes and associated pests and diseases. The measures will include providing for improved aeration, drainage and runoff management, humidity control, pest control, and waste management. In addition, solar power will be introduced within the stores for ventilation and drying, lighting and powering management systems. Energy efficiency measures will be implemented in the infrastructure for drying, processing and storage to reduce carbon emissions from fuel wood currently used to operate these facilities. The cooperatives will be prioritized as per the following eligibility criteria:

(i) The cooperative must be registered for more than a year and is able to access loans[18];
(ii) The cooperative stores seed and/or is trading or has a business plan (that includes O&M) to develop a trading agribusiness with potential downstream value chain linkages;
(iii) It should have at least 1,000 m2 land available or planning to buy similar area;
(iv) It should have a reserve fund, with preference to those reinvesting at least 10% above the minimum legal requirement of 20% gross profit (the minimum stipulated in the Law on Agricultural Cooperatives 2013) into the reserve fund;
(v) The cooperative should have strong commitment to implement climate change measures to reduce vulnerability to impacts of climate change and reduce carbon footprint of its operations through promoting bioenergy (biodigesters), renewable energy (e.g., solar roofs) and improving energy efficiency.
(vi) It should have strong commitment of cooperative management team and approved by at least 2/3 of members as detailed in Article 43 on the Law of Agricultural Cooperatives. However, the 2/3 majority will be for all members and not just those attending general meetings;
(vii) The cooperative should develop a realistic and technically viable O&M plan for post-harvest and renewable energy infrastructure at the cooperative;
(viii) There is full social and gender inclusion within its membership; and
(ix) The area under cooperative primarily grows rice, maize and/or cassava.

Preferential support will be given to agricultural cooperatives with a majority of female members, and those in close vicinity of the rehabilitated gravity irrigation schemes and mango drip irrigation sites.

[18] Agricultural cooperatives can be registered with MAFF and those that have access to formal financing. The Rural Development Bank will support those cooperatives with good management and business plans with loans, this is a recent move (June 2016) and is backed by an AFD guarantee which commits to cover 65% of any losses; average loan size $5,000.

4.2.2 PPTA

The PPTA reporting has a list of 41 nominated ACs as shown in Table 13, but there is no documentation whether these nominated ACS meet the selection criteria. Also for one Cassava Storage and Processing plant in Tboung Khnum province a feasibility report has been made which presents a budget of $ 85,000 for the improvement of the building and an additional $ 50,000 for training but details for what kind of training is proposed is not provided. Also, no budget for equipment is proposed.

Table 14: Nominated Drying, Processing and Storage Facilities

Takeo Province	Kampong Cham Province	Kompot Province	Tboung Khmum Province
Rusei thmei Rong roeung	Sombomea nchhay	Romdul Serey Reang Tareach	Seda Senchay Representative Subproject
Roluos meas	Tuol Prah Viheir	Por Samruong	Neang Teav
Kampeng sok sensambo	Kaksekor MaenChay	Samak Amatak	Tambae Meanchey
Pracheachon Prey romdeng	Pramyam Rung Roeu	Raksmey Samaki Amatak	Natural Pepper Treak Memot
Baksei Rikreay	Somraong Prem Pray	Kasekor Samaki Sre Knong	Samras Don Tey
Cheug kuon Chok Chey	Akphiwhat Srok yaoe	Ruprom Samaki RuongRoeung	Sam Ki Meanchey
Ang tek samaki	Thang Rorlear chomrur phual	Prey Krang Meanrith	Green Natural Kroch Chmar
Sramok soksenchey	Traoe SamaKi Mea Chey	Pornha Ang Chamroeun Chey	Seda Meanchey
	Meansor Meachey		
8	9	8	8

4.2.3 CFAVC Inception Phase

During the inception phase MAFF submitted a preliminary list of 50 cooperatives which are shown in Annex 3. These still have to be assessed to see if they meet the selection criteria. Preliminary visits have been made to 30 cooperatives by CS2 consultants to assess their interest, activities and the degree to which they meet the selection criteria (see annex 3). None of the interviewed cooperatives has an active business plan. The remaining 30 ought to be selected close to the 27 irrigation schemes.

The selection of cooperatives and installation of storage, cleaning and drying units will be undertaken by CS1 in the first input of the International PADV Operations and Management Specialist which is planned for QR1 of 2020. After the selection of the locations has been completed the selected cooperatives will be provided with training by CS2 Capacity Building team. In fact, much of the training will be delivered to these cooperatives. The PAM also envisages reducing vulnerability to impacts of climate change and reducing the carbon footprint of cooperative operations through promoting bioenergy (biodigesters).

4.3 Improving Connectivity

4.3.1 DMF and PAM

With regards to the activity of upgrading of roads to improve connectivity of farms and markets the DMF has a target of 250 km farm roads, yet the PAM/Costs stab has allocations for rural connector roads, i.e. 178.15 km concrete rural connector roads for $ 25,601 million and 435,69 km laterite rural connector roads for $ 10,432 million.

4.3.2 PPTA

In the PPTA reporting the only details for this activity is in the Costab.

4.3.3 CFAVC Inception Phase

During the CFAVC inception phase so far not much has been done on the preparation of the MRD program as the CS1 DTL for MRD has not been mobilized while the Road Engineer of the CS5 contract had to be replaced and was only mobilized mid December 2019. However, the CS1 team agrees that also given the small size of the irrigation schemes the need for rural connector roads is much higher than for farm–roads. MRD has presented to PMU a number of Proposed road construction works as shown in **Tables 15-17** which still have to be assessed.

4.4 Upgrading of quality and Safety Laboratory Equipment

4.4.1 DMF and PAM

The newly inaugurated Plant Biotechnology Laboratory (PBL) part of the NAL at the General Directorate of Agriculture (GDA) will be supported to develop GMO testing and tissue culture protocols (Cambodia has no GMO testing laboratories and is one of only three ASEAN countries that does not. The ASEAN Secretariat is keen that Cambodia should develop appropriate facilities). It is intended that the laboratory will reach ISO 17025 accreditation for a range of tests and should achieve cost recovery to the amount of $75,000 per annum.

The DMF target is “Crop product quality and safety testing infrastructure in National Agricultural Laboratory upgraded to test 1500 samples (2017 baseline: 700) and generate service income more than $75,000 (2017 baseline: $0), whereas the PAM states that “The newly inaugurated Plant Biotechnology Laboratory (PBL) will be supported; no building is required as the sanitary and phytosanitary measures (SPS) and Plant Protection Unit will be moving from the existing laboratory building to a new building; however, some building redesign and reorientation is required to satisfy future International Standards Organization (ISO) 17025 accreditation. The activities will include: (i) establishing genetically modified organism (GMO), plant toxins, bio-fertilizer and organic fertilizer testing capacity; (ii) supporting ISO 17025 accreditation; (iii) developing tissue culture protocols for banana and cassava; and (iv) assisting the laboratory commercialization process to achieve partial cost recovery.

Table 15: MRD Proposal for Road Construction in Kampot Province

No	Name of AC	Address	Name of Community Leader			Name of Road	Length (k.m)	Type	Width (m)		Start, NE point		End, NE point		Code /Inv
			Name	Role	Phone Number										
1	Ratanak Polroath Samaki AC	Kchoy Khanglech, Domnak Sokrom, Dong Tung	Mr. Eun Sophal	Chief of Community	012 528 305	Wat Sovann Cholsa-Sahakom	3.400	Laterite	4.50		0439911	1188180	0442297	1187563	Code 003
2	Preykrang Meanrith AC	Preykrang Khangcheung, Meanrith, Dong Tung	Mr. Seng Wang	Chief of Community	012 697 833	Span Domnaksokrom-Sahakom	3.360	Laterite	4.00		0439828	1188921	0436909	1188247	Code 095
						Phum Boeng-Sahakom	7.540	Laterite	4.50		0436211	1195006	0436909	1188239	Code 016
3	Punhea Angkor Chamreun chey AC	Punhea Angkor, Wat Ang Khangcheung, Banteay meas	Mr. Louy Saly	Chief of Community	076 91 66 268	Phsar Chhouk-Sahakom	15.550	Laterite	5.00		0440458	1197879	0449267	1188291	
						Wat Borivas-Sahakom	7.080	Laterite	5.00		0455678	1186608	0449264	1188289	Code 028
4	Senhan Chomroeunphal AC	Domnak Trayeng, Somroung Le, Banteay Meas	Mr. Dok Luon	Chief of Community	012 555 213	Wat Domnak Trayeng-Sahakom	2.700	Laterite	4.50		0456370	1187697	0454077	1188396	Code 043
5	Raksmey Samaki Amatak AC	Chres, Chres, Chom Kiri	Mrs. Suong Vanny	Chief of Community	017 492 192	Wat Stoeng Thmea-Sahaom	8.100	Laterite	5.00		0441747	1198721	0441823	1205461	Code 013
						Chhouk Chomkiri-Sahakom	5.230	Laterite	5.00		0437689	1206416	0441818	1205461	Code 061
6	Pour Somrong AC	Pour, Sre Somroung, Chom Kiri	Mrs. Uh Hoeun	Chief of Community	088 5294 452	Wat Mony One-Sahakom	4.730	Laterite	4.50		0437218	1208007	0441579	1208743	Code 056
7	Samaki Amatak AC	Doung, Sre Khnong, Chom Kiri	Mr. Noun Sovann	Chief of Community	088 4700 606	Road No 41-Sahakom	2.710	Laterite	4.50		0438258	1211067	0440897	1210697	Code 398
8	Romdoul Sarey Reang Tareach AC	Tareach, Trapang Rang, Chomkiri	Mrs. Sat Sophal	Chief of Community	012 488 728	Wat Angchork-Sahakom	0.691	Laterite	6.00		0436723	1207937	0436142	1208018	Code 392
9	Kpob Run Komnuthmey AC	Kpob Run, Sre Cheng, Chomkiri	Mr. Krouy Chhorn	Chief of Community	099 442 268	Road No 41-Sahakom	1.340	Laterite	6.00		0443180	1221827	0441889	1221548	Code 436
10	Kasekor Roungroueng	Kamnob, Sre Cheng, Chomkiri	Mr. Set Chhan	Chief of Community	012 948 713	Toul Phchoek-Sahakom	2.130	Laterite	4.00		0442329	1220661	0440338	1220055	Code 422
Total length							**64.561**								

Table 16: MRD Proposal for Road Construction in Takeo province

No.	Name of AC	Village	Commune	District	Phon No	Name of Road	Length (km)	Type	Exiting Width (m)	Start, NE point		End, NE point		Code /Inv
1	Samaki Trapang Kralagn AC	Trapang Kralagn	Ou saray	Tram Kok	092977984	Trapang Kralagn-Tomnop Khpob Trabek	3.100	Laterite	4.50	0448654	1221655	0447922	1223523	Cod 255
						Mongmean Lak-Trapang Kralagn	5.500	Laterite	4.00	0474601	1214865	0448654	1221655	
2	Sensok Tekthla AC	Tekthla	Trapang Krasang	Bati	012823703	Vat Angron- Slarom+	4.900	Laterite	5.00	0475915	1242506	476223	1238580	Code 112
						Trapang Krasang-Kodoul	2.700	Laterite	4.00	0475568	1240834	0473014	1241274	Code 129
3	Basey rikreay AC	Ang Baksey	Cheang Tong	Tram Kok	085406045	RN3-Ang Baksey	4.900	Laterite	4.00	0464833	1222208	0460116	1222069	
4	Lumpong kasikam Samaki AC	Peanmeas Kang kert	Lum Pong	Bati	012823703	Kloungtvar Vattotar -plov Tonlebati	9.700	Laterite	5.00	0473930	1246137	0473367	1254972	Code 105
5	Syayrin Amatak AC	Svay Run	Chomras Pen	Samrong	010687144 010481181	Vat Damrey Yoktek-Sretasok	1.300	Natural Gravel	4.00	0471708	1231927	0471886	1233141	Code 101
6	Samaki Kvav Amatak AC	Khav	Khvav	Samrong	012603054	Pum Kvav	1.000	Chalk Road	4.00					
						RN2 -Pum Kvav	6.300	Natural Gravel	4.00	0475783	1234382	0470453	1235989	Code 522
7	Kampoeng Soksen Sombo AC	Chi Marak	Kompeng	Kiri Vong	097983139	Kamoeng -Chi Marak	5.400	Laterite	4.00	0467507	1178037	0470206	1175332	
8	Chompa Prey Pduv AC	Dong Het	Chom pa	Prey Kabas	017336921	Dong Het-Vatchampa	3.800	Natural Gravel	4.00	0489747	1230960	0489157	1230930	Code 180
						Pum Donghet	1.500	Natural Gravel	4.00					
9	Phombey Meanchey AC	Chroy Sleng	Kiri Chong Koh	Kiri Vong	071972092	RN2-Croy Sleng	1.400	Natural Gravel	5.00	0486549	1174131	0487256	1174885	Code 115
10	Cheung Koun Chok Chey AC	Cheung Koun	Cheung Koun	Samrong	012601417	Salakhum Cheung Koun-PumCheung Koun	1.500	Natural Gravel	4.00	0481631	1229678	0480478	1229999	
						Pum Cheung kon-Tomnop Ang Changa	3.200	Natural Gravel	5.00	0481614	1229893	0480945	1232560	Code 534

11	Rolous Meas AC	Roleas	Thlea Prachom	Koh Andet	097550424	Thla Prachom -klong Tvar Vattralach	4.500	Natural Gravel	5.00	486798	1193571	485060	1196825	Code 121
12	Pomleu Kaseko AC	Romun	Beang Krang Khang Cheung	Samrong	012284048	klong Tvarvat Angroka-Sretasok	6.900	Natural Gravel	4.00	465745	1231209	471755	1232310	Code 099
						Plov Sahakhom Ponleu Kaseko	0.552	Natural Gravel	4.00	469218	1231406	469234	1230863	
13	Sdok Sdam Cooperative AC	Trapang Sdok	Tang Yab	Prey Kabas	012323400	Plov Sahakhom Sdok Som	0.152	Chalk Road	4.00	0484367	1237009	0484263	1236972	
		Trapang Sdok Prey Chambok	Tang Yab Tnout	Prey Kabas	012323400	Klong Tvarvat An Andet-Klong Tva Asrom Donam	2.700	Ston Mix	5.00	484160	1238703	483132	1240760	Code 134
		Keo Chamreang	Tang Yab	Prey Kabas		KlongTvavat phnom Chorchok- Pumpey	5.200	Natural Gravel	5.00	485830	1234489	486242	1239549	Code 338
		Chhnoul Kpas Krang Ampel	Tang Yab	Prey Kabas		Pum Chhnul Kpas-Pumkrang Ampel	1.900	Ston Mix	4.00	484050	1236319	485918	1236294	
14	Ponleu Beng Krapom Chouk Cooperative	Beng	Krapom Chouk	Koh Andet	088684856	Deum beng	9.400	Laterite	6.00	493374	1183408	487087	1186802	Code 95+250
			Krapom Chouk	Koh Andet		Plov Sahakom Deum Beng	0.447	Chalk Road	4.00	490999	1183570	491360	1183657	
Total length							**87.951**							

Table 17: MRD Proposal for Road Construction in Tboung Khnum province

№	Name ofAC	Village	Commune	District	Phon No	Name of Road	Length (k.m)	Type	Exiting Width(m)	Start,NE point		End, NE point		Community mechanism		other
1	Seda Meanchey	Seda Senchey	Se Da	Dam Bae	077628426	Chrey Plok-Seda Senchey	5.9	Laterite road	4	0593886	1332141	595819	1337482	595695	1337238	
2	DomBae RongRerng	Chrey Pleuk	DamBae	DamBae	090328787	WatTmey-Khjey	9.800	Laterite road	5.00	592345	1326244	596757	1332750	592885	1332178	
3		KorKos														
4		Kjeay														
5		Svay PorPea														
8	Samakey Kok	Angkoeun Sam	Kok	Ponngakreak	086591890	Wat AngKeng-SamRoery	5	Laterite road	5.00	587143	1294800	587364	1299136	587050	1294828	
9		Rerouy														
10		Trapang Sentu														
11	Kaksekor Dombae	SroMor	Teuk Jrav	Dam Bae	0882708811	PhomSromor-TaMeak (KnongTomnub-PhleuProleay)	9.300	Laterite road	5.00	602963	1315996	595510	1317734	600937	1316099	On Dam and Canal dike
12						PlovKnongPhumSromor	0.670	Laterite road	5.00	602409	1316149	602958	1315462			
13	Kdey SongKhem Kaksekor	BeiMert	Toul Chnol	Krouch Chma	0975808292	PlovTapoav-Songkom Meanchey	20.000	Laterite road	6.00	578982	1344481	575754	1337690			
14	Svay (Phum Sre khach)	Sre khsatch Seda	Tropang Pring	Dam Bae		Plov N73(PhumSreKhsach-Kilo 18-SenMonoRot)	11.400	Laterite road	5.00	601899	1347882	606977	1340245			Community establishing
15	Tomnub Berng Ka Aet	PrekPdav-Ta Pang	PemChiLang	Tabong Kmom		Preak Pdov-Wat Tapang Plov	3.89	Laterite road	7.00	559846	1337256	563205	133592			On Dam
16	Tomnub Steng Penh	Steng Penh Tmor	ChiKor-PreahTheat	Tabong Kmom-OReangOuv		Knong Phum Steng Penh Wat	1.00	Laterite road	5.00	563500	1312637	563636	1312628			
17	Tomnub Trapang Kros	Pich Ti Bei	Tmor Pich	Tabong Kmom		Perk-Tmor Pich Ti Bei	6.800	Laterite road	4.00	563225	1327282	564359	1329966			On Dam
18	Tomnub Ba Ray	Ba Ray	Chhok-Seda	Krouch Chama-Dambae		Plov Ba Ray-Prey Jor	15.700	Laterite road	5.00	586569	1346077	597907	1341921			
Total Length							89.48									

The project will supply analytical testing equipment for GMO analysis and bio-fertilizer and organic fertilizer testing, the supply of tissue culture equipment and materials that will include making the tissue culture laboratory aseptic and the supply of growth media, etc. and plantlet weaning facilities. Pesticide residue rapid test kits for field testing and desktop testing equipment for plant toxins will also be supplied. The main strategy will be to gain ISO 17025 accreditation for the range of tests supported by the project but also those tests in which NAL feels confident that accreditation can be achieved. The other targets are for PBL to generate revenue at least $75,000 per annum by year 6 and to license tissue culture technology to two companies. On matters of biosafety and biotechnology policy and standards, as well as upgradation of the laboratory infrastructure and capacity, biosafety experts from the Ministry of Environment (MOE) will be involved.

4.4.2 PPTA

In the PPTA a range of equipment needed for the laboratory was identified and this is budgeted in the COSTAB at $3.45 million.

4.4.3 CS2 Investigations

4.4.3.1 Equipment List

The CS2 specialists have been informed by laboratory staff that the equipment list in the PPTA report and Costab was in fact prepared by national agricultural laboratory staff and that they have little confidence in having identified the correct equipment or all the equipment required. It is expected that the equipment will require re-specification by the CS2 Laboratory / Solar Team.

4.4.3.2 CS2 Assessment

The TOR indicate that the Plant Biotechnology Laboratory (PBL) will be supported to achieve International Standards Organization (ISO) 17025 accreditation supported by a team of six national specialists although five of these specialists are budgeted in COSTAB at international rates. It is not clear that all of the specified national specialist positions can be recruited in Cambodia with the required expertise (as specified in the terms of reference (ToR)) because there are few if any laboratories operating in Cambodia operating to ISO 17025 standard, and, for example, there are no laboratories that undertake GMO testing. Specialists trained under the ADB SPS Project were trained in food safety and phytosanitary testing and do not possess the skills needed for the CFAVC project. Existing specialists in such areas as tissue culture are in full-time employment. The positions have been advertised with no response so far and enquiries made through MAFF have so far not yielded any candidates. Apart from the national laboratory coordinator, a long-term position, the budget for the other five specialists in the COSTAB still appear to be specified at international rates.

Decisions are required as to whether to recruit some or all or the specialists required to implement the support to the PBL internationally and whether to modify the DMF targets to reflect the scope of work indicated in the PAM and the TOR so that appropriate indicators can be selected for the PPMS.

4.5 Installation of Green Energy Provision

4.5.1 DMF and PAM

The DMF states that at least 50 agribusinesses become more resource efficient in terms of water savings (5-10% efficiencies); energy savings (20%); and reduction in post-harvest losses (10%) (2017 baseline: and that 12,000 additional biodigesters and 6,000 compost huts made operational, benefiting at least 80,000 persons, including at least 50% women, due to better household air quality (2017 baseline beneficiaries: 11,468 persons, including 5,721 women).

The PAM states that this activity includes (i) installation of at least 12,000 more biodigesters in target agricultural cooperative areas by the sixth year from a baseline figure of 11,468 units, benefitting 80,000 persons including 40,000 females; (ii) supporting the construction of 6,000 compost huts, to process bio-slurry; and (iii) establish a national framework on the biodigester quality (standard development) and harmonize biogas initiatives in a private sector friendly manner, and as noted under Activity 1.2, the project will also promote the use of solar energy within post-harvest and processing units at cooperatives. Likewise, photovoltaic energy will be used in the submersible pumps to supply water to the drip irrigation demonstration sites under activity 4.1. The quality of solar systems will be ensured through using certified companies and products. The project will also advise agribusinesses to reduce energy costs and support those that are prepared to invest in solar energy through: (i) sponsoring feasibility studies on the potential for photo voltaic energy to reduce energy costs in the value chain; (ii) providing advice to at least 10 agribusinesses that have the potential to reduce energy costs with photovoltaic energy; and (iii) linking of such agribusinesses with the green financing interventions.

The PAM suggests that bio-digesters and compost huts should be installed in the same communes as the cooperatives selected under activity 4.2 above. These cooperatives will focus on rice, cassava and maize and there is no direct guarantee that there will be extensive livestock production in the same area. The principle is that the compost produced by households with bio-digesters and compost huts should be used by the selected cooperatives to reduce fertilizer cost and thus create synergies. This requirement could delay the commencement of the bio-digester program and may need review.

Beneficiary households will be required to provide co-financing prior to the installation of the digesters. In line with the operational modalities of the National Bio-digester Program (NBP), the Project will provide a flat rate subsidy of $150, independent of the size of the bio-digester. According to the NBP, a compost hut with brick wall and a long-lasting roof made of corrugated iron is relatively expensive and costs around $200. As this investment comes on top of the investment in a bio-digester, most farmers will not be able to afford it. To alleviate some of the additional investment, it is proposed to provide an incentive of $100 per standardized compost hut. It is expected that around 50% of the farmers will invest in such a compost hut, a significant increase compared to a baseline of 15%.

4.5.2 PPTA

No bio-digester schemes were identified under the PPTA and no solar PV schemes. One storage scheme was identified.

4.5.3 CS2 Investigations

4.5.3.1 Targeting for Solar PV units and Biodigesters

As described in section 4.2 above, the project will also support selected agricultural cooperatives by installing 50 (12 units), 100 (44 units) or 200 (24 units) ton cleaning, drying and storage units.

Some 80 cooperatives will need to be selected and assessed to ensure they meet selection criteria, and this will take several months. It is unlikely the cooperatives will be selected in less than nine months but all should be selected within year one. The cleaning, drying and storage units should be installed in the dry seasons of 2020 and 2021. This could delay the start of biodigester implementation and the design of solar PV units.

The PPIUs have provided an indicative list of 80 cooperatives to be supported. These will need to be assessed to determine how closely they meet the selection criteria in the PAM. In addition, at present there are no specialists identified under packages CS1, CS2 and CS5 to design the cleaning, drying and storage units. This activity will need to be clarified before the CS2 Laboratory / Solar team can begin work on designing the solar PV units because these need to be integrated into the designs.

The CS2 role at this stage will be to support GDA with solar roof units to provide power involving the IPV and NPV. The budget allows for 80 solar photo-voltaic (PV) roof units including a 2.5 kilo-watt (kW) array and 12 kW hour batteries and inverter, each unit budgeted at $7,000.

The biodigesters are expected to reduce greenhouse gas (GHG) emissions through three pathways: (i) substitution of non-renewable cooking and lighting fuel by a renewable fuel (biogas), (ii) reduction of methane emissions from manure by capturing and burning methane for thermal energy (cooking and lighting) and (iii) displacement of chemical fertilizers by bio-slurry. The design criteria of biodigesters include: (i) durability, reliability and maintenance requirements; (ii) local availability of construction materials; (iii) appropriateness of the design for areas with high water tables; and (iv) costs. The selection criteria for households eligible for a biodigester include the following: (i) Commune members who are located within the catchment area of those agricultural cooperatives supported by the project; (ii) Households having at least 15 kg manure available daily and a maximum of 150 kg per day; (iii) Commitment to adopt climate smart and good agricultural practices such as composting, mulching, organic agriculture, climate resilient varieties; (iv) Preference to female headed households and those committing to a realistic and technically viable O&M plan; (v) Preference to households with presence of respiratory related illnesses due to air pollution or those households at risk that use biomass for cooking; (vi) Preference to households with capacity to contribute funds either by having own funds or taking loans; and (vii) Commitment to use bio-slurry as a fertilizer substitute.

The major focus of all biodigester programs in Cambodia to date has been on households, and specifically households with livestock. Biodigesters can digest any organic material accept wood and are relevant in applications such as rice straw disposal, cassava chip waste digestion and waste disposal on maize and rice cooperative stores and cleaning sites. The PAM states that biodigester potential has been estimated at 268,000 units in the four target provinces and indeed there are undoubtedly 268,000 or more households who have sufficient organic matter to run a $4m^3$ biodigester. However, over the past seven years, the NBP has managed to distribute around 2,000 biodigesters per year nationally whilst the private sector has distributed less. This suggests that there is a gap between theoretical market size and realized demand. This could be attributed to many factors and there is at present no clear analysis of this demand gap. The PPTA specialists did not undertake an economic analysis of biodigester performance taking into account energy savings and bio-slurry value versus investment and maintenance costs and cost of labor. It is suggested that such a study is undertaken during the first two years of CFAVC.

The budget for biodigesters and compost huts is US$2.854 million (from the Green Climate Fund (GCF) Grant) with a further $6.4 million from government and beneficiaries. Much of the implementation will be undertaken by the NBP, including identifying most of the farmers who wish to install biodigesters. There is a training and support budget of US$3.36 million. There are four or five types of biodigester being installed in Cambodia, three under the aegis of the NBP and two by private companies. It is envisaged that procurement packages for biodigester and compost hut construction will be divided between the private sector and the NBP to ensure that a

variety of biodigesters are implemented and to support the eventual transfer of biodigester activity to the private sector.

The procurement for biodigesters is also relatively complex. This will be discussed in section 14.2.2 on Procurement.

4.5.3.2 Compost Huts

Compost huts are not a feature of all international biodigester programs. They are certainly not required if wet slurry is applied to crops directly from the biodigester. In the Cambodian context they are perceived to be necessary when preparing dry compost outside the biodigester, using the slurry as part of the compost mix, to prevent flooding and nutrient leaching under severe rainfall conditions. Alternative strategies can be used and these need further consideration.

5 Current Implementation Status OUTPUT 2: Climate Smart Agriculture and Agribusiness Promoted

5.1 Release of Agricultural Varieties

5.1.1 DMF and PAM

The DMF states that “Three additional climate resilient varieties of rice and maize released (2017 baseline: 0)”.

The PAM states that “CFAVC will support the Cambodian Agricultural Research and Development Institute (CARDI) to trial and release climate resilient rice and maize varieties including seed production and multiplication, in cooperation with the International Rice Research Institute (IRRI). The varietal characteristics or traits that will be selected will include tolerance to higher temperatures, drought, prolonged submergence as well as the release of varieties with shorter cropping cycles. This will not be a basic plant breeding program which will take 10 years to develop. CARDI and IRRI already have over 200 climate resilient lines that can be trialed within a 5-year program that includes continued selection, agro-climatic adaptation, climate resilient trait evaluations, yield comparisons and farmer and processor evaluation. The Project will also support large scale seed multiplication of climate resilient varieties for each target crop in target provinces and distribution of quality seed to farmers. For example, new rice varieties suitable for direct seeding, and for alternate wetting and drying technologies will be demonstrated together with the full technology package on about 100 ha in each target province. The Project will recommend standards for seed certification procedures for different grades of seed, and seed certification procedures for the approval of and implementation by the government. The CS2 Package is not involved in the above activities, which will be supported by CS3, Variety Development Consulting Firm by the International Rice Research Institute (IRRI). The RFP for Package CS3 is expected to be issued to IRRI under single source selection in January 2020.

5.1.2 PPTA

The PPTA prepared TOR for the RFP for the CS3, Variety Development Consulting Firm by the International Rice Research Institute (IRRI). The TOR are in the process of being updated by CS2 to reflect the need to develop climate resilient mango and cassava varieties.

5.1.3 CS2 Investigations

Under the CS2 package, technical assistance (TA) will be provided to CARDI to develop a commercialization program with recommendations on the legal framework to develop intellectual property rights and partial cost recovery for the institution. The expected results will be: (i) at least two climate resilient rice varieties released for commercial production and one climate resilient glutinous maize variety released for commercial production; and (ii) CARDI would be able to achieve partial cost recovery in variety development and foundation seed supply with the corresponding legal framework in place.

5.2 Training in CSA and Agribusiness Development Skills

5.2.1 DMF and PAM

The DMF states that "40,000 farmers (of whom 16,000 are women) trained in CSA and agribusiness development skills, of which 50% are SRP compliant with direct links to millers and exporters (2017 baseline for SRP compliance: 0)".

In the PAM, this is amplified as follows: "Utilizing some of the infrastructure developed under output 1, the CS2 Capacity Building Team will support GDA to strengthen capacity of farmers, cooperatives and agribusinesses on CSA and climate friendly practices. The Project will support the deployment of a farmer-oriented training program on CSA, reaching at least 40,000 farmers (16,000 women), focusing on the rice, cassava, maize and mango value chains. The CS2 Capacity Building Team will assist GDA to train youth, landless and women. Farmers, FWUGs, agricultural cooperative boards and their members, and government officials from the Provincial Departments of Agriculture, Forestry and Fisheries (PDAFFs) delivering both formal training and on-farm demonstrations on the following topics; (coordinated by the NTC and the IGAP):

(i) CSA practices, including laser land levelling, alternate wetting and drying, sustainable agricultural waste management, rational use of inputs (water, energy, fertilizers, and pesticides), agro-forestry and soil cover maintenance techniques, anti-erosive landscaping, and other practices leading to reduction of greenhouse gas (GHG) emissions;
(ii) Standards compliance such as Cambodia Good Agricultural Practice (CAMGAP) and sustainable rice platform (SRP). The Project will prepare training manuals and materials for SRP standards for sustainable rice cultivation, for CSA, and for CAMGAP for tropical fruit;
(iii) Agricultural cooperative management and business development plans including bookkeeping, accounting and the importance of access to crop value chains and marketing;
(iv) Management and operation of provincial agricultural development centers (PADCs) and mechanization workshops for government staff (see Activity XX) (the NTC will work with the National Agricultural Machinery Operations and Maintenance Training Specialist;
(v) Management, operation and maintenance (O&M) of irrigation infrastructure, drying and storage units for maize, rice and cassava as well as all other infrastructure;"

The PAM describes the targets as: The expected results of this activity by 2025 will be as follows:

(i) 16 certified trainers on CSA from the GDA Department of Industrial Crops and Extension;
(ii) 40,000 farmers (at least 16,000 women) trained in CSA with productivity increases of at least 15%;
(iii) 20,000 farmers (at least 8,000 women) trained and compliant with SRP, which leads to direct paddy marketing links with SRP affiliated millers and traders;

(iv) 500 farmers (at least 200 women) trained and compliant with CAMGAP in tropical fruit;
(v) 50 provincial input (agrochemical, fertilizer, etc.) suppliers have received training in CSA and capable to pass on that training to farmers;
(vi) 150 agricultural cooperative management and board members can fulfil their management and accounting obligations as specified within the law of agricultural cooperatives;
(vii) 50 cooperatives have successfully entered into a profitable agribusiness venture (this does not include establishing a saving and loan scheme);
(viii) At least 27 farmer water user communities (FWUCs) or FWUGs and at least 500 FWUC or FWUG members have the capability to operate and manage their irrigation schemes:
(ix) The operation of agricultural machinery expanded;
(x) 4,000 ha of laser land levelling (~1000 ha in each province) demonstrated to improve water use efficiency;
(xi) At least 15 training workshops for government staff and farmers' groups held on project management, and agronomic resource efficiency, climate resilience in value chains and agribusiness."

5.2.2 PPTA

The PPTA did not specify training approaches in any detail.

5.2.3 CS2 Investigations

The CS2 team has made several proposals on Training and this is under review with GDA. There is concern that SRP is not yet commercially recognized – therefore no price premiums are available to farmers who adopt SRP, and there is no certification process yet. The CS2 Capacity Building Team have also discussed this with the Rice Federation and GDA and they suggest that the Project reviews its approach. Amru Rice, IFC, and CAVAC are currently training 2,000 farmers in Cambodia and have developed a training manual for SRP but this program is being undertaken at Amru Rice's own risk. It is felt to be unlikely that other exporters will take on the same risk. The DMF says "40,000 farmers (of whom 16,000 are women) trained in CSA and agribusiness development skills, of which 50% are SRP compliant with direct links to millers and exporters (2017 baseline for SRP compliance: 0).". It is very unlikely we can link SRP compliant farmers to exporters because there is no certification process and there will be no price premiums, however, GDA suggest that the training primarily focuses on SRP for rice despite these problems.

In order for trainers to be recognized by the SRP platform, trainers need to be trained by someone who has attended and passed the SRP training undertaken in Bangkok. Only trainers who have passed the official SRP platform training can access the official SRP platform training manuals and curricula. At present, only one person in Cambodia has achieved this qualification. He is fully employed on the IBIS rice project. CS2 plan to send and finance two GDA staff to attend the training-of-trainers course in Bangkok in March 2020.

5.3 Development of Operation and Maintenance Capabilities for the Irrigation Systems

5.3.1 DMF and PAM

The DMF states that "27 FWUCs/FWUGs made operational and 500 FWUC/FWUG members (of which 30% women) developed capacity to operate and maintain their irrigation schemes (2017 baseline: 0)."

In the PAM the envisaged O&M program goes much further as described as follow:

- Infrastructure O&M is critical to ensuring its continued effectiveness and productivity, and improper or inadequate O&M arrangements can undermine the long-term utility of the investments and lead to more costly rehabilitation efforts. The root causes of underperformance of O&M in Cambodia are insufficient funding, inadequate capacity, and inappropriate governance structures. The government's manual on Standard Operating Procedures (SOP) requires that the EA/IA must determine the impact of the project on its annual resources/budgets for O&M and how these additional future costs will be covered by the Royal Government of Cambodia or EA to ensure sustainability. An addendum to the CFAVC loan agreements requires that a comprehensive O&M plan must be developed at an early stage of project development. MEF established an O&M budget of about $15 million per year for all types of infrastructure. The amount is limited, but the ministry plans to increase O&M budget gradually. The project aims to address the O&M barriers related to governance, capacity, funding and technology as follows (see also Table 17):
- **Institutional arrangements**. For each water management infrastructure sub-project, the PDWRAM will encourage FWUGs or FWUCs to establish O&M committees and prepare O&M plans. Likewise, each agricultural cooperative will be required to prepare a realistic and technically viable O&M plan for infrastructure related to renewable energy and post-harvest operations. The O&M plans will clearly define the roles and responsibilities of the different stakeholders, include a schedule of routine maintenance activities, initial user tariffs (wherever applicable), and collection mechanisms for at least the first few years after construction, as well as estimated O&M costs for the lifespan of the infrastructure. O&M plans will be updated and finalized on completion of the subproject and agreed upon. Formal links with PDAFF, PDWRAM, PDRD at provincial level and MAFF, MOWRAM and MRD will be established, with their roles and contributions to O&M included in the plans. The number of completed subprojects that have O&M plans in place, and the number of subprojects that are functional and used by communities a year after completion will also be monitored. The PMU staff will visit a sample of the subprojects after completion to evaluate O&M. The project will also need to develop a mechanism for effective complaints handling or grievance redress mechanism on O&M.
- **Capacity building.** As part of output 2, the project will have a strong focus on O&M learning. O&M training will be provided at regular intervals to FWUGs, FWUCs, agricultural cooperative members, biodigester beneficiaries and other stakeholders, including provincial government authorities, and, where appropriate, small-scale contractors or private companies involved in O&M. The project will raise awareness of the need for O&M through several channels including videos and distribute simple pictorial manuals or user-friendly guides to help communities in carrying out O&M activities. Capacity building will also include communication materials and information campaigns to encourage appropriate behavior in support of O&M, such as proper use of infrastructure, fee payment, and so forth. Some efforts will also be devoted to enhancing organizational and managerial capacity of FWUC/FWUGs on O&M. The project will support a community networking strategy -a peer-to-peer learning initiative- that supports the sharing and dissemination of

best practices and lessons learned on O&M and will facilitate integration, business relations formation, and cross-fertilization throughout. Finally, the project budget includes post-construction training and technical support to O&M.

- **Financing.** The project budget covers short-term financing needs for routine O&M. To the extent possible, O&M financing of irrigation subprojects would be partly covered by user fees from FWUGs or FWUCs. In addition, MOWRAM will seek support from MEF's O&M budget (currently about $15 million annually). The Department of Agricultural Cooperative Promotion (DACP) of MAFF will also allocate limited O&M budget for cooperatives to be supported under the project. Farmers' willingness to contribute labor or cash for O&M of infrastructure at agricultural cooperatives will also be a criterion for support. The project will establish appropriate incentives for O&M wherever feasible, by exploring public-private partnerships (PPPs) that can play in commercializing O&M efforts. Financial support for each major subproject will be made conditional on the set up and operationalization of relevant O&M arrangements. The subprojects that provide information on O&M costs and responsibilities will be prioritized for support. The information may include: O&M costs to be financed (e.g., operations and minor repairs versus major repairs or capital costs), ways to finance O&M costs after subproject completion (e.g., water user fees, post-harvest infrastructure usage fee), and responsibility to pay for O&M (FWUCs, cooperative members and/or local government authorities).
- **Technical issues**. This project aims to rehabilitate infrastructure to a climate resilient condition through good design, proper materials, and appropriate supervision. It is expected that such infrastructure will have lower long-term O&M costs. In this process, the best practices learned from other ADB projects regarding design quality and construction will be followed. Efforts will be made to select appropriate design and technology, use local materials of required quality, and provide supervision to ensure construction is in accordance with the specifications. Such efforts will help optimize the trade-offs between the lifecycle costs (investment costs and O&M requirements) and the scale of benefits to the community. For biodigesters, only those biodigesters meeting national biodigester standards will be commissioned. The project implementation consultants (PIC, package CS1) will assess alternative technical solutions and inform communities of associated lifecycle costs, including future O&M costs.

Table 18: Sustainable O&M Procedures

Infrastructure type	Institutional arrangements	Capacity building	Financing	Technical issues
1.1 Rehabilitating water management infrastructure to climate resilient condition	FWUGs and FWUCs, with support from PDWRAM, will prepare O&M plans for each irrigation sub-project.	The project will train FWUGs and FWUCs on O&M through workshops, awareness raising and multimedia.	MOWRAM will seek MEF budget on O&M. The project will encourage collection of water user fee from FWUCs.	Climate resilient design, proper construction materials, and appropriate supervision will be ensured.
1.2 Upgrading agricultural cooperative value chain infrastructure	Each agricultural cooperative, in cooperation with DACP, will develop an O&M plan for post-harvest infrastructure.	The project will train cooperative members on O&M for post-harvest infrastructure.	DACP will seek MEF budget on O&M for a few cooperatives. Farmers will be encouraged to contribute labor or cash to O&M of post-harvest infrastructure.	Good design, proper materials, and appropriate supervision will be ensured.
1.3 Improving connectivity to cooperatives and markets through climate resilient	Agricultural cooperatives, in cooperation with PDRD, will develop O&M plan for rural	The project will train cooperative members on O&M of farm roads.	PDRD will encourage farmers to contribute labor to maintain farm roads; MRD will seek MEF budget on O&M	Climate resilient design, proper construction materials, and appropriate

Infrastructure type	Institutional arrangements	Capacity building	Financing	Technical issues
farm road networks	roads.		to cover critical roads.	supervision will be ensured.
1.4 Strengthening infrastructure for agricultural quality and safety testing	National Agricultural Laboratory (NAL) will be responsible for O&M of all lab facilities.	The project will train NAL staff on O&M of laboratory facilities.	NAL will allocate necessary O&M budget.	Internationally certified laboratory equipment will be procured.
1.5 Promoting renewable energy for value chain improvement	National Biodigester Program, in cooperation with the General Directorate of Animal Health and Production, will provide advice on O&M to project beneficiaries.	The project will train farmers on O&M of biodigesters and cooperative members on O&M for solar panels.	Farmer beneficiaries will be encouraged to cover the costs of O&M for biodigesters. The cooperatives will allocate resources for O&M of solar panels.	Quality of biodigesters and solar systems will be ensured through procurement from certified companies.

5.3.2 PPTA

The PPTA did not specify training approaches in any detail but the COSTAB budget of US $ 258,360 is allocated to MOWRAM and this activity is expected to be undertaken by MOWRAM. This allocation equals to US 9,568 per FWUC of 550 ha.

5.3.3 CFAVC Inception Investigations

No activities were implemented. Discussions have been held MOWRAM who are concerned that FWUG training will require a lot cooperation.

5.4 Agricultural Development Centers and Mechanization Workshops

5.4.1 DMF and PAM

The DMF target is: “4 provincial agricultural development centers and 4 engineering workshops made fully operational to provide agribusiness services and strengthen farmer value chain linkages (2017 baseline: 0).”

5.4.1.1 Provincial Agricultural Development Centers

The PAM states that “The project will provide the training facilities at the provincial level by establishing four provincial agricultural development centers (PADCs) and four provincial agricultural engineering workshops so that they are fully operational to improve and create resource and training centers for service provision, agribusinesses and farmer value chain linkages. The project will finance the building of a PADC in Takeo, Tboung Khmum and Kampong Cham provinces and the rehabilitation of the existing extension/agricultural development center in Kampot. Technical assistance will be provided to manage the training facility and undertake a needs assessment to ensure good training unit management and appropriate procurement. This is to improve the formal training facilities for provincial training and capacity building of CSA, Sustainable Rice Platform (SRP) and Cambodia Good Agricultural Practice (CAMGAP) standards, as well as agricultural cooperatives and FWUC accountancy, bookkeeping and business planning, together with the theory of agricultural machinery and

equipment repair, operation and maintenance. Training and classroom equipment will also be provided.

5.4.1.2 Farm Mechanization Workshops

The PAM states that the project will support the construction of three farm mechanization workshops, including classrooms in Kampot, Kampong Cham and Tboung Khmum and commissioning the new workshop and classroom in Takeo. Technical assistance will be provided for agricultural engineering design and fabrication, repair, operation and maintenance. Equipment and tools for the repair and maintenance of agricultural production and processing equipment will be supplied. The equipment and tools for the manufacture and assembly of agricultural production and processing equipment, together with the supply of design, training and classroom equipment to the provincial workshop units will also be supplied."

5.4.2 PPTA

The PPTA reporting only has in the Costab an estimate of the costs for the 4 agricultural development centers of $ 648,000 and for the 4 mechanization centers at $ 863,000. These budgets include training.

5.4.3 CFAVC Inception Phase

No activities were implemented by CS1 as the International Mechanization Workshop specialist was not mobilized yet. This also as both the PAM and the ToR of Cs1 do not state who is responsible for the design of the agricultural development centers. Workshop staff will be provided with training-of trainer courses and capacity building for agricultural engineering design and fabrication, repair, operation and maintenance.

CS2 have identified the proposed sites and persons in charge at PPIU level and are in process of identifying the proposed staff complements.

6

6 Current Implementation Status OUTPUT 3: Enabling Environment for Climate Friendly Agribusiness Enhanced

6.1 Policy and Standards Development

6.1.1 DMF and PAM

The DMF targets for climate friendly agribusiness policies and standards are:

3a. Climate-smart and gender-responsive agribusiness policy for target commodities, including a PPP framework focusing on agribusinesses formulated (2017 baseline: 0). **

3b. CAMGAP for tropical fruit and organic fertilizers endorsed as national standard for tropical fruit and organic fertilizers (2017 baseline: 0).

The PAM states “The project’s support to climate friendly agribusiness policy development will include:

(i) identification of measures to remove barriers for private sector investment in climate friendly agribusiness;

(ii) identification of investment strategies for the public sector to enhance climate smart agribusiness growth;

(iii) promotion of the development of climate-friendly infrastructure so that Cambodia’s agribusinesses have a comparative and competitive advantage with their regional counterparts; and

(iv) creation of institutional and legal frameworks conducive to supporting and assisting climate friendly agribusiness, particularly with respect to regulations, taxes, business registration, licenses and the multiplicity of government institutions involved in the sector. The project will seek to identify reforms required to ease freedom to do business while promoting adequate social, environmental and climate-related standards, and to improve efficiencies in logistics and administration.

The climate smart agribusiness policy work will entail working with MAFF and MOC within the framework of the Industrial Development Policy (IDP) 2015-2025, particularly to conduct studies identifying priority products with processing potential and prepare a comprehensive action plan based on value chains to enable the government to provide concrete support to those sectors within the scope of the IDP.
Climate-conscious agricultural product standards. Currently, the International Standards Organization (ISO) is developing ISO 14080 towards climate neutrality in different operations and ISO 26000 to consider climate change adaptation. The project will support developing at least 8 climate-conscious standards for agribusiness operations aimed at climate neutrality and effective adaptation. The activities may be broadly divided into two categories: (i) for standards that have been drafted already, a technical review followed by public consultation is needed to determine impact for the eventual endorsement by the National Standard Council (NSC), in order that the standards can be national standard with the Cambodia Standard mark; and (ii) for the standards that are yet to be drafted, working groups will need to be formed to develop the first draft, followed by technical committees for the review of the drafts, followed by public consultation with the eventual endorsement by the NSC. For climate-conscious standards, most of the work may fall into category 2. For example, standards for climate-resilient post-harvest infrastructure facilities (e.g., storage, milling, processing) will need to be developed to guide the development of future infrastructure.

The project will support activities related to certification and compliance that concerns climate change issues and human health and welfare in line with corporate social responsibility (CSR)

guidelines. It includes support to good agricultural practices (GAP) for mangoes to develop a CAMGAP standard for fair trade, organic production, tropical fruit, and support to the SRP. All standards are aimed at strengthening environmental protection and, for those compliant, enter in specific value chains demanding such standards. The CSR and SRP standards are expected to go further in ensuring worker health and safety as well as guaranteeing that there is no child or bonded labor, and ensuring workers have a living wage and an equitable share of the profits within the supply chain. The project will support a human resource development program for government staff to build capacity in policy and standards development and elaboration, and link with the work on regulatory impact assessment, already supported by ADB.27 The expected results of the sub-output by 2024 will be as follows:

(i) CSA policy drafted and reviewed by MOC and MAFF and jointly endorsed by both ministries;

(ii) Guidance manuals for climate neutrality and adaptation standards for agribusiness operations developed;

(iii) Climate-friendly SRP becomes more widely utilized with eight of the largest Cambodia millers/exporters being part of the Alliance;28 (iv) CAMGAP for tropical fruit standard drafted and becomes a Cambodia Standard with Cambodia standard mark; and

(iv) IDP strategies for climate friendly agribusiness developed."

6.1.2 Agribusiness Policy

The CS2 Policy Team has completed and initial review existing policies and strategies relating to agribusiness policy and an initial review the progress of standards relating to CSA, GAP and SRP. Initial discussions have been held with the Department of Planning at MAFF. The CS2 Policy Team is now waiting to be formally introduced to the relevant working groups, technical committees and focal points so that they can develop a common action plan in cooperation with the relevant persons.

6.1.3 Formulating climate friendly agribusiness policies and standards

Develop CSA Standards: Currently, the International Standards Organization (ISO) is developing ISO 14080 towards climate neutrality in different operations and ISO 26000 to consider climate change adaptation. Together with MAFF, the Project will support developing at least 8 climate-conscious standards for agribusiness operations aimed at climate neutrality and effective adaptation. The activities may be broadly divided into two categories: (i) for standards that have been drafted already, a technical review followed by public consultation is needed to determine impact for the eventual endorsement by the National Standard Council (NSC), in order that the standards can be national standard with the Cambodia Standard mark; and (ii) for the standards that are yet to be drafted, working groups will need to be formed to develop the first draft, followed by technical committees for the review of the drafts, followed by public consultation with the eventual endorsement by the NSC. For climate-conscious standards, most of the work may fall into the second category. For example, standards for climate-resilient post-harvest infrastructure facilities (e.g., storage, milling, processing) will need to be developed to guide the development of future infrastructure. The Rainforest Alliance already has a set of standards and CS2 will need to investigate if ASEAN is moving towards an ASEAN standard.

The Project will support activities related to certification and compliance that concerns climate change issues and human health and welfare in line with corporate social responsibility (CSR) guidelines. This will include support to good agricultural practices (GAP) for mangoes to develop a CAMGAP standard for fair trade, organic production, tropical fruit, and support to the SRP. All standards will be aimed at strengthening environmental protection and, for those compliant, facilitate entry into specific value chains demanding such standards. The CSR and SRP

standards are expected to go further in ensuring worker health and safety as well as guaranteeing that there is no child or bonded labor, and ensuring workers have a living wage and an equitable share of the profits within the supply chain. The Project will support a human resource development program for government staff to build capacity in policy and standards development and elaboration, and link with the work on regulatory impact assessment, already supported by ADB.

In Cambodia, a process to rationalize and harmonize the existing architecture of laws and regulations has been initiated with the aim to create a new Environmental Code that builds on international best practices and adapts these to the context of Cambodia. The Government has also embarked on a significant change of jurisdiction related to the institutions responsible for forest land. In March 2016, the government announced the consolidation of conservation areas under the Ministry of Environment and the unified management of economic land concessions (ELCs) under MAFF. By April 2016, rapid implementation of this policy measure led to the transfer of 1.6 million hectares of protected forests from the Forestry Administration to the MOE, and the transfer of approximately 450,000 hectares of land under ELCs from the MOE to MAFF. In addition, a National Protected Areas Strategic Management Plan has been prepared, and an action plan is under development that will provide impetus to mobilizing financial resources and strengthening implementation. In Cambodia, more than 1,000 stakeholders were consulted during the formulation process for the national REDD+ strategy. The series of national and subnational consultations covered 20 provinces and brought together representatives of community forestry, fisheries, protected area networks, Indigenous Peoples, civil society organizations, non-government organizations (NGOs), international NGOs, academic institutions, and the private sector. In addition, nine half-day events to increase awareness and understanding among indigenous community members on REDD+ and the recent progress of REDD+ development were organized in three provinces. Indigenous Peoples and civil society organizations are also represented in the Cambodian REDD+ consultation group, which represents nine distinct constituencies, including the private sector and academia. The consultation group participates in decision-making; provides inputs to annual work plans and budgets; participates actively in REDD+ taskforce meetings and consultations; nominates representatives to subnational, national, and international capacity-building events and policy forums; and contributes through facilitation of events, review of media products, and as required to ensure and uphold high standards of stakeholder engagement in the Cambodian REDD+ readiness.

Scaling-up Investment in CSA: This Action Area includes proposed actions to:

- Scale up and ‘climate-smart’ agri-finance member companies to their farmers and suppliers
- Work with members of the Banking Environment Initiative to develop new ‘climate-smart’ financial products for farmers and small and medium-sized enterprises, either directly or with their intermediaries
- Adapt and scale-up existing insurance products for farmers
- Collectively engage with climate finance and donor funding mechanisms
- Assess options for internal carbon pricing.

6.2 Promoting green finance and risk sharing mechanisms, including PPP

6.2.1 DMF and PAM

The DMF states that

- 3c: 50 staff, including 30% women, from financial institutions trained in CSA and green finance (2017 baseline: 0).
- 3d. 30 agribusinesses, including 30% women-led and/or owned, *** trained on green finance and CSA (2017 baseline: 0).
- 3e. 20,000 households, including 20,000 women, provided with information on climate risk sharing instruments (2017 baseline: 0).
- 3f. ICT platform for climate friendly agribusiness established in Kampong Cham province (2017 baseline: 0).

In the PAM, these targets are detailed as follows: “There currently exists a framework for PPPs, supported by ADB. However, the current framework, legal and institutional setting, is not conducive to climate friendly investments. Furthermore, there are no adequate risk-sharing mechanisms between government, local producers and the private sector, meaning that smallholders are often left bearing a disproportionate amount of risk. This limits innovation and the potential upscale of innovative climate friendly technologies. The Project will make recommendations to fill these current gaps based on lessons learned and feasibility assessments from previous and ongoing projects, and to introduce innovative mechanisms that can be applied in the Project sites.

The Project will support in

(i) creating an enabling environment for PPPs in agribusiness in the four value chains;
(ii) the identification of incentives for private sector participation in agribusiness particularly improving the private sector´s access to green finance and ways to reduce the risk aversion of commercial banks;
(iii) reducing the financial risks associated with the impacts of climate change on the raw material base.
(iv) To achieve the PPP objectives, the project will support dialogues between public and private sector stakeholders at the national level through convening an Inter-Ministerial Committee (IMC) and promote the establishment of crop centric PPP forums for each value chain (cassava, maize, and mango) both of which will meet twice a year. After each forum is held, the IMC would meet to review the crop forum points raised and to respond to the recommendations. The Project Manager will represent the PMU at each of the committee meetings and crop-centric forums.
(v) The project preparation technical assistance (PPTA) consultants identified eight PPP projects within the value chains. The project will conduct detailed feasibility studies within the project implementation. Two study tours for selected representatives from the government will be conducted during the fourth year of project implementation to learn best practices and benchmarking of potential Cambodian PPP initiatives.
(vi) To further encourage climate-friendly private sector engagement and to orient the market towards “greening” the value chains, the project will strengthen the capacity of financial institutions on green finance to devise and channel climate-friendly agribusiness investments. This will build on the Mekong Sustainable Finance Working Group and the Micro-Finance Institutions (MFI) Client Protection Principle to help Cambodian financial institutions develop environmental and climate screening criteria and tools to guide their lending activities. Coordination and lessons sharing will also be

pursued with the Association of Banks in Cambodia (ABC), which has recently launched the Cambodian Sustainable Finance Initiative (CSFI), an effort to develop sustainable finance principles and announced plans to work towards integrating environmental and social safeguards and lending standards into their business decisions. CSFI is supported by USAID, Pact, Wildlife Conservation Society (WCS) and Mekong Strategic Partners, in partnership with the National Bank of Cambodia and MOE. CSFI is aimed at developing and strengthening finance sector safeguards and risk management standards related to social and environmental impacts which are potentially created through the private sector.

(vii) The project will complement CSFI activities by providing training for commercial banks and microfinance institutions in targeted areas on (i) identification, benefits and opportunities of green financing, especially through environmental and climate risk screening criteria; (ii) awareness of green financing principles, operations and requirements; (iii) integration of green finance criteria into credit application and reporting procedures; and (iv) reporting on green finance. This training is expected to reduce the risk aversion of commercial banks, while also strengthening linkages, trust and shared understanding between lenders, borrowers, and input and services providers regarding climate friendly agribusiness investment opportunities.

(viii) As part of the policy support on green finance and risk sharing mechanisms, the project may explore additional opportunities to enhance financial sector participation in agribusiness investments. The opportunities for establishing an agricultural supply chain adaptation facility, in which a partner financial institution (e.g., Rural Development Bank which is being encouraged to lend to cooperatives) can share some of the contract farmers' credit risk through first-loss guarantee, may be explored. Feasibility of climate smart lending platform and value chain financing options such as warehouse receipt financing scheme may also be considered. The credit facility and guarantee scheme are expected to be available for only those projects that meet specific climate safe screening criteria which will be developed. It can also be made available for commercial banks when lending to SMEs meeting those same criteria. This will serve two purposes, to provide: (i) a commercial incentive for banks to abide by the agreed best practice and climate change screening principles; and (ii) an extra degree of confidence for commercial banks to lend to the underserved SME market, provided the borrowers meet the guaranty eligibility criteria. The technical assistance related to credit guarantee program may involve: (i) finalizing the design of the guarantee scheme with all key stakeholders (Cambodian banks and ADB, MFIs, and RDB) in such a way that the scheme remains simple to operate while offsetting against additional risks; and (ii) designing a guarantee training program for banks/MFIs and RDB to understand guarantee criteria and eligibility, usage, and administration."

6.2.2 Green Finance and PPP

The CS2 Policy Team has completed and initial review of existing policies and strategies relating to PPP and initial discussions have been held with the Department of Planning at MAFF. An action plan has been submitted to the PMU and awaits discussion and agreement and proposed dates for convening the first Inter-Ministerial Committee (IMC) meeting. The CS2 Policy Team hope to organize the first crop forum for rice in consultation with the Rice Federation in January or February 2020.

The CS2 Policy Team is now awaiting identification of replacement candidates for the International Green Financing Specialist and National Green Financing Specialist and hopes to mobilize the latter in April 2020.

6.2.3 Provision of Households of Climate Risk Sharing Instruments

The project will seek to reduce risks associated with impacts of climate change, particularly for smallholder farmers, through creating an enabling environment for climate risk sharing mechanisms such as crop insurance under the guidance of inter-ministerial committee on crop insurance headed by the Ministry of Economy and Finance (MEF). Because penetration of crop insurance and other risk sharing instruments is extremely low, the project will first provide policy support by examining financial and regulatory constraints specific to target provinces and identify mechanisms to overcome such barriers. The project will build on the experiences of the Climate Resilient Rice Commercialization project which focuses on Battambang, Kampong Thom, and Prey Veng provinces and the work of the Cambodian Center for Study and Development in Agriculture (CEDAC) in five provinces, including Kampot and Takeo. The project will examine opportunities to expand such services to Kampong Cham and Tboung Khmum and consider including cassava and maize to rice as the portfolio of insurable crops.

These initiatives await the mobilization of the green finance specialists.

6.3 Establishment of ICT Platform

An ICT platform for CSA will be established in Kampong Cham province using innovative technologies such as cloud computing, and internet-of-things solutions on a pilot basis. The platform will facilitate adoption of more energy-efficient and water use efficient measures, climate friendly agriculture practices and farm credit services. The platform will have three modules: • Module 1: Information advisory systems such as market information systems and weather information services; • Module 2: Digital technologies for CSA practices; and • Module 3: Information systems to monitor and manage climate risk management activities.

Module 1 will use the existing market information system and improve the organization of contents, modes of dissemination, enable price simulation and forecasting capabilities. Targeted information and additional data points will be introduced to add value to Kampong Cham farmers, traders, rice mills, and animal feed manufacturers. Agrometeorological capabilities will be introduced to deliver weather forecast and early warning messages to the farmers in the province. Module 2 will enable selected farms with Internet of Things (IoT) based capabilities that will collect information related to soil chemistry, and agriculture inputs. The data collected will be used to provide advisory information to farmers to improve farm productivity. Module 3 will introduce systemic platforms to capture climate risk management services such as emergency aid disbursement activities and integrate digital payment methods.

This will be a pilot initiative of e-agriculture components such as agro-meteorological algorithms, upgrades to the existing market information system and capacity development that are conceptually applicable to all provinces, as well as specific components, such as CSA practices and technologies, farm credit information systems and procedures and emergency fund disbursement systems. These will enable better planning of agribusiness activities, which in turn will lead to adoption of better farming practices that are climate friendly. Developing data collection and strengthening activities will support the sustainability of climate friendly actions of the project.

The ICT platform will be established by Package CS4, who are not yet mobilized.

7 ISSUES and QUESTIONS

7.1 DMF and PAM Inconsistencies

It has appeared that there are differences in DMF and PAM content on a number of project activities such as shown in **Table 19**.

Table 19: DMF and PAM Inconsistencies

Output	ACTIVITY	DMF content	PAM Content
1	Installation of the Drip Irrigation Systems	The DMF does not mention any activity related to a) Mango production and b) construction of drip irrigation systems for these mango farms but one of the 3 Project Outcomes is a performance indicator of 15 % increase in mango yields between 2017 and 2026.	The PAM mentions a training program will be implemented in 12 Mango farms in which a drip irrigation system has been constructed.
	National Agricultural Laboratory upgrading	Lab upgraded to test 1,500 samples and generate service income more than US$ 75,000 ha.	The PAM has more complex targets: (i) establishing genetically modified organism (GMO), plant toxins, bio-fertilizer and organic fertilizer testing capacity; (ii) supporting ISO 17025 accreditation; (iii) developing tissue culture protocols for banana and cassava; and (iv) assisting the laboratory commercialization process to achieve partial cost recovery. The PAM targets are reflected in the TOR.
	Connectivity	The DMF has a target of 250 Km farm roads	The Costab in the PAM has allocations for 178.15 km concrete rural connector road and 435.69 km laterite rural connector roads
	GDAHP	12,000 biodigesters and 6,000 compost huts	The PAM requires farmers receiving biodigesters under CFAVC to be members of agricultural cooperatives (in one place) or farmers in communes within the catchment area of the cooperatives (in another place).
2	Capacity Building	The following items not included in the DMF:	(i) The operation of agricultural machinery expanded; (ii) 4,000 ha of laser land levelling (~1000 ha in each province) demonstrated to improve water use efficiency;
	PPP	A PPP framework focusing on agribusinesses formulated (2017 baseline: 0)	The project preparation technical assistance (PPTA) consultants identified eight PPP projects within the value chains. The project will conduct detailed feasibility studies within the project implementation. Two study tours for selected representatives from the government will be conducted during the fourth year of project implementation to

Output	ACTIVITY	DMF content	PAM Content
			learn best practices and benchmarking of potential Cambodian PPP initiatives.
	CARDI	The DMF target is: 2a. Three additional climate resilient varieties of rice and maize released (2017 baseline: 0).	(i) at least two climate resilient rice varieties released for commercial production and one climate resilient glutinous maize variety released for commercial production; and (ii) CARDI would be able to achieve partial cost recovery in variety development and foundation seed supply with the corresponding legal framework in place.
	O&M of irrigation systems	The DMF has only as target that the 27 FWUCS are capable to maintain and operate the 27 rehabilitated irrigation schemes	The PAM goes much further and includes funding and institutional arrangements.
3	Policy	The DMF has the target "CAMGAP for tropical fruit and organic fertilizers endorsed as national standard for tropical fruit and organic fertilizers (2017 baseline: 0).	The PAM has no description of developing national standards for organic fertilizers under output 3 and it is assumed that the DMF target relates to the standards to be developed for bio-slurry under output 1.

7.2 Unclear Assignment Tasks or Budgets and Issue to Be Resolved

There are also a number of project activities for which it is not clear which agency/consultant should be in charge of certain activities as shown in **Table 20**. This includes both issues of funding and responsibilities.

Table 20: Unclear Arrangements

Output	ACTIVITY	PAM Content	ToR of Consulting Package	Issue
1	Training in application of Drip Irrigation Systems in Mango farms	The PAM mentions the construction of 14 drip irrigation systems in farms with a size > 5 ha and a lot more requirements	Design of these drip irrigation systems are not included in any of the Terms of Reference of any Consulting Services while review Design and supervision are included in the ToR of CS1.	There needs to be a decision as to whether drip irrigation systems will be individually designed by CS5 consultants or whether system design will be included in the tenders. If design is included in the tenders, each package would have two phases, a design phase and an implementation phase. The implementation phase would be contingent on approval of designs. There would still need to be a qualified input to specify the tenders,
	Sites for drip irrigation farms	The PAM suggests installing drip irrigation on existing mango orchards	The DED of these drip irrigation systems not included in any ToR	Best practice is to install drip irrigation on new planting. This would necessitate selecting farmers for demo sites who have existing orchards and wish also to undertake new planting.
	Installation of 800 on-farm rainwater harvesting ponds	The PAM has a lot of requirements for the selection of the on-farm rainwater harvesting ponds	The design of the 800 on-farm rain water is not mentioned in any of the CS ToRs. Review Design and supervision are included in the ToR of CS1.	Implementing Agency disputed
	Agricultural Cooperatives Equipping with adaptation measures			The Agricultural cooperatives should be located as close as possible to the irrigation schemes and roads
	Agricultural Mechanization Workshops			The Agricultural mechnanozation workshops should be located as close as possible to the irrigation schemes and roads
	National Agricultural Laboratory upgrading		The activity to design these laboratory improvements are in the ToR for CS 2 assigned to national experts but some of the expertise required is not available in Cambodia.	The selection of specialists and tasks assigned requires review.
	12,000 biodigesters	The budget in Costab suggests a 70% subsidy level, whilst the PAM suggests		Clarification is required over the level of subsidy and a decision is required about procurement

Output	ACTIVITY	PAM Content	ToR of Consulting Package	Issue
		a uniform subsidy of $150l. In addition, it is difficult to envisage procurement packages that include an upfront contribution from beneficiaries		methodology.
	Capacity Building	(iii) The operation of agricultural machinery expanded; (iv) 4,000 ha of laser land levelling (~1000 ha in each province) demonstrated to improve water use efficiency;	The standard for SRP is very complex. is not yet recognized by any certification body and at present no price premiums are paid to farmers undertaking SRP. The PAM requires 20,000 farmers trained in SRP to be compliant in SRP – however, there is no body to audit compliance.	The laser levelling demonstrations are part of the capacity building under CS2. Tenders need to be formulated that include both design and implementation. None of the consultants on CS1 and CS2 have expertise to specify the tenders.
	PPP	The project preparation technical assistance (PPTA) consultants identified eight PPP projects within the value chains. The project will conduct detailed feasibility studies within the project implementation. Two study tours for selected representatives from the government will be conducted during the fourth year of project implementation to learn best practices and benchmarking of potential Cambodian PPP initiatives.		
	CARDI	(i) at least two climate resilient rice varieties released for commercial production and one climate resilient glutinous maize variety released for commercial production; and (ii) CARDI would be able to achieve partial cost recovery in variety development and foundation seed supply with the corresponding legal framework in place.		
	GDAHP	The PAM requires farmers receiving biodigesters under CFAVC to be members of agricultural cooperatives (in one place) or farmers in communes within the catchment area of the cooperatives (in another place).	It is not clear which target we are using and also not clear if farmers on the 27 irrigations schemes can be included. On the strictest definition, i.e. membership of agricultural cooperatives supported by the project, we may have less than 12,000 farmers.	

8 WORK PLAN OUTPUT 1: Critical Agribusiness Value Chain Infrastructure improved and made Climate resilient

8.1 Determination and Ranking of Agricultural Production Areas s

As discussed in para 3.2 is it essential that in the 4 CFACV participating provinces agricultural production centers are identified in which a cluster of activities will be implemented such as a) improvement of the gravity irrigation systems, b) FWUC development, c) training of the farmers in climate smart agriculture, d) construction of laterite access roads, e) improvement of the neighboring Agricultural Cooperatives, f) training of the AC members in Green energy and climate-risk sharing instruments and g) construction of a concrete road to the market. This activity should be a joint activity of the provincial authorities and the 3 mobilized consulting services packages CS1, CS2 and CS 5.

8.2 Rehabilitation water management infrastructure (off-farm irrigation systems, on-farm rainwater harvesting ponds, drip irrigation) to climate resilient condition

8.2.1 Gravity Irrigation Schemes

8.2.1.1 General

The CS 5 consultant is assigned to assist the PMU, PPIU MOWRAM in the preparation of feasibility study and detailed engineering design of all gravity irrigation subprojects while CS1 is to review and endorse them. Therefore, the CS 5 consultant should take necessary steps for a) the screening of the nominated subprojects, b) the planning and implementation of project activities, b) topographic survey, c) feasibility study, d) DED, and e) preparation of tender documents. To allow for a speedy implementation the CS5 contract has an allocation of around $ 1,000,000 for surveys in third-party contracting. The preparation and submission of required reports and documents should occur in a timely manner and assist in preparation of tender documents in cooperation and consultation with the Client. Figure 8 shows the process to be applied for the selection and design of the Gravity Irrigation schemes.

8.2.1.2 Trapiang Run scheme

The documents prepared by the PPTA for the implementation of the Trapiang Run scheme during the PPTA are in need of major revision. This concerns a) the design layout, b) the DDR and c) the Feasibility study.

8.2.1.3 Design Process for Remaining 26 Irrigation Schemes

The following steps will be undertaken in the preparation of the DED for the remaining 26 irrigation schemes.

8.2.1.4 Grouping the schemes in Priority Groups

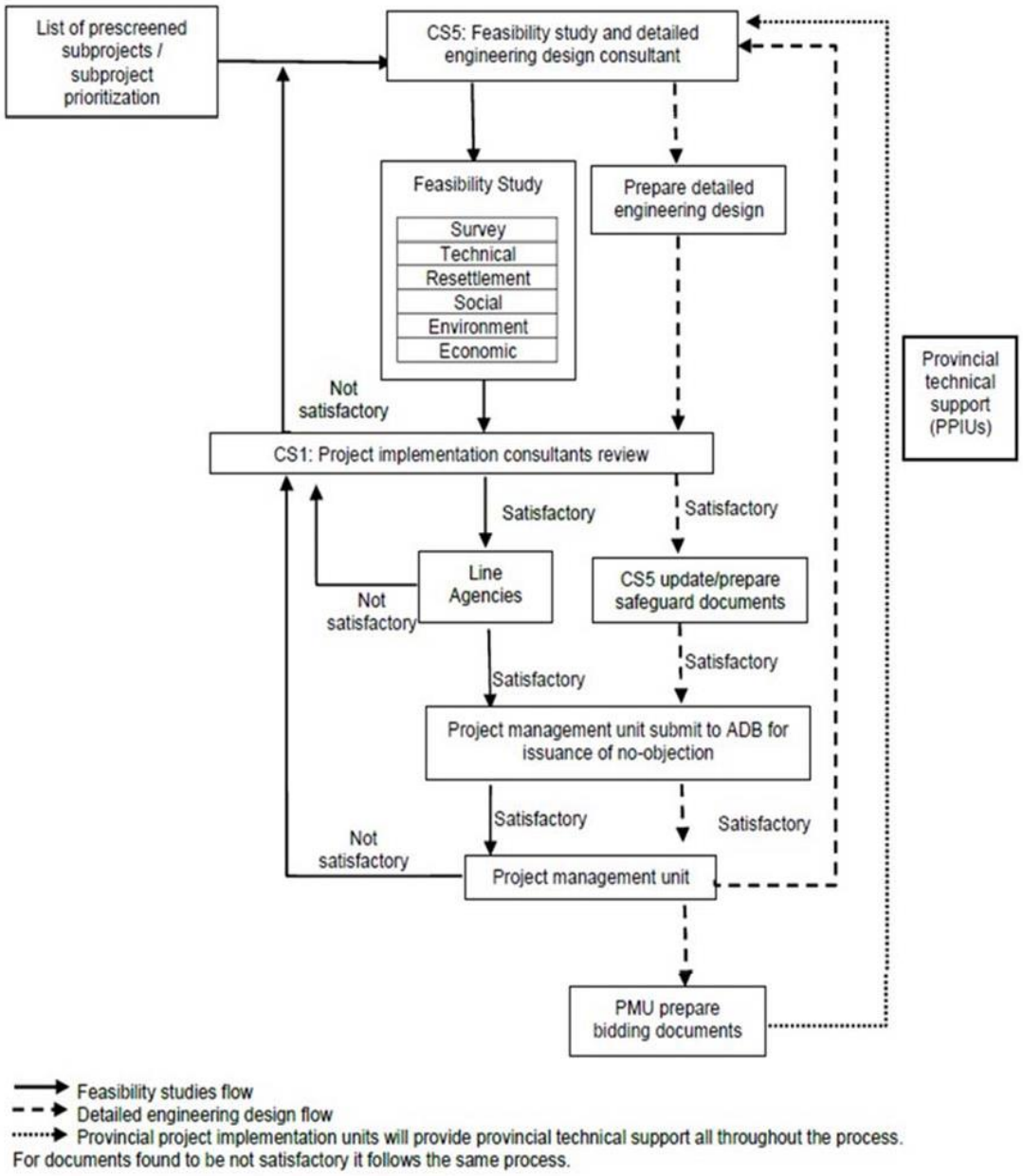
As discussed in para will the process of reconnaissance, feasibility study, topographical surveys and DED start in the initial 10 schemes covering 4,050 Ha which in the Inception Period have been ranked as High Priority. In these 4,050 ha the DED process should be completed in QR3/2020 so that the construction works can be tendered for mid-2020 and the advance payments made for the construction contracts, estimated at US$ 890,400 can be disbursed in 2020. **Table 21** shows the proposed schedule for DEE preparation.

Table 21: Schedule for DED Preparation (Ha)

Province	2020 (High Priority Nominated Schemes)		2021 (Medium Priority Nominated + Additional schemes)		2022 (Medium Priority + Additional Schemes)	
	Schemes	Ha	Schemes	Ha	Schemes	HA
Kampot		1,350				
Takeo		750				
Tboung Khmum		995				
Kampong Cham		955				
TOTAL		4,050		5,400		5,400

At is planned that all DED works should be completed in 2022 to allow for the construction to be implemented in 2023 and 2024 schedule for set-up of the O&M, one constraint is that the validity of the CS5 contract currently is 60 months up to October 2024. It is proposed that this contract is limited to the end of 2022 with necessary amendment including additional experts to prepone the completion schedule.

Figure 8: Detailed process or Selection and Design of Irrigation Gravity Schemes



8.2.1.5 Reconnaissance and Feasibility

As first activity CS 5 needs to determine that the subproject is technically, environmentally, socially and economically feasible. This process involves the following steps:

1. Detailed field surveys, walk-throughs and analysis will be undertaken to determine that the sub- project: (a) is pro-poor (i.e. benefits will mainly accrue to poor farming households); (b) for irrigation projects, there is demonstrated water availability in sufficient quantity and quality to ensure the intended benefits of the project can be achieved; (c) works are technically feasible; (d) has demonstrated commitment from local government authorities; (e) has commitment from cooperatives and or water users to operate and maintain structures post project and to distribute water and resources in an equitable manner; and (f) is economically feasible (EIRR >12%). For estimation of EIRR, farm budgets will need to be estimated.

2. The methodology used during project preparation for the representative subproject can be used.
    - Hold meetings and discussions with community groups, commune leaders and potential cooperatives and water users, to understand the issues and expectation of local people.
    - Socioeconomic data will be collected on each subproject site. If required, land acquisition and resettlement plans (LARPs), initial environmental examination (IEEs) and environment management plans (EMP) will be prepared. These should follow the project's land acquisition and resettlement framework (LARF) and environment assessment and review framework (EARF). Due diligence report (DDR) and IEE for the representative subprojects were prepared in PPTA stage and can be followed. Due regard will also be given to the Summary Poverty Reduction and Social Strategy (SPRSS).
3. Submit documents to PIC for review, comments and approval/endorsement.

8.2.1.6 Topographic Survey

After the schemes has been cleared topographical surveys will be implemented with the allocations in the CS5 contract. These are to cover a) the total irrigation area, b) for reservoirs the likely inundation area and c) strip surveys for the agreed alignment of the embankments, primary canals and secondary canals. Surveys a) and b) can be implemented with Lidar but c) surveys have to done with levelling instruments (No total station). It is proposed that the topo-surveys are contracted out in provincial contracts.

With regards to the Topographical Surveys the CS5 team has to implement the following:

(i) Using well qualified and experience surveying staff and professional survey equipment conduct detailed topographic survey for the full length of the irrigation. It is recommended that the CS5 uses its own staff or subcontracts a national private firm. The same is true when additional data are required.
(ii) Undertake hydrological surveys if secondary data does not exist.
(iii) Prepare the survey drawings and maps in CAD format.

8.2.1.7 Detailed Engineering Design

With regards to the Detailed Engineering Design the following procedure will be applied:

(i) CS5 to consult PPIUs, local district officials, communes, existing or potential cooperatives and water users;
(ii) CS5 take due account of projected climate change impacts and incorporate design features that enhance resilience;
(iii) CS5 should propose to the MOWRAM and obtain approval what design standards to use. However, where innovative climate resilient improvements can be used, CS5 consultants will incorporate such innovations in the design providing sufficient justification for such additional costs, structures or practices can be proven.
(iv) CS5 to prepare LARP, DDR, IEE, EMP and environmental code of conduct as necessary upon finalization of design.
(v) CS5 to submit to PIC for review with relevant line agencies to ensure compliance with standards and regulations of the government.
(vi) PIC to submit to PMU for approval

During the DED phase a total of 2 meetings will be conducted by CS 5 with the involved FWUC as shown in **Table 22**.

Table 22: DED Consultation Meetings during DED

Nr	Timing	Aim of the meeting	Expected Outcome
1	At initial walk-through during the Reconnaissance Survey	To get feed-back from the farmers on scheme short-comings and expected improvements	Agreed Minutes of Meeting
2	In first phase of Design for finalization	To get endorsement of the farmers on the layout of the improved improvements and to get feedback from the FWUCS which parts of the works they intend to implement	Agreed Minutes of Meeting

8.2.1.8 Procurement

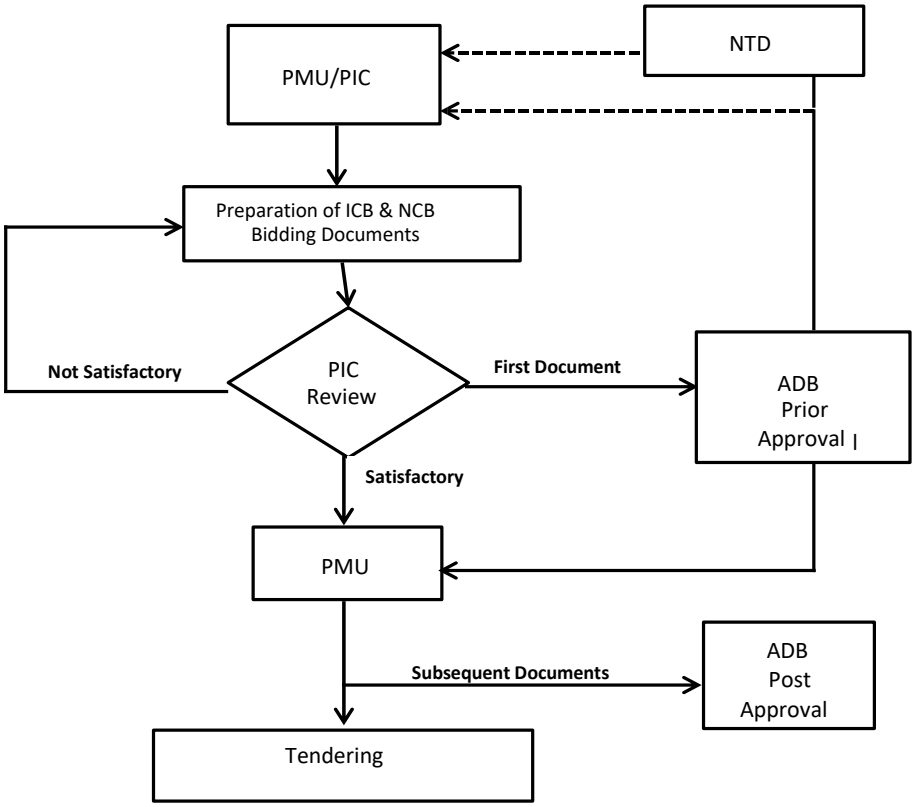
Following approval of PMU of the detailed engineering design, CS5 will assist the national technical department of MOWRAM in PMU with assistance from PMU and PIC in the preparation of the tender documents and contracts for the construction of the subproject following international competitive bidding or national competitive bidding depending on the estimated value of the package. All tender documents should follow standard formats prepared during project preparation, unless modifications are required by PMU.

Implementation of all irrigation and drainage works are planned to be multi-year contracts with the implementation period planned for to be completed in 1 dry season (December – June) with a 1-year maintenance/reliability period.

It is planned that all irrigation civil works will have a clause stating that while all works on the rehabilitation and climate-proofing of embankments, primary- and secondary irrigation and drainage works will be implemented by the main contractor, all works on tertiary canals will be in principle implemented by the FWUC except if they have during the design phase mentioned that they are not capable/interested to do so.

A total of 13 Civil Works packages are planned as shown in **Table 23**.

Figure 9: Detailed process or Approval of the Tender Documents



ICB: International Competitive Bidding

NCB: National Competitive Bidding
NTD: National Technical Department (MOWRAM & MRD)
PMU: Project Management Unit
PIC: Project Implementation Consultants

Table 23: Proposed Irrigation Civil Works Contracts packaging

Province	2020 (High Priority Nominated Schemes)		2021 (Medium Priority Nominated + Additional schemes)		2022 (Medium Priority + Additional Schemes_	
	Nr of Contracts	Ha	Nr of Contracts	Ha	Nr or Contracts	HA
Kampot	2	1,350	1		1	
Takeo	1	750	1		1	
Tboung Khmum	1	995	1		1	
Kampong Cham	1	955	1		1	
TOTAL	5	4,050	4	5,400	4	5,400

8.2.1.9 Construction Supervision

Construction Supervision will be the task of CS1.

8.2.1.10
8.2.1.10 Establishment of O&M Capabilities

The task to support the establishment of O&M capabilities will be a combined task of CS1 and CS2, in which CS1 will focus on the technical aspects and CS2 will focus on the training aspects. The establishment of O&M capabilities concerns both the involved FWUC as well as the involved PDWRAM. At this point clarity is needed from the PMU how far the O&M tasks will be.

Table 24: Sustainable O&M Procedures

Infrastructure type	Institutional arrangements	Capacity building	Financing	Technical issues
1.1 Rehabilitating water management infrastructure to climate resilient condition	FWUGs and FWUCs, with support from PDWRAM, will prepare O&M plans for each irrigation sub-project.	The project will train FWUGs and FWUCs on O&M through workshops, awareness raising and multimedia.	MOWRAM will seek MEF budget on O&M. The project will encourage collection of water user fee from FWUCs.	Climate resilient design, proper construction materials, and appropriate supervision will be ensured.
1.2 Upgrading agricultural cooperative value chain infrastructure	Each agricultural cooperative, in cooperation with DACP, will develop an O&M plan for post-harvest infrastructure.	The project will train cooperative members on O&M for post-harvest infrastructure.	DACP will seek MEF budget on O&M for a few cooperatives. Farmers will be encouraged to contribute labor or cash to O&M of post-harvest infrastructure.	Good design, proper materials, and appropriate supervision will be ensured.
1.3 Improving connectivity to cooperatives and markets through climate resilient farm road networks	Agricultural cooperatives, in cooperation with PDRD, will develop O&M plan for rural roads.	The project will train cooperative members on O&M of farm roads.	PDRD will encourage farmers to contribute labor to maintain farm roads; MRD will seek MEF budget on O&M to cover critical roads.	Climate resilient design, proper construction materials, and appropriate supervision will be ensured.
1.4 Strengthening infrastructure for agricultural quality and safety testing	National Agricultural Laboratory (NAL) will be responsible for O&M of all lab facilities.	The project will train NAL staff on O&M of laboratory facilities.	NAL will allocate necessary O&M budget.	Internationally certified laboratory equipment will be procured.
1.5 Promoting renewable energy for value chain improvement	National Biodigester Program, in cooperation with the General Directorate of Animal Health and Production, will provide advice on O&M to project beneficiaries.	The project will train farmers on O&M of biodigesters and cooperative members on O&M for solar panels.	Farmer beneficiaries will be encouraged to cover the costs of O&M for biodigesters. The cooperatives will allocate resources for O&M of solar panels.	Quality of biodigesters and solar systems will be ensured through procurement from certified companies.

8.2.2 Drip Irrigation Schemes for Mango Farms

8.2.2.1 General

The CS2 Capacity Building Team will work with GDA and the PIUs to select drip irrigation demonstration sites in mango producing areas. This process of selection started in December 2019. The budget for each mango orchard is $7,000 for drip irrigation equipment, $3,500 for connection to a water source or tube-well and $9,000 for a solar pump. The total budget of $322,780 for equipment investment is expected to cover 14 or 15 demonstration farms, although informal quotations from drip irrigation companies suggest the budget may be underestimated. Demonstration farms will primarily be selected in Takeo and Kampot although the Ministry of Agriculture, Forestry, and Fisheries (MAFF) have asked for one or two demonstrations to be established in Kampong Speu province – as this is the largest mango growing area in Cambodia.

8.2.2.2 Site Selection

The CS2 Capacity Building Team will visit the provinces to select sites according to criteria in the project administration manual (PAM) in December 2019 and January 2020 in cooperation with provincial project implementation units (PPIUs) and after consultation with GDA. The selection criteria for drip irrigation demonstration sites include the following, the recipient: (i) Must be a smallholder and not an absentee farmer; (ii) Must have a land title, or equivalent and at least 5 ha of land; (iii) Has marketing contacts that require Grade A fruit or has the potential of gaining such contracts; (iv) Must grow the Keo Romeat mango variety or other climate resilient varieties that are amenable to floral manipulation and have market potential (v) Has access to the water or water is available for a borehole and pond construction (if of sufficient size or replenishment to satisfy the water demands of irrigating mango) (vi) must be willing to allow several training days each year on farm and participate in training as trainer.

8.2.2.3 Best Practices

Best practice suggests that drip irrigation needs to be established on newly planted mango orchards. This will have the greatest impact on both yield and fruit quality but does not comply with FFS training on CAMGAP, which needs to be undertaken on mature mango orchards. The Project may need to establish 15 drip demonstration sites and also select separate farms on which to hold FFS – unless we can identify farmers with mature orchards who wish to undertake new planting and are willing to host FFS training. The only DMF target is to raise mango yield from an average of 15 tons per ha by 15% in Project areas – i.e. to 17.25 tonnes per ha.

Box 1: Mango Drip Irrigation

Where an established orchard is converted to drip, the change in wetting pattern can 'shock' the tree and result in poor tree health and reduced productivity in the first year after conversion. However, converting existing trees can be successful if growers follow a few simple guidelines.

Two key aims when converting existing trees from full-cover to drip irrigation are to:

1. Quickly encourage new root growth in the soil volume wetted by the drippers to support the tree during periods of peak water demand.
2. Leach salts from the soil volume wetted by the drippers.

Full-cover irrigation systems tend to result in salt build-up beneath the tree row. To leach salts away from the tree row, the first few irrigations under drip should be reasonably heavy, taking into account crop water requirements, water tables and problem areas.

Issues that might be encountered include those associated with the rootstock (some are more sensitive to conversion than others), soil compaction, nematodes and phytophthora. The success of the conversion can often be related to existing tree health. The conversion process can reveal some pre-existing problems that might have been tolerated or masked under rainfed, sprinkler or flood irrigation.

The best period for conversion to drip irrigation is normally straight after harvest. Particularly for varieties harvested in autumn, winter or early spring, as this gives the tree extra time to adapt to the new system before the onset of dry season and without a crop to support.

Irrigation management in the first season

Ample water supply is usually recommended in the first year after conversion. Growers should not be too concerned about overwatering in the first year. A healthy orchard that successfully overcomes the conversion to drip irrigation has the opportunity to be efficiently drip-irrigated for many years to come.

8.2.2.4 Solar Pumping System

The CS2 Laboratory / Solar Team will design and support the establishment of solar pumping, and the CS2 Capacity Building Team will coordinate training curriculum and training days, including training of trainers for MAFF specialists and study tours (see activity XX).The solar pumps can be specified soon after site selection once the CS5 team start the design of the drip systems. This is expected in February / March 2020. There will be two types of solar pumping system based on the water source i) surface pump for pond water ii) submersible pump for tube-well water. During site visits CS5 will collect field data as required by and specified by the CS2 Laboratory / Solar Team. The Project Implementation Consultant (PIC) / Project Management Unit (PMU) will be able to prepare procurement documents in March / April 2020 for complete equipment and installation packages. The CS2 Capacity Building Team will recommend a list of tenderers who can provide guarantees and maintenance. The systems should be procured in one package with a five-year guarantee and a five-year maintenance contract

8.2.2.5 Procurement of the Drip-Irrigation Systems

Procurement of Equipment: Tenders can be launched in May or June 2020 and evaluated by the PMU with support from the PIC consultants. The CS2 Laboratory / Solar Team will prepare evaluation criteria.

8.2.2.6 Equipment Installation

It is expected that equipment can be installed in October 2020, at the start of the dry season, and that the installation companies will train farmers to operate the solar pumping systems and to undertake basic maintenance. Implementation monitoring and monitoring of maintenance will be undertaken by the PPIUs with support from PIC consultants. CS2 will provide training to the PPIU staff on monitoring procedures.

8.2.3 Land Levelling

The activity of Land levelling will be supported by CS2. It is expected that most of the land levelling demonstrations will be undertaken on the rehabilitated irrigation schemes and will be undertaken in three tranches once construction is completed in 2022, 2023 and 2024. The capacity building for selected FWUGs will include training on water application on land that has been well levelled.

8.3 Commissioning On-farm Rainwater Harvesting Ponds

The following steps will be undertaken in the commissioning of the On-farm rain water harvest ponds.

8.3.1 Verifications of the Proposed Locations and Designs

The CS1 provincial consultants can assist with the processes of verifications of the proposed locations and the proposed Designs. Final approval of the proposed locations and Designs will be issued by the PMU at the endorsement of the CS1 PIC Team Leader or in his absence the responsible CS 1 PIC DTL.

8.3.2 Procurement

Following approval of PMU of the proposed location and designs the CS1 team will assist in the process of the preparation of the tender documents and contracts for the actual implementation.

Implementation of all ponds are planned to be multi-year contracts with the implementation period planned for to be completed in 1 dry season (December – June) with a 1-year maintenance/reliability period. A total of 12 Civil Works Packages for these ponds are planned as shown in **Table 25**.

Table 25: Proposed Packages for Ponds

Province	2020 (High Priority Ponds)	2021 (Medium Priority Ponds)	2022 (Low Priority Ponds)
	Nr of Contracts	Nr of Contracts	Nr or Contracts
Kampot	1	1	1
Takeo	1	1	1
Tboung Khmum	1	1	1
Kampong Cham	1	1	1
TOTAL	4	4	4

8.3.3 Construction Supervision

Construction Supervision will be the task of CS1.

8.4 Upgrading agricultural cooperative value chain infrastructure (drying, processing and storage facilities)

The Project will support selected agricultural cooperatives by installing 50 (12 units), 100 (44 units) or 200 (24 units) ton cleaning, drying and storage units. The PAM and TOR do not make clear who will design the cleaning, drying and storage units and this needs clarification. Implementation will be supported by the PMU and the PIC. Some 80 cooperatives will need to be selected and this will take several months. It is unlikely the cooperatives will be selected in less than nine months but all should be selected within year 1.

The following steps will be undertaken in the commissioning of the On-farm rain water harvest ponds.

8.4.1 Verifications of the Proposed Locations and Designs

The CS1 provincial consultants can assist with the processes of verifications of the proposed locations and the proposed Designs. Final approval of the proposed locations and Designs will be issued by the PMU at the endorsement of the CS1 PIC Team Leader or in his absence the responsible CS 1 PIC DTL. Selection of 80 cooperatives has been started during the inception phase. These cooperatives will need to be assessed to ensure they meet the selection criteria in the PAM and some of the initial list may have to be changed.

8.4.2 Procurement

Following approval of PMU of the proposed location and designs the CS1 team will assist in the process of the preparation of the tender documents and contracts for the actual implementation.

It is planned that the construction of these 80 cleaning, drying and storage units should be installed in the dry seasons of 2021 and 2022.

8.4.3 Construction Supervision

Construction Supervision will be the task of CS1.

8.4.4 Establishment of O&M Capabilities

Regarding the establishment of the O&M capabilities the PAM requires the following to be taken.

Table 26: Sustainable O&M Procedures for ACs

Infrastructure type	Institutional arrangements	Capacity building	Financing	Technical issues
Upgrading agricultural cooperative value chain infrastructure	Each agricultural cooperative, in cooperation with DACP, will develop an O&M plan for post-harvest infrastructure.	The project will train cooperative members on O&M for post-harvest infrastructure.	DACP will seek MEF budget on O&M for a few cooperatives. Farmers will be encouraged to contribute labor or cash to O&M of post-harvest infrastructure.	Good design, proper materials, and appropriate supervision will be ensured.

8.5 Improving Connectivity

8.5.1 General

The CS 5 consultant is assigned to assist the PPIU MRD in the preparation of feasibility study and detailed engineering design of all roads. Therefore, the CS 5 consultant should take necessary steps for a) the screening of the nominated road sections, b) the planning and implementation of project activities, b) topographic survey, c) feasibility study, d) DED, and e) preparation of tender documents. The preparation and submission of required reports and documents should occur in a timely manner and assist in preparation of tender documents in cooperation and consultation with the Client. Figure 8 show the process to be applied for the selection and design of the Roads.

8.5.2 Design Process for Roads

The following steps will be undertaken in the preparation of the DED for all roads:

8.5.2.1 Detailing of the Implementation Schedule

As discussed in para will the process of reconnaissance, feasibility study, topographical surveys and DED start in those schemes which in the Inception Period have been ranked as High Priority. For the time being it is planned that in each of the 4 provinces 2 irrigation schemes representing 1,100 ha should enter the DED process up-front to allow that for these 8 schemes the construction works can be tendered for mid-2020 and the advance payments made for the construction contracts, estimated at US$ 959,200 can be disbursed in 2020. Table 17 shows the proposed schedule for DEE preparation.

Figure 10: Detailed process or Selection and Design of Roads

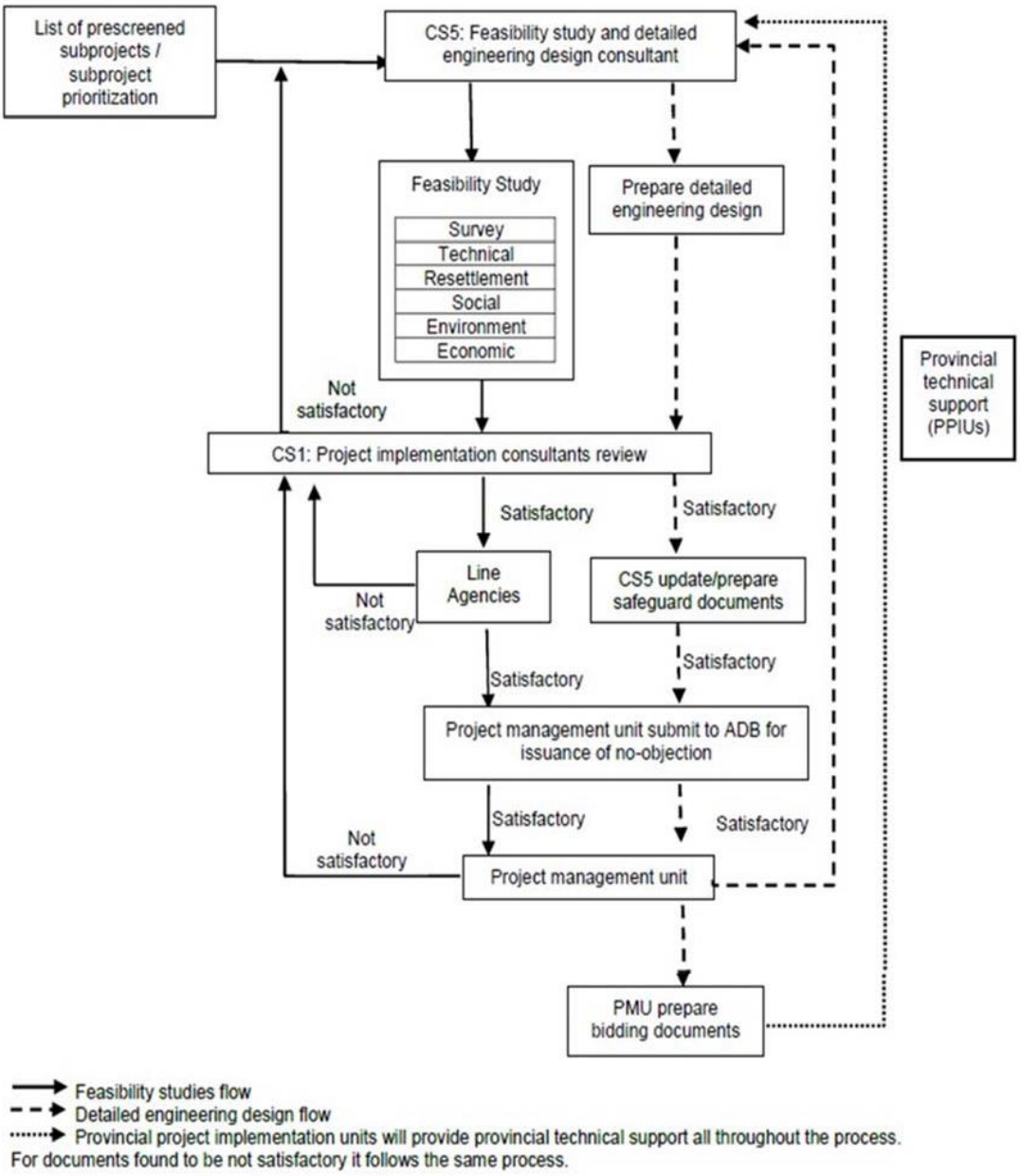


Table 27: Schedule for Road Contracting

Province	2020/2021 (High Priority Roads)		2021/2022 (Medium Priority Roads		2022/23 (Low Priority Roads)	
	Road	Km	Road	Km	Roads	Km
Kampot						
Takeo						
Tboung Knom						
Kampong Cham						
TOTAL						

At is planned that all road construction should be completed in 2023 to allow for the 1-year maintenance period and the set-up of the O&M service to be completed before project closure late 2024. t loan clos, one constraint is that the validity of the CS5 contract currently is 60 months up to September 2024. It is proposed that this contract is limited to the end of 2022.

8.5.2.2 Reconnaissance and Feasibility

As first activity CS 5 needs to determine that the subproject is technically, environmentally, socially and economically feasible. This process involves the following steps:

(i) Undertake a reconnaissance visit to the areas of the proposed irrigation schemes and proposed ACs to investigate the existing condition of the road and structures interconnecting these, their history, present maintenance arrangements and funding.
(ii) Hold meetings and discussions with AC ad FWUC members and commune leaders in order to understand the issues and expectations of local people.
(iii) Carry out traffic count surveys and estimate the type and quantities of goods that may be exported along the road once it has been rehabilitated (e.g., agricultural produce based on the cropped area served by the road).
(iv) Investigate the local geology and soils and possible sources of construction materials (local quarry site, borrow pit area, etc.).
(v) Consider and collect information on issues such as flooding, traffic, resettlement needs, environmental concerns, and particular problems such as use by heavy vehicles.
(vi) Make a ranking in priority based on the same ranking for the irrigation schemes
(vii) Submit documents to PIC for endorsement to PMU, PSC and ADB.

8.5.2.3 Topographic Surveying

After the road sections have been cleared topographical surveys will be implemented for which funds are foreseen in the CS5 contract. Table 28 shows the proposed times-schedule. It is proposed that the topo-surveys are contracted out in provincial contracts. With regards to the Topographical Surveys the following procedures have to be applied:

(i) Prior to carrying out the topographical surveys, establish permanent control points for both horizontal and vertical control along the full length of the road.
(ii) Using well qualified and experienced surveying staff and professional survey equipment, conduct a detailed topographic survey for the full length of the road. All topographical details such as existing roads, tracks, drainage structures, buildings, walls, existing road furniture and services/utilities (electric, telephone and water lines) shall be surveyed. At the location of bridges and other structures a wider area shall be surveyed, and the position of all features will be recorded.
(iii) Prepare the survey drawings and maps in CAD format.
(iv) Where necessary, site specific geotechnical information for the design and construction of the road and structures will be collected through appropriate field and laboratory investigations and supporting calculations.

Table 28: Schedule for Road Surveys (Km)

Province	2020 (High Priority Roads		2021 (Medium Priority Roads)		2022 (Low Priority Roads)	
	Laterite	Concrete	Laterite	Concrete	Laterite	Concrete
Kampot						
Takeo						
Tboung Knom						
Kampong Cham						
TOTAL			153.30	62.68	156.30	62.88

8.5.2.4 Detailed Engineering Design

With regards to the Detailed Engineering Design CS5 has to implement the following:

(i) Analyze the information collected and, consider alternative designs to overcome the issues for each road section before deciding on the best solution (low cost with a good quality laterite surface and higher cost with alternative road surfaces - different sections of the road may have different surfaces depending on the likelihood of floods, potential daily traffic and reducing dust through villages).

(ii) For sections of the road that flood, prepare designs for raised embankments to take the road surface above flood levels four years out of five years.

(iii) Consider the need for and dimensions of bridges, concrete causeways and culverts to allow floods to pass.

(iv) Identify sources of suitable materials for road construction and their costs.

(v) Prepare the detailed engineering designs, drawings and costs of the road and road structures. The engineering design should provide the following details:

a. Earthworks - cut and fill;
b. Drainage – side ditches, and pipe and box culverts;
c. Bridges – structural calculations for the substructure (foundations and abutments) and superstructure;
d. Pavement – surface, wearing course, base course, sub-base and shoulders;
e. Road safety facilities – road signs, road markings, speed bumps outside schools, etc. The design drawings accompanied by supporting documents and calculations, should include longitudinal sections and cross sections of proposed road and structures, indicating the high flood marks. Standard road surface width will be 5.0meters, but it may be necessary or desirable to reduce the widths of some road sections and provide passing places.

(vi) Submit all reports and drawings (three hard copies and one soft copy) to PIC for provincial level approval. The soft copies will include the CAD files and pdf versions to enable access by staff who do not have the CAD programs. The PIC will forward copies to the PMU and ADB.

During the DED phase a total of 2 meetings will be conducted with the involved AC members s shown in **Table 29**.

Table 29: DED Consultation Meetings during DED of Roads

Nr	Timing	Aim of the meeting	Expected Outcome
1	At initial walk-through during reconnaissance survey	To get feed-back from the AC farmers on scheme short-comings and expected improvements	Agreed Minutes of Meeting
2	In first phase of Design for finalization	To get endorsement of the farmers on the layout of the improved improvements and get feedback from the AC members which parts of the works they intend to implement	Agreed Minutes of Meeting

8.5.2.5 Procurement

Following approval of PMU of the detailed engineering design, CS5 will assist the national technical department of MOWRAM in PMU in the preparation of the tender documents and contracts for the construction of the subproject following international competitive bidding or national competitive bidding depending on the estimated value of the package. When CS 5 has finalized their draft Tender file, they will forward it to the Project Implementation Consultant (CS1- PIC) for their review and endorsement. All tender documents should follow standard formats prepared during project preparation, unless modifications are required by PMU. A total of 16?? Civil Works packages are planned as shown in **Table 30**.

Table 30: Proposed Road Construction Packages

Province	2020 (High Priority Roads		2021 (Medium Priority Roads)		2022 (Low Priority Roads)	
	Laterite	Concrete	Laterite	Concrete	Laterite	Concrete
Kampot						
Takeo						
Tboung Khmum						
Kampong Cham						
TOTAL						

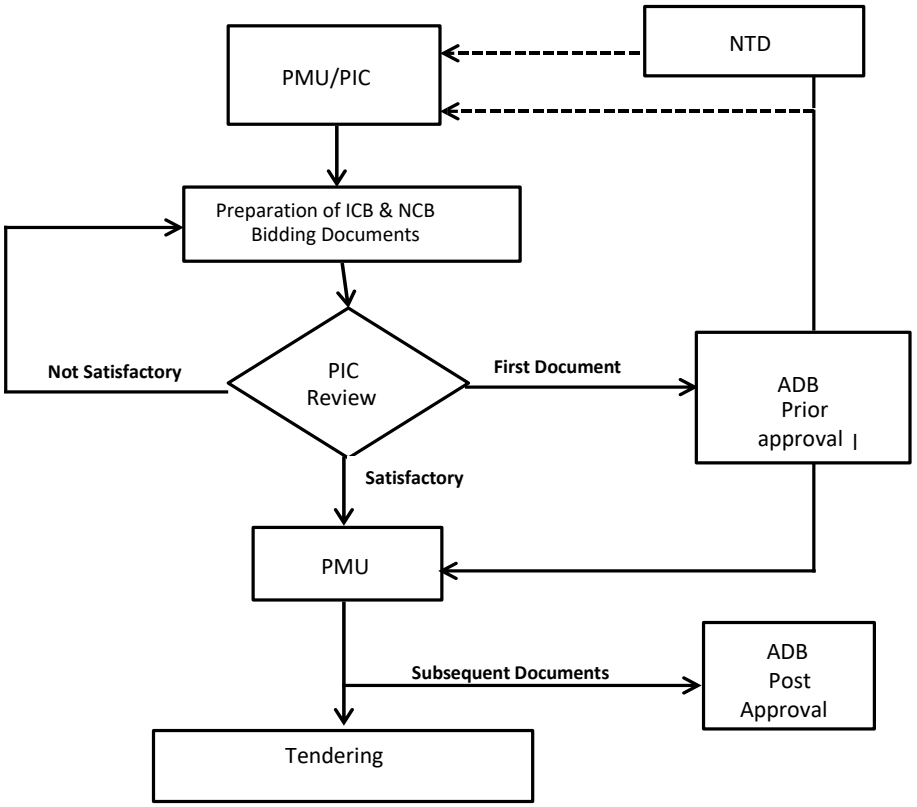
8.5.2.6 Construction Supervision

Construction Supervision is the task of the CS2 POIC consultant.

8.5.2.7 Development of O&M Capabilities

The task to support the establishment of O&M capabilities will be a combined task of CS1 and CS2, in which CS1 will focus on the technical aspects and CS2 will focus on the training aspects. With regards to the O&M for Roads the PAM requirements are shown in Table 29.

Figure 11: Detailed process or Approval of the Tender Documents



ICB: International Competitive Bidding

NCB: National Competitive Bidding
NTD: National Technical Department (MOWRAM & MRD)
PMU: Project Management Unit
PIC: Project Implementation Consultants

Table 31: Sustainable O&M Procedures for Roads

Infrastructure type	Institutional arrangements	Capacity building	Financing	Technical issues
Improving connectivity to cooperatives and markets through climate resilient farm road networks	Agricultural cooperatives, in cooperation with PDRD, will develop O&M plan for rural roads.	The project will train cooperative members on O&M of farm roads.	PDRD will encourage farmers to contribute labor to maintain farm roads; MRD will seek MEF budget on O&M to cover critical roads.	Climate resilient design, proper construction materials, and appropriate supervision will be ensured.

8.6 Upgrading of quality and Safety Laboratory Equipment

Once the relevant specialists have been identified and recruited and once indicators for the PPMS agreed, the newly inaugurated PBL within the NAL at GDA will be supported as follows. Primarily, the Project is not required to construct new buildings as the sanitary and phytosanitary measures and Plant Protection Unit will be moving from the existing laboratory building to a purpose constructed new building; however, the PAM (page 71, para 12) states that some building redesign and reorientation is required to satisfy future International Standards Organization (ISO) 17025 accreditation and responsibility for this redesign will lie with the CS2 Laboratory / Solar Team, working with GDA. It is not anticipated that specialists will be mobilized until early 2021.

Sub-Activities

Developing a strategy and work plan to get the PBL ready for ISO17025 accreditation: The CS2 Laboratory / Solar Team will work together with GDA to prepare a strategy and work plan during the first quarter of 2021. They will identify requirements for analytical testing equipment for genetically modified organism (GMO) analysis and bio-fertilizer and organic fertilizer testing, the supply of tissue culture equipment and materials that will include making the tissue culture laboratory aseptic and the supply of growth media, etc. and plantlet weaning facilities. Pesticide residue rapid test kits for field testing and desktop testing equipment for plant toxins will also be supplied. Once equipment is identified in the first quarter of 2021, procurement will be undertaken by the PMU supported by the PIC in the third quarter of 2021.

The main strategy will be to gain ISO 17025 accreditation for the range of tests supported by the Project including mainly those tests in which NAL feels confident that accreditation can be achieved. The other targets are for PBL to generate revenue at least $75,000 per annum by year six and to license tissue culture technology to two companies. On matters of biosafety and biotechnology policy and standards, as well as upgradation of the laboratory infrastructure and capacity, biosafety experts from the Ministry of Environment (MOE) will be involved.

Review of PBL Spatial Organization: As part of the development of the strategy and work plan, the CS2 Laboratory / Solar Team will review the PBL spatial organization. One of the major concerns in molecular diagnostic laboratories is that detection procedures are repeatedly performed, which increases the possibility of cross-contamination of samples and of false positive results. Avoidance of contamination will be one of the most critical factors in ensuring the correctness of results. Contamination can arise from several sources, such as samples previously analyzed as positive, isolated template genomic nucleic acids and previously amplified molecules (“amplicons”).

GMO detection often involves use of the polymerase chain reaction (PCR), either conventional or real-time. Millions of copies of the GMO sequences are produced in a single tube, making PCR products the major source of contamination, which is easily distributed throughout the laboratory because of the small size of PCR amplicons and the large quantities of products produced in a single PCR reaction. To avoid contamination, the CS2 Laboratory / Solar Team will assist the PBL with:

- **Spatial organization** to ensure unidirectional transfer of samples. The use of separate chambers for each phase of the detection process is proposed, including sample storage,

sample homogenization, isolation of DNA, PCR reaction set-up, addition of isolated DNA, room for PCR instruments and a room for post-PCR analysis (gel electrophoresis).

- **Establishment of preventive actions** such as decontamination with ultra-violet radiation, changing laboratory clothing and gloves, using separate laboratory ware, reaction reagents, pipette sets, etc., for each laboratory, to ensure that no contamination is transferred between different stages of the detection procedure. It is also suggested that air pressure be controlled to avoid contamination from the air, by dispersal of amplicons from the completed PCR samples. In addition, air contamination controls will be included in the detection protocol.
- **Ensuring setting-up of controls for temperature sensitive procedures.** Variation in the environmental temperature can cause large differences in pipetting accuracy, causing differences in final concentrations of compounds in PCR.

Undertake Market Assessment: The CS2 Laboratory / Solar Team will also undertake a comprehensive market assessment of the market for a range of laboratory services in Cambodia during the first and second quarters of 2021, via a combination of rapid desk review techniques and surveys to collect primary information. Quick scoping review techniques will be used to rapidly scan through available secondary information from existing documents and the prior plan and identify data gaps that need to be addressed through study/primary data collection activities. This will help identify and synthesize the current state of the market for laboratory services in Cambodia. The review will also revisit the timelines, historical causality, and other concerns with reference to the product registration and legal framework.

Once data gaps have been identified, a study will be conducted in the second quarter of 2021 to collect first-hand information regarding the market for laboratory testing. While not an all-encompassing list, the study will give a better picture regarding the following aspects:

- Size of the market
- Value chain
- Market composition
- Major players
- Market share
- Key product features
- Pricing strategies
- Communication modalities
- Purchase trends and causal linkages with other factors if applicable
- Product registration process and optimization possibilities

The study will inform the strategy and workplan which will be based on establishing a range of services to ISI17025 standard that can achieve partial cost recovery.

Prepare procurement package and supervise physical works: As part of the strategy review and workplan development, the CS2 Laboratory / Solar Team will work with GDA to identify the testing procedures to be undertaken by the laboratory and the equipment needs and laboratory re-design necessary to achieve ISO17025 registration for these tests. This will also be completed during the second quarter of 2021. The PBL management emphasize that the equipment list in the PAM is based on limited experience and will need complete review. The Laboratory will specify procurement requirements as follows.

Buying, leasing, and renting are all different models that may be used for procuring PBL equipment. A procurement needs assessment will be conducted to better understand what needs to be procured, and what model may subsequently be the optimal procurement method. A sample table that will be used is provided as follows:

Table 32: Procurement Models for Laboratory Equipment – Scenario Analysis

Parameters	Buying	Leasing		Renting
		Capital	Operational	
Need for maintenance services	High	High	Medium	Low
	Provide both standard and customized services		Provide only standard services	Provide only basic maintenance services
Tenure of equipment usage	Long term	Long term	Short-medium term	Short term
	Equipment with usage for more than 3 years		Up to 3 years	Less than a year
Necessity to upgrade	Low – Medium	Low – Medium	High	N/A
	Equipment with high need to upgrade are not procured through buying or capital leasing as the new buyer might end up owning the obsolete equipment		Short to Medium term nature provides choice to switch to upgraded equipment	N/A
Frequency of usage	Medium to High	Medium to High	Medium to High	Less
	Equipment which are used every day or every week continuously in the research and development process			Occasional usage based on ad-hoc requirement

A parameter analysis will be undertaken and procurement methods will be suggested based on the following metrics:

- **Need for maintenance services:**
  - Customized services are necessary for end users who wish to undertake research and development in order to carry out their operations to the desired specifications.
  - If the equipment needs a high degree of maintenance services, the CS2 Laboratory / Solar Team will advise buying or capital leasing, as these options offer not only standard but also customized maintenance services.
  - As the service contracts in renting are high-priced and the equipment is being used by many people, the CS2 Laboratory / Solar Team suggests obtaining equipment that requires less maintenance.
- **Tenure of equipment usage:**
  - If the expected usage of the equipment is more than three years and its frequency of usage is high, CS2 Laboratory / Solar Team will suggest acquisition either by capital lease or buying, provided the need to upgrade the equipment is low.
  - If the expected usage of the equipment is less than three years and ownership is not desired, the CS2 Laboratory / Solar Team suggests acquisition through an operational lease
  - A rental option will be preferred if the equipment will be used for a short term and its frequency of usage is low.
- **Need to upgrade:**

- Regulations and technology developments will require upgrading lab equipment regularly. High-end equipment that involves high technology is subjected to a high rate of change in technology, which results in regular upgrades.
- It is preferable to acquire equipment with a low to moderate need for upgrades through buying or capital lease, as acquiring equipment with high upgrade requirements could result in owning obsolete equipment.
- It is preferable to procure equipment associated with frequent technological changes and frequent upgrades under operational lease, as it avoids owning obsolete equipment.
- Operational leasing is suitable for all types of users irrespective of the industry or size of the company when the technology is changing frequently and there is a need for constant upgrading of the equipment.

➢ **Frequency of usage:**

- It is preferable to acquire equipment for medium to high frequency of usage through buying or leasing, as return on equipment is high because the cost of the equipment is spread over the years of usage.
- Renting is preferred for equipment that is used less frequently or by ad-hoc requests. Acquiring equipment for temporary usage through buying or leasing incurs more cost and less return.

While this should not be considered a comprehensive list, the CS2 Laboratory / Solar Team envisions that the following equipment and materials will require procurement:

Table 33: Indicative Equipment List

Reagents and consumables	Equipment
• Oligonucleotide primers, • Taq polymerase enzymes • Deoxynucleotide triphospates • Enzyme buffers • Magnesium solutions • Sterile water • Kits and related reagents	• Analytical balance • Incubator for DNA extraction • Thermal Cycler • Micropipettes • Spectrophotometer

The procurement plan for NPL equipment will be developed with the PMU according to Asian Development Bank (ADB) / MAFF procedures in Cambodia in the third quarter of 2021. Turnkey packaging and purchase of consumables and equipment by lots will be considered according to the market conditions in Cambodia. The CS2 Laboratory / Solar Team suggests that the procurement plan include period procurement milestones (packages to be procured). An implementation schedule will be developed based on the procurement plan and experience in Cambodia.

The CS2 Laboratory / Solar Team will assist the PMU to develop bidding documents in strict accordance with MAFF / ADB procurement guidelines. We envision we will require all necessary documents and information in respect of:

- technical requirements and standards
- general and statutory regulations,
- available documents related to the scope and works,

- documents related to commercial issues,
- existing equipment, drawings, routes maps etc.,

1. The following shall also be discussed and agreed with the PBL / PMU at this stage:

- Prequalification requirements for Bidders
- Cost of PBL's maintenance activities which could be reduced by specific requirements that may be setup in the technical specification,
- Other.

Based on the technical standards developed with PBL The CS2 Laboratory / Solar Team will prepare or review existing draft technical specifications to be used as a part of the tender dossier. They will assure that the parameters of the equipment and services laid down in the specifications are technically sound, descriptive and based on international and applicable to PBL's standards and guidelines.

Establishing GMO, plant toxins, bio-fertilizer and organic fertilizer testing capacity and Reporting Standards: Reliable and efficient methods for detecting GMOs will be essential for establishing an effective system for traceability all along the supply chain from seed producers to final consumers. The performance of the methods used in the PBL must be in uniformity with laboratories around the world, in order to obtain reliable and comparable results. This section of the workplan will break down CS2 Laboratory / Solar Team's approach to helping the PBL obtain accreditation of molecular biology methods for GMO detection according to ISO/IEC 17025, and the approach to assisting the laboratory with molecular methods for all laboratory diagnostics where qualitative and quantitative characterization of nucleic acids will be needed.

The non-availability of reference materials for GMO detection is one of the major weaknesses in detecting GMOs, requiring applicants to also provide the reference materials. Accreditation will a suitable mechanism for harmonizing the conditions obtained in the PBL, and will comply with the general requirements of the ISO/IEC 17025 standards. Key considerations on which the CS2 Laboratory / Solar Team will assist the PBL with will include:

Ensure laboratory organization and required environmental conditions are in place: As stated above, one of the major concerns in molecular diagnostic laboratories is that detection procedures are repeatedly performed, which increases the possibility of cross-contamination of samples and of false positive results. Avoidance of contamination will be one of the most critical factors in ensuring the correctness of results and the organization and plan agreed in the strategy will need to strictly implemented.

Establish Testing methods and their validation: IN the fourth quarter of 2021, the CS2 Laboratory / Solar Team will assist the PBL with selection of appropriate methods that have been published either in international, regional or national standards, or by reputable technical organizations, or in relevant scientific texts or journals. This will be done by conducting intra-laboratory validation of each method before the method can be used in routine testing. The CS2 Laboratory / Solar Team will assist the PBL with the following:

- **Validation of methods-** CS2 Laboratory / Solar Team will suggest and assist the PBL with adoption of modular approach to validation, one that allows flexibility and, especially, lower costs of the validation step. For instance, the DNA extraction method, a PCR method targeting the species-specific sequence, and a PCR method for the GM-specific sequence could each be validated independently. The CS2 Laboratory / Solar Team will also provide standards for testing precision of methods by the repetition of the tests by different operators, on different days of measurement and by parallel tests and proficiency testing.

- **Evaluation of uncertainty of measurement-** The CS2 Laboratory / Solar Team will help draft guidelines for reporting of uncertainties associated with quantitative results in accordance with the Guidance to the Expression of Uncertainty in Measurement. They will assist with adaptation of requirements of the accreditation bodies according to the current state of knowledge in the specific testing field. They will assist with guidelines that help the PBL staff control for variables during testing, and to avoid faulty techniques such as inadequate sample homogenization. They will also help develop a control chart based on periodic measurement of a stable, but otherwise typical, test item to identify significant deviations from normal operations.

Calibrate Equipment: The CS2 Laboratory / Solar Team will assist the PBL with calibration and validation of all key equipment and associated software used for GMO detection, like pipettes, PCR apparatus, Real-Time PCR apparatus, etc. They will devise maintenance codes so that equipment is maintained under the same conditions and regime as in an accredited laboratory, and assist in reviewing adequate documentation that certifies correct maintenance of the substitute equipment in the laboratory providing tests. They will also suggest a practicable replacement method in case key equipment malfunctions.

Establish handling tests and calibration items: The CS2 Laboratory / Solar Team will assist the PBL with establishing procedures for transportation, handling, storage, retention and disposal of test items. They will also assist with guidelines to maintain confidentiality clauses with the client regarding results obtained; documentation handling and storage codes will be of utmost importance. The CS2 Laboratory / Solar Team suggests a separate reception room to store all key documentation, and restrictions on access to computer data.

Ensure the credibility of test and calibration results: Reference materials are often one of the great limitations of GMO testing, since certified reference materials (CRMs) for quantitative analysis are available only for the few GMOs placed on the market. The production of CRMs is very complex and must fulfill special requirements. In the absence of CRMs, the CS2 Laboratory / Solar Team suggests usage of material from proficiency tests or seeds provided by the companies producing the GMOs, after signing the agreement contract. Additionally, the CS2 Laboratory / Solar Team will also provide guidelines on usage of proficiency testing samples and other confirmed positive samples as qualitative reference material in routine work.

- **Participation in proficiency testing-** The CS2 Laboratory / Solar Team strongly suggests participation in proficiency testing programs to monitor the validity of analysis and to draw attention to possible incorrectness of tests. They will provide guidelines on analysis of quality check samples as part of the PBL's routine procedures to provide objective standards and permit comparison of their analytical results with those from other laboratories.
- **Setting up the testing plan and data analysis-** The CS2 Laboratory / Solar Team will devise guidelines to ensure that all tests are run in replicates, and statistical analysis applied. Special attention will be given to the calculation of data in quantitative analyses. The guidelines will also incorporate methods of controlling for false negative or positive results. Variability among replicates of the same sample may cause different results under different calculation methods, and thus must be carefully managed.

Establish Procedures for Reporting results: During the fourth quarter of 2021, the CS2 Laboratory / Solar Team will draft and formalize guidelines and necessary documentation templates that ensure that:

- Test reports include information about the sample and methods used for analysis, relevant dates, signatures of people responsible for analyses, etc.
- Test reports include, where applicable, a statement on the evaluated uncertainty of measurement, and reference the method of evaluation of uncertainty.

- Unless sampling uncertainty has been fully taken into account, reports should also make clear that the result and the associated uncertainty applies to the tested sample only and not to any batch from which the sample may have been taken.

Develop tissue culture protocols for banana and cassava: Also, in the fourth quarter of 2021, the CS2 Laboratory / Solar Team will work with GDA to develop cassava tissue culture capability within the PBL. They will develop a tissue culture method to be used by the PBL. The following section describes the necessary material and what tissue culture methods that may be suggested will look like:

- ***Plant Material-*** *Cassava (M. esculenta Crantz).*
- ***Media preparation:*** *Will include instructions on development of the medium and supplementing with nutritive additions.*
- ***Preparation of explants:*** *Will include guidelines about plant collection, and excising of leaves and stems. Cleaning procedures to remove soil debris. Instructions on how to excise axillary buds from nodal sections to be transferred to maintenance medium. Instructions will also be provided on preparation of the maintenance medium vitamins, macro and micronutrients.*
- ***Culturing of the explants:*** *Maintenance of shoots from axillary buds, and removal followed by subculture in fresh maintenance medium. This will provide an aseptic source of material to be cultured continuously.*

The guidelines will provide detailed instructions regarding plant varieties to be used, apparatus specifications, preparation of culture media, and maintenance and subculture of the plant. It will be illustrated with detailed diagrams to aid the learning process. The manual will also help PBL researchers to devise controlled experiments that compare between multiple culture techniques, collection of results, and on data analysis techniques to objectively identify the most optimal culture technique.

Support ISO 17025 accreditation: The CS2 Laboratory / Solar Team will work with the NIS to support ISO accreditation of the PBL on 2022 and 2023 They will assist the PBL with ISO 17025 accreditation of its facilities by providing advice and formulating guidelines regarding:

- **Staff qualifications and experience-** Staff who will release test results should be recruited on the basis of their demonstrated ability to evaluate the validity of test results as well as ability to communicate orally the technical aspects.
- **Accommodation and environmental conditions**
- **Assuring the quality of reagents and consumables-** The CS2 Laboratory / Solar Team will create guidelines regarding quality testing of standard samples and reagents as adequate for the procedure. They will also demonstrate labelling codes and requirements for reagents, and educate the PBL staff on storage and hazard management.
- **Method validation-** Guidelines and protocols will be created to ensure methods are validated / verified for each group of products to establish the method's applicability and limitations. The range of matrices that will require individual validation includes raw and processed materials, as well as on the scope of the method (qualitative or quantitative).
- **Equipment-** In addition to procurement assistance and laying out of specifications, the CS2 Laboratory / Solar Team will provide manuals on proper calibration of equipment, complete with instructions on maintenance frequency, correct control mechanisms, and replacement protocols as required.
- **Handling of test and calibration items-** The CS2 Laboratory / Solar Team's support will include assistance to ensure that adequate measures are in place to prevent cross-contamination during transport, storage, preparation and analysis.

- **Assuring the quality of test and calibration results-** The CS2 Laboratory / Solar Team will develop a quality control program that covers staff proficiency, infrequently performed matrices and performance in external proficiency testing programs, where available, to be followed with appropriate analysis of data and corrective actions. Controls will be devised, for example, to address inhibition, sensitivity and contamination during the GMO test system
- **Reporting of results-** The CS2 Laboratory / Solar Team will provide guidelines on proper reporting arrangements of results, both qualitative and quantitative.

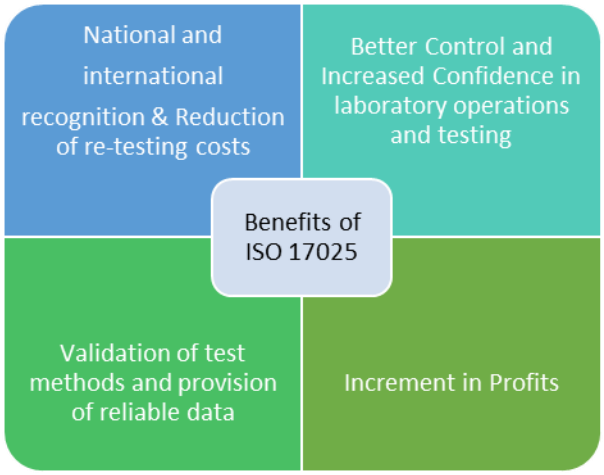
The Process to Achieve ISO 17025 Accreditation: ISO 17025 is the latest version introduced in 2017. It was necessary to come up with a newer version to inject efficiency, transparency and effectiveness in the process of testing and other laboratory requirements. The ISO/IEC 17025 standard consists of general requirements for the competence of testing and calibration laboratories, which facilitates the effectiveness of their laboratory activities. The ISO/IEC 17025 standard helps laboratories to provide reliable data and technically valid results to its customers, so as to be deemed competent. It is important to mention that this standard is also applicable to all organizations performing laboratory activities such as universities, research centers, and others, and can be used by inspection bodies and/or other conformity assessment bodies. It also helps to promote continual improvement of data quality and laboratory effectiveness.

The adoption of the requirements of ISO/IEC 17025, like other conformity assessment standards such as ISO/IEC 17043, ISO/IEC 17020, ISO/IEC 17021-1, ISO/IEC 17065, etc., will not only promote competence but will also reduce undesired impacts and potential failures in the laboratory activities.

The Evolution stages

According to ISO/IEC 17000, accreditation is defined as a "third-party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks." A laboratory aiming to obtain accreditation will need to demonstrate conformity with the requirements of ISO/IEC 17025:2017 as administered by the Accreditation Body. According to ISO, it is estimated that across the world there are approximately 100,000 laboratories that are using the ISO/IEC 17025 standard as the main source for their laboratory accreditation. In addition, the accreditation of a laboratory ensures effective testing, calibration, and measurement of laboratory samples, processes and equipment. It is important to mention that this standard positively impacts the quality of results delivered by laboratories in a number of ways:

- Meeting the requirements for the competence of the personnel;
- Participation of the laboratories in proficiency test schemes;
- The use of certified reference materials with known values traceable to national, regional or international standards;
- The calibration and maintenance of laboratory equipment; and
- The overall processes that laboratories use to generate their data.



8.6.1.1.1 Key points to consider:

- By adopting or implementing the ISO/IEC 17025 standard requirements and achieving accreditation, a laboratory will gain national and international recognition, thereby making it easier for customers to readily identify and select reliable laboratories;
- By choosing an accredited laboratory, clients will experience reduction in the costs of re-testing their products;
- By complying with the requirements of the ISO/IEC 17025 standard, the laboratory will have a better control over its activities;
- When performing testing/calibration services, the laboratory managers/technicians will be able to access better and updated technologies, which will increase the confidence in generating valid results;
- An accredited laboratory will experience an increase in revenues and profits due to the laboratory's proficient capability to provide reliable and technically valid results;
- The laboratory will ensure the validity of standard, non-standard and laboratory developed test methods which impact the provision of reliable data to their clients.

8.6.1.1.2 Integrated Implementation Methodology for Management Systems and Standards – ISO/IEC 17025

The following are recommendations on policies and strategies for developing testing laboratories compliant with ISO 17025:

Legal status/legal entity
The testing laboratory has to be established as an entity that can be held legally responsible for its activities.

Financial policy
Start-up cost includes building, infrastructure development, and procurement of equipment. It is difficult especially in developing countries to cover operating costs from earned income. One of the important tasks will be to develop plans to secure both medium and long-term funding for the testing laboratories. One potential source of funding is from government. A commitment from government especially in developing countries to provide long term financial support is a prerequisite in the effort to building a testing laboratory.

Management structure
A procedure needs to be established to ensure a procedure to ensure that departments of a testing laboratory with conflicting interests do not adversely influence compliance with ISO/IEC 17025. For example, if the finance, administration, quality assurance, information technology, the safety officer, and human resources departments do not report to the laboratory management department.

Personnel
It is essential to recruit staff members who have both theoretical training and adequate practical experience. It may be necessary to deploy staff for an extended period of time in a working

laboratory in order to gain experience and to maintain their necessary skill set. Remuneration of staff is an important financial issue. The testing laboratory should have adequate funds in its budget to ensure that fully trained staff are paid well enough in order to keep them in the organization.

Training system
Training is an important part of the laboratory plan and program. A training program has to be put in place to train new staff and to keep staff up to date with technological change and evolution.

B1.4.1.8: Assist the laboratory commercialization process to achieve partial cost recovery: The CS2 Laboratory / Solar Team will work with GDA to assist PBL to transition to a commercial enterprise.

Development of manuals and business plan CS2 Laboratory / Solar Team will assist the PBL to become a self-sustaining enterprise that strives to create value for partner laboratories and farmers who would profit from its offerings and research. The CS2 Laboratory / Solar Team will help in the following aspects:

- **Partnership creation with other laboratories**: The CS2 Laboratory / Solar Team will help the PBL establish strategic partnerships with laboratories across Cambodia and overseas. These will aid information and knowledge dissemination between all entities involved.
- **Establishment of a functional value chain**: For the PBL to transition to a commercial enterprise, it will need to be fed and in turn supply a robust value chain. The CS2 Laboratory / Solar Team's experts will provide assistance with optimization of the PBL's value chain, by identifying and helping establish strong backward and forward linkages.
- **Product creation and marketing**: The CS2 Laboratory / Solar Team will help the PBL package its products and services into quantized market offerings by using insights garnered from a comprehensive market assessment of Cambodia. They will also provide marketing assistance by helping the PBL craft effective strategies and content to communicate its products and services.
- **Operational and administrative assistance**: As already laid out in previous sections, The CS2 Laboratory / Solar Team will help create technical manuals to ensure conformation to ISO 17025 standards. In addition, they will provide assistance with creating administrative manuals to ensure smooth operation of the facility.

Capacity building of PBL staff: The CS2 Laboratory / Solar Team will conduct a comprehensive training needs assessment early in 2022, and provide specific training to PBL staff on technical aspects including GMO and phytotoxins analysis, Cassava tissue culture, and bio-fertilizer testing during 2022 and 2023. The CS2 Laboratory / Solar Team's training modules will place utmost importance on educating staff about relevant ISO standardized techniques and conformance criteria.

8.7 Installation of Green Energy Provision

8.7.1 Bio digesters

8.7.1.1 Procurement

The GDAHP / PMU will have access to a program support budget of up to $3.36 million to support the implementation of the biodigester program and achievement of the disbursement targets. This is not included in the procurement plan in the PAM. Actual procurement packages for design and installation / construction of biodigesters and compost huts will be managed by the PMU. The procurement plan in the PAM envisaged 16 procurement packages. The support budget includes all training, marketing and monitoring and this is not therefore included in the procurement packages

NBP is the only provider in Cambodia currently implementing the farmer's friend biodigester design. The NBP works through local masons who are normally contracted to construct or install a small number of biodigesters. Many masons trained by NBP have left to join the construction industry because work is more consistent and often better paid. NBP may have to train new masons and such training is included in the support budget. Unless additional budget is included in the procurement packages for training and marketing it is unlikely that any private providers can implement the farmer's friend biodigester model. It is likely that a number of sole provider packages will need to be let to NBP to ensure continued implementation of the farmer's friend, which is recognized as a technically sound biodigester.

There are two private companies providing alternative models but they have installed less than 2,000 biodigesters nationwide. In order to ensure diverse provision of biodigesters and future expansion of the biodigester market it is suggested that a number of the packages are let under NCB conditions. It is suggested that NBP remains in charge of providing post-purchase subsidies through the ACLEDA bank for all packages and this would require NBP checking the quality of all installations. It would, however, complicate the design and budget for each of the packages, see below.

As mentioned above, in section 4.5, there is a major gap between estimated and actual demand. In order to fulfil the targets envisaged in the DMF, a marketing study will need to be undertaken in the second and third quarters of 2020, followed by a major marketing campaign in 2021. It would be advantageous to involve all players in the biodigester market in the marketing campaign and this would suggest that some of the supporting budget is allocated for marketing and training through the private companies.

A further complication is that of the total budget of $9.28 million for biodigesters and compost huts (the part of the budget in the PAM procurement plan), $2.85 million comes from the green climate fund (GCF) grant, $2.76 million from the government, and $3.66 from beneficiaries. $1.2 million of the budget is for compost huts. Each biodigester is budgeted at $667 and farmers are expected to pay up front unless they can obtain credit or buy on the pay as you go scheme devised by one of the private companies. It is not clear how beneficiary contribution, with farmers paying up front, can be included in procurement packages.

It is clear that the GCF grant is designed to cover the subsidies and it seems the most appropriate that this is managed through the NBP scheme with ACLEDA bank rather than have a separate subsidy scheme attached to each of 16 procurement packages. It is not clear what the government contribution, of $2.76 million, will cover? The PAM does not specify if this is further subsidy or meant to cover time of government staff? It is not clear if the government contribution will be in kind or in cash?

8.7.1.2 Implementation

The CS2 Laboratory / Solar Team's experts will thoroughly assess and analyze the bio digester standards partially developed under TA-7833 Capacity Building for Efficient Utilization of

Biomass for Bioenergy & Food Security of the Greater Mekong Sub-region. Numerous parameters are involved to ensure quality standards for the installation of farmer's friend model of bio digester and perhaps other models proposed by the private sector. The Team will take each major parameter into account to prepare a briefing paper on the status of the standard. The first draft of the briefing paper have been prepared and the paper will be submitted in January 2020. The final draft, which will also cover proposed standards for bio-slurry, is expected in early 2021.

Setting-up technical committees and working groups

To achieve the paper on technical standards, the CS2 Laboratory / Solar Team, will provide support to PMU and the General Directorate of Animal Health and Production (GDAHP) to set-up technical committees and working groups on biogas standards development and next steps. These technical committees and working groups need to be established in the first or second quarter of 2020. Technical Committees (TCs) and Working Groups (WGs) will allow policy makers, farmers, and community members, to get actively involved in developing a required standard for biodigester construction and maintenance and for bio-slurry.

The CS2 Laboratory / Solar Team propose a composition of technical committees made up of end line product users, policy makers and those with a general interest in the standard being developed. They will consider the following area to form the TCs and WGs. With respect to TCs:

- The TC is the group of experts responsible for managing revisions to, or the development of, bio-digester standards
- Made up of a particular number, maximum of 16 people, from diverse backgrounds
- When the TC is required to work on a specific topic or standard for which it does not have adequate representation or expertise, a WG is established
- Advise and reach consensus on the topics for inclusion and the content of the standards through a series of meetings
- Oversee the development of standards
- Monitor, identify and provide strategic guidance on standards development

With respect to WGs:

- Members are existing TC members or subject matter experts that have been brought in for the duration of the biodigester work;
- Advise and reach consensus on the topics for inclusion and the content of the standards through a series of meetings;
- Ensure that all voices relevant to the standard are heard;
- Endeavor to include geographic representation whenever possible to ensure the expansion of biogas in rural areas of Cambodia.

The CS2 Laboratory / Solar Team will make recommendations for implementation arrangements for the actual biodigester program in the first and second quarters of 2021, once procurement details are agreed, and the final draft bio-digester and bio-slurry standards will be completed in the first or second quarters of 2021. The Team will analyze the different phases of implementation - conditions for implementation, reporting, construction, bio-slurry management, and monitoring and evaluation and will provide recommendations on important areas of development needed to accelerate national implementation and eventually to mainstream biodigester technology and usage.

8.7.2 Compost Huts

The economic cost-benefit analysis and technical justification for compost huts in cases where liquid slurry is not directly applied to crops will be further studied during the marketing study mentioned above, and it is expected that a range of options will be made available to farmers, depending on the farm situation on a case by case basis.

8.7.3 Solar Energy

Drip Irrigation Pumping Systems

Solar Pumping System Design: The CS2 Laboratory / Solar Team will design and support the establishment of solar pumping for the drip irrigation systems. They are expected to specify solar pumps in February / March 2020 in parallel to the drip irrigation systems design. There will be two types of solar pumping system based on the water source i) surface pump for pond water ii) submersible pump for tube-well water. The Team will need field data and will prepare a list of required information. The Project Implementation Consultant (PIC) / Project Management Unit (PMU) will be able to prepare procurement documents in March or April 2020 for complete equipment and installation packages. The CS2 Laboratory / Solar Team will recommend a long list of tenderers who can provide guarantees and maintenance. The systems should be procured in one package with a five-year guarantee and a five-year maintenance contract.

Procurement of Equipment: Tenders can be launched in April or May 2020 and evaluated by the PMU with support from the PIC consultants. The CS2 Laboratory / Solar Team will prepare evaluation criteria.

Equipment Installation: It is expected that equipment can be installed in October 2020, at the start of the dry season, and that the installation companies will train farmers to operate the solar pumping systems and to undertake basic maintenance. Implementation monitoring and monitoring of maintenance will be undertaken by the PPIUs. The CS2 Laboratory / Solar Team will provide training to the PPIU staff on monitoring procedures. Monitoring will be supported by CS2, divided between the CS2 Laboratory / Solar Team and the CS2 Capacity Building Team.

Training and Establishment of Producer's Association: Training will be implemented on the field sites selected and will commence as soon as equipment is installed in the fourth quarter of 2020. Details of the training approach and content are shown under section 9.2. It is hoped that through farmer and trader meetings at the demonstrations and field days, a producers' association can be created. This process will be supported by the National Public Private Partnership Specialist (NPP) at the provincial crop forums (see activity 3.2).

Solar Roof Units for Cooperative Storage, Cleaning and Drying Units

The CS2 role at this stage will be to support GDA with solar roof units to provide power involving the CS2 Laboratory / Solar Team. The budget allows for 80 solar photo-voltaic (PV) roof units including a 2.5 kilo-watt (kW) array and 12 kW hour batteries and inverter, each unit budgeted at $7,000.

Assess installation sites: Once the cooperative sites have been selected, the Team will consult with the CS1 team leader and the National Cooperative Storage & Rural Roads Engineer Specialists to assess installation sites (on the basis of field data provided by CS1) and identify appropriate solar PV roof units. This is currently anticipated for the third quarter of 2020.

Specify Solar PV roof units and recommend suppliers: The Team will specify the solar PV roof units and recommend suppliers so that the PMU procurement staff to prepare a tender which should include installation, a five-year guarantee plus a five-year maintenance contract. The PMU will prepare tender documents and evaluate tenders in the fourth quarter of 2020. The Team will prepare evaluation criteria. It is expected that storage, cleaning and drying units will be tendered in three batches, in 2020, 2021 and 2022. The solar PV units will also therefore be tendered in three batches.

Post installation monitoring: After installation the CS2 Laboratory / Solar Team will assist the PPIUs to ensure the 5-year maintenance contracts are being implemented. The Team will provide training for PPIU staff in monitoring procedures.

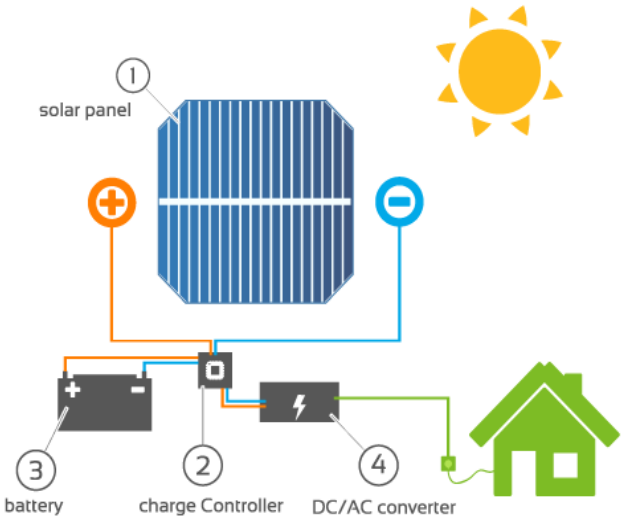
Support to 10 Agribusinesses on Energy Cost Reduction

Selection of Ten Agribusinesses: The CS2 Laboratory / Solar Team will conduct a technical, economic, social and environmental assessment to ensure the general feasibility of photo voltaic during the first and second quarters of 2020. This will identify the potential level of energy cost reduction among agribusinesses in the value chain.

Recommendation for photo voltaic installation companies: The Team will assess technical and financial aspects such as cost and installation/maintenance facility of the existing solar companies/service providers operating in Cambodia to select the most suitable companies. Willingness to provide service in rural areas will be taken in to account.

Selection of Ten or More Agribusinesses: Building on the Gender Assessment of Value Chins undertaken by CS1 (which should be completed by month nine of 2020), the Team will then assess at least ten specific agribusinesses to identify those that will be sustainable and viable if they adopt photo voltaic to reduce energy cost. The following criteria are vital in the selection of potential agribusinesses:

Area/location: Location is important in terms of solar PV installation and maintenance. Adequate sun light is required for cost effective power generation through solar PV. Geographic placement of selected agribusiness areas will be analyzed to ensure sufficient sun light.



Accessibility: Access to technological services for maintenance is another important condition for selecting potential agribusinesses. Infrastructure developed in rural areas requires that transport of solar equipment is feasible to ensure on time installation and maintenance

Affordability: Each agribusiness should be financially solvent to afford solar PV system as it incurs one-off costs for both equipment and maintenance.

Energy Consumption: An energy consumption assessment will be conducted to determine the peak load of the selected agribusinesses. Inclusion of solar PV for businesses with a high-power consumption cycle will ensure large scale energy saving.

Specify Appropriate Solar PV Systems: For each agribusiness, a site survey will be conducted to determine the locations on the site best suited for rooftop or separate arrays of solar PV. To verify initial estimations made from aerial images, the CS2 Laboratory / Solar Team will conduct field visits. They will confirm the roof type and structure, as well as confirming roof obstructions and examine potential for solar arrays on sites near to buildings. These visits will also aid in the recommendation of specific PV systems for each roof / external array in rural areas. Such studies will determine the loads that each roof can safely handle before installation or determine the size of external solar arrays.

Thin film/amorphous	**Fixed 0° tilt**	**Fixed 18° tilt**	**Single-Axis**
PV array power (kWp/100ft^2)	0.666	0.592	x
PV array area (ft^2)	100	100	x
Annual kWh/100 ft^2	1158.3	1120.8	x
Peak kWp/ft^2	0.00666	0.00592	x
kWh/ft^2	11.583	11.208	x
Poly-crystalline	**Fixed 0° tilt**	**Fixed 18° tilt**	**Single-Axis**
PV array power (kWp/100ft^2)	1.008	0.896	0.896
PV array area (ft^2)	100	100	100
Annual kWh/100ft^2	1647.9	1591.2	2109.6
Peak kWp/ft^2	0.01008	0.00896	0.00896
kWh/ft^2	16.479	15.912	21.096
Mono-crystalline	**Fixed 0° tilt**	**Fixed 18° tilt**	**Single-Axis**
PV array power (kWp/100ft^2)	1.332	1.184	1.184
PV array area (ft^2)	100	100	100
Annual kWh/100ft^2	2178	2102.4	2788
Peak kWp/ft^2	0.01332	0.01184	0.01184
kWh/ft^2.	21.78	21.024	27.88

System performance/Energy saving: Based on the total area available for PV on each agribusiness roof / separate array derived from calculations using Google earth and AutoCAD, the CS2 Laboratory / Solar Team will estimate the total power production capacity of the roofs of all the buildings or separate arrays rated 4 and 5 for up to eight different combinations of PV systems. They will evaluate the energy production and savings, life-cycle costs, emission reductions and financial viability for various types of these renewable energy technologies. Based on the required peak wattage and annual kWh production for a 100 ft^2 area for three different PV types (thin film/amorphous silicon with 8% efficiency; poly-crystalline silicon with 12% efficiency; and mono-crystalline silicon with 16% efficiency for three different mounting systems; a horizontal laminate system, a ballasted system with 18˚ tilt and a one way tracking system) will be calculated.

Economic Analysis: The CS2 Laboratory / Solar Team will conduct an economic assessment of each solar PV installation in the fourth quarter of 2020. Costs will be identified based on the following study areas:

- Total Cost of Solar PV panels
- Total cost of phase Inverters
- Net cost of whole set-up
- Auxiliary and misc. cost
- Total System cost

Support for Feasibility Studies / Green Finance: Once the CS2 Laboratory / Solar Team have confirmed that partial or complete energy provision through solar energy is appropriate to a specific agribusiness and the agribusiness has confirmed interest in investment, the specialists will work with the CS2 Policy Team to link the agribusiness to companies that can undertake a full feasibility study as required by green financing companies identified under the Project during 2021. The Team will ensure that any feasibility studies undertaken are closely linked with the PIC to ensure environmental and social safeguards.

9 WORKPLAN Implementation Status OUTPUT 2: Climate Smart Agriculture and Agribusiness Promoted

9.1 Activity 2.1 Deploying climate-resilient varieties.

9.1.1 DMF Target: 2a. Three additional climate resilient varieties of rice and maize released

9.1.1.1 Partial Commercialization of CARDI

Under the CS2 package, technical assistance (TA) will be provided to CARDI to develop a commercialization program with recommendations on the legal framework to develop intellectual property rights and partial cost recovery for the institution. The expected results will be: (i) at least two climate resilient rice varieties released for commercial production and one climate resilient glutinous maize variety released for commercial production; and (ii) CARDI would be able to achieve partial cost recovery in variety development and foundation seed supply with the corresponding legal framework in place.

9.1.1.2 Develop Action Plan

The CS2 Capacity Building Team will review the existing legal framework relating to seed production, distribution and marketing for rice and other crops such as maize in the second quarter of 2020. They will pay particular attention to the work being undertaken on the seed industry legal framework by the ADB Loan Project: Rice Commercialization Project and will develop synergies with other donor partner projects that have or are assisting government departments or agencies to become special operating agencies or moving towards partial cost recovery and assess lessons learned in the policy development process. This will include the CS2 Laboratory / Solar Team working with the PBL. Then, working with the CARDI director and staff members and the PMU, the Team will develop an action plan with the outcome of developing a commercialization strategy and plan for the Institute. This process can start before the IRRI team has mobilized although liaison with the IRRI team will provide excellent support to identifying steps required for CARDI to achieve commercialization and appropriate varieties for commercial release. The action plan should be completed by the end of the second quarter of 2020.

9.1.1.3 Develop a Training Program and Workshops

The CS2 Capacity Building Team will develop and deliver a training program and workshops on the seed industry, institutional commercialization and intellectual property and breeder's rights for key CARDI staff. The training program will be developed during the second quarter of 2020. Experience of initiating institutional change indicates that all staff involved in the change process need to be aware of what is happening and be given opportunities to express their opinion. The training program will therefore be very inter-reactive and will be delivered during the fourth quarter of 20202 and the first quarter of 2021. It is also crucial that the institutional leadership supports the direction of change and feels in control of the change process. The CARDI management team will be consulted at each step of the process. It is expected that 20 to 30 CARDI staff will receive training over a two-week period with classroom modules and interactive workshops.

9.1.1.4 Procurement of Equipment, Studies and TA

The CS2 Capacity Building Team will work with CARDI and the PMU, on any procurement items that may be needed to fulfil the tasks identified during the fourth quarter of 20202 and the first quarter of 2021. The procurement, including subcontracting service providers, will be in accordance with the Government of Cambodia and ADB Guidelines on Procurement. The Team will monitor the procurement program in accordance with the agreement between ADB, Ministry of Finance (MEF) and the executing agency (EA). The total budget for supporting the CARDI partial commercialization process is $165,000.

Enter commercial contracts: Ultimately the final decisions to (i) release at least two climate resilient rice varieties and one climate resilient glutinous maize variety for commercial production; and (ii) enter into partnerships with the private sector in variety development and foundation seed supply with private sector partners lie with the Government of Cambodia. The CS2 Capacity Building Team will assist CARDI to develop a commercialization strategy and legal framework during the fourth quarter of 20202 and the first quarter of 2021, but cannot make the final decision to enter into contracts. The Team recommends that contracts are made with established commercial players who can rapidly achieve the objective of a national seed distribution network to provide timely seed to Cambodian farmers and who have the commercial clout to support a substantial advertising campaign[19]. The CS2 Capacity Building Team will prepare draft contracts and recommend potential private sector partners.

9.1.1.5 Procurement of CS3

The project will support the Cambodian Agricultural Research and Development Institute (CARDI) to trial and release climate resilient rice and maize varieties including seed production and multiplication, in cooperation with the International Rice Research Institute (IRRI). IRRI will be contracted directly through sole selection. The ToR for the RFP are in the process of being amended to incorporate IRRI's agreement to coordinate with CIAT, CIMMYT and CARDI to ensure that Cambodia has climate resilient maize, Cassava and mango varieties available for early distribution to farmers. It is intended to release the RFP in January 2020.

9.2 Activity 2.2 Strengthening capacity in climate friendly production practices and technologies

9.2.1 DMF Target 2b: 40,000 farmers (of whom 16,000 are women) trained in CSA and agribusiness development skills, of which 50% are SRP compliant with direct links to millers and exporters:

9.2.1.1 Capacity Building

Strengthening capacity in climate friendly production practices and technologies: Utilizing some of the infrastructure developed under output 1, the CS2 Capacity Building Team will support GDA to strengthen capacity of farmers, cooperatives and agribusinesses on CSA and climate friendly practices. The Project will support the deployment of a farmer-oriented training program on CSA, reaching at least 40,000 farmers (16,000 women), focusing on the rice, cassava, maize and mango value chains. The CS2 Capacity Building Team will assist GDA to train youth, landless and women. The majority of trainees will consist of members of the 80 agricultural cooperatives

[19] Pacific Seed, East-West Seed, CP Group (maize), Know You seed, Cia Thai Seed.

(some 12,000 households) and households in the 27 irrigation schemes to be rehabilitated. Farmers, FWUGs, agricultural cooperative boards and their members, and government officials from the Provincial Departments of Agriculture, Forestry and Fisheries (PDAFFs) delivering both formal training and on-farm demonstrations on the following topics;

(i) CSA practices, including laser land levelling, alternate wetting and drying, sustainable agricultural waste management, rational use of inputs (water, energy, fertilizers, and pesticides), agro-forestry and soil cover maintenance techniques, anti-erosive landscaping, and other practices leading to reduction of greenhouse gas (GHG) emissions;
(ii) Standards compliance such as Cambodia Good Agricultural Practice (CAMGAP) and sustainable rice platform (SRP). The Project will prepare training manuals and materials for SRP standards for sustainable rice cultivation, for CSA, and for CAMGAP for tropical fruit;
(iii) Agricultural cooperative management and business development plans including bookkeeping, accounting and the importance of access to crop value chains and marketing;
(iv) Management and operation of provincial agricultural development centers (PADCs) and mechanization workshops for government staff (see Activity 9.3);
(v) Management, operation and maintenance (O&M) of irrigation infrastructure, drying and storage units for maize, rice and cassava as well as all other infrastructure;

9.2.1.2 Approach to Capacity Building

Gender responsive capacity-building will aim to ensure agricultural practices are in line with the global best practices and climate resilient standards. Building capacity is important in such activities as CSA, and standards compliance for CAMGAP and SRP, all of which are required for farmers entering a quality assured value chain, depending on the crop and the level of assurance required. More and more traders and processors are insisting on such assurance; particularly in more mature export markets of European Union, United States of America, Japan, Korea and even China. The CS2 Capacity Building Team will assist GDA to develop a gender responsive capacity-building program for the entire duration of the Project during the second and third quarters of 2021. For details reference is made to Annex 15.

9.2.1.3 Incentive Structure

There is considerable international experience that demonstrates that farmers do not adopt practices in which they receive training unless the market gives clear price signals and changes to their traditional agricultural practice will enhance livelihood strategies. At this time in Cambodia, it is not clear that price premiums are widely available for produce grown under CAMGAP, SRP or CSA standard regimes. Many farm households adopt livelihood strategies in which farming income is only one part of the revenue stream. Farming techniques that require additional labor strategies may withdraw labor from off-farm earning activities and result in a diminished overall household livelihood. At this time a few farm cooperatives are contracted to produce organic rice and receive price premiums for doing so, and a limited number of vegetable producers are able to obtain quality premiums for certified organic vegetable production. Otherwise there appear to be no national or Association of Southeast Asian Nations (ASEAN) standards and no market structures that pay a price premium for delivery to such standards.

9.2.1.4 Carbon Trading Pilot

The CS2 Capacity Building Team suggest that MAFF review a possible pilot introduction of carbon trading under CFAVC for up to eight CSA practices where carbon improvement can be measured. It will be premature to establish a legislative framework that would enable cooperatives to adopt a ten-year management plan and draw on the international carbon credits

scheme as operated for the REDD+[20] scheme in Cambodia. Such a scheme would also require developing institutions that could monitor implementation of a carbon credits scheme and undertake soil analysis and audit compliance with, for example, tree planting schemes or bio-slurry compost application. In addition, such schemes can only be implemented on large farms or in organizational structures that combine a sufficient number of farmers who are willing to initiate a management plan on a collective basis. The process of developing a management plan and undertaking regular farm audits is too expensive for individual small farms. CFAVC could develop up to eight CSA standards and work with selected cooperatives under the training program already envisaged under CFAVC to train farmers in the practices required, establish a management plan and monitor compliance on an annual basis. Estimates of carbon sequestration could be made and a payment system developed on the basis of international carbon trading practice. It is suggested that an initial feasibility study of such a scheme could be undertaken in the second and third quarters of 2021 as it might offer a way to offer farmers an incentive structure that would encourage adoption of CSA, SRP or CAMGAP practices.

9.2.1.5 Legal and Policy Instruments

Institutional and regional legal policy instruments are vital to the development and incorporation of CSA practices nationwide which often do not possess sufficient financial means or appropriately qualified staff to establish national focal points. A regional approach can help in overcoming these constraints. For that purpose, the CS2 Policy Team will review progress in development of such standards across the region during the second and third quarters of 2021 and will remain in close coordination in order to properly train and develop capacity of the MAFF and the GDA counterpart staff.

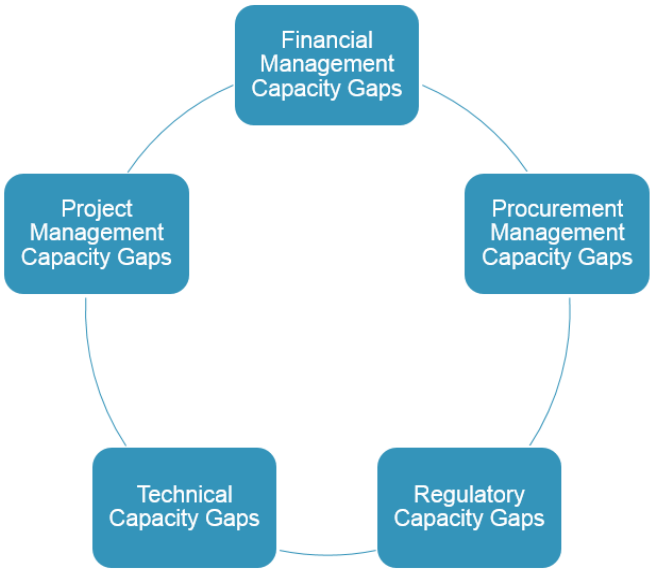


Figure 12: Integrated Capacity Gaps Assessment

Develop Capacity Building Plan and Training Curriculum: The CS2 Capacity Building Team will work with GDA to develop a Capacity Development Plan which will incorporate approaches to meet capacity gaps identified by the respective domain specialists.

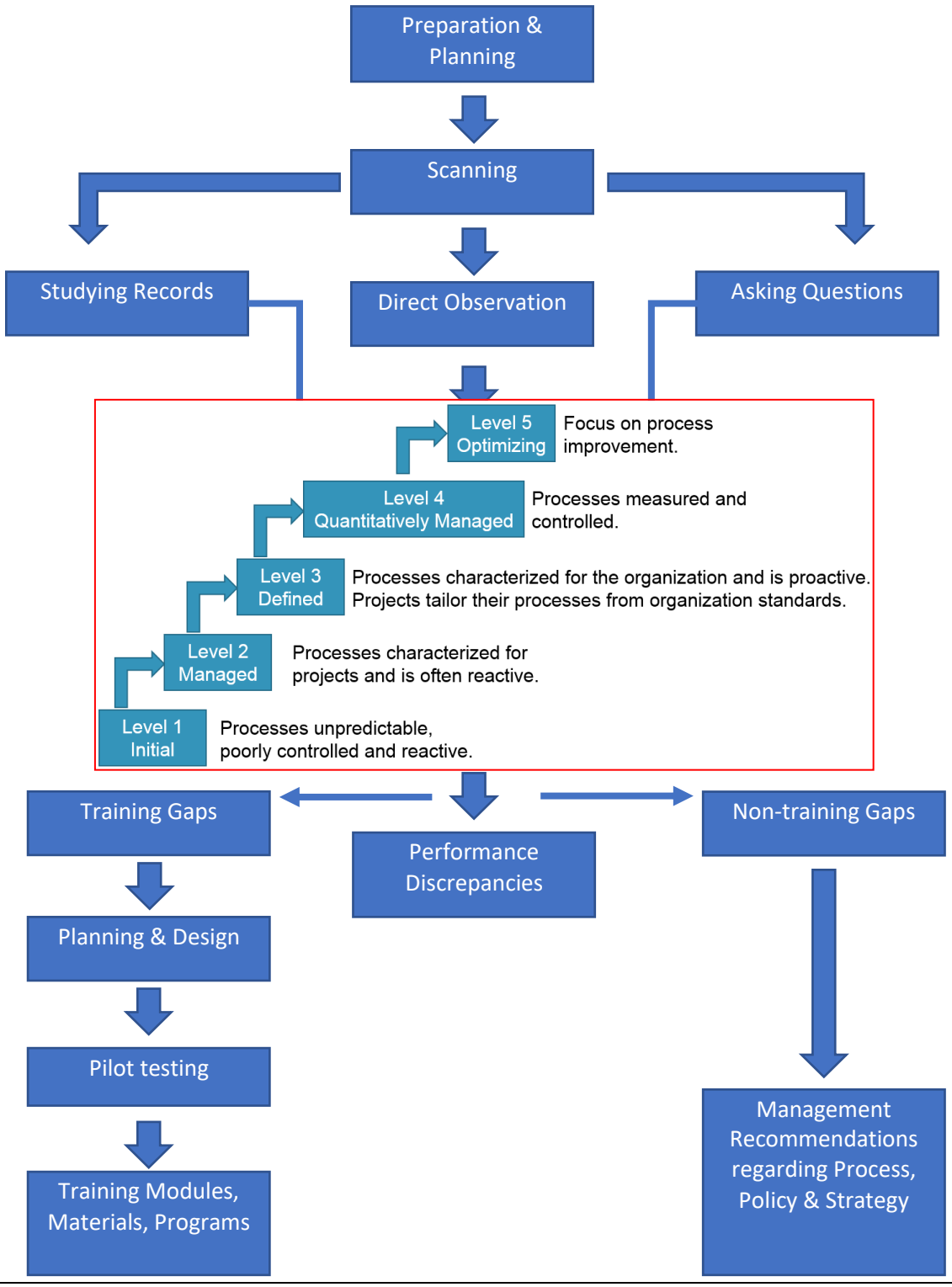
The identified capacity gaps will be assessed and classified into:

[20] Reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries

- Non-training Gaps (Strategy, policy or process level, resolvable through management actions).
- Training Gaps (Human level, resolvable through appropriate training and capacity building).

The capacity building plan will include curriculum development for all planned training activities and identification and training of trainers and training providers, as well as procurement of training providers. Where possible, the Capacity Building team will adapt existing training curricula.

Figure 13: Flow chart depicting capacity gap identification and classification process



Deliver training in CSA practices: The CS2 Capacity Building Team understand both good agricultural practice (GAP) and CSA as a flexible and adaptable framework. CSA and GAP are not a series of top-down good-ideal practices to be demonstrated and followed as a formula by the farmers and communities.

CSA as understood by the CS2 Capacity Building Team is a far more wide-reaching change in system than just modifying high-input, often monoculture based, farming systems by using innovation and smarter use of climate resistant seeds, fertilizers, chemicals and machines. It is driven by what the Food and Agriculture Organisation (FAO) calls the landscape / living soils approach whereby more diversified and mixed cropping systems are developed and the surrounding landscape is protected and also part of the livelihood system enhanced.

The landscape / living soils approach requires trainers to prioritize field observations with farmers, field observation of existing practices and developing Community Integrated farming systems.

The prioritization of field observations requires training techniques based on farmer field schools.

*The **Farmer Field School** (FFS) is a group-based learning process, which started in Indonesia where it was developed as a major tool contributing to the promotion of Integrated Pest Management (IPM). The FFS model aims to help farmers to discover and learn about field ecology and integrated crop management. On the basis of this knowledge, farmers become independent, confident decision makers and experts in their own fields (Fliert and Vande-Fliert 1993). The 'training' is 'hands-on' and is carried out mostly entirely in the field following four major principles: i) grow a healthy crop; ii) observe field weekly; iii) conserve natural enemies of crop pests; and iv) understand ecology and become experts in their won fields. A corner-stone to the IPM/FFS method is Agro-Ecosystem Analysis (AESA), involving regular(weekly) field observation of crop and overall setting (climate, soil, …), noting and confronting these observations and reaching decisions on what to do in the near future; and close monitor as a team results and impacts of these decisions. This encourages farmers to conduct their own experiments and to test ecological crop management methods. At the end of the season, real crop budgets are calculated using the farmers own costs and yields, relating the experiments to the various derived margins.*

Adapted from Mubashir Habib & Al,
NWFP agricultural university, Peshawar, Pakistan
African Crop Science Conference; Proc. Vol 8, 1443-1146

The Climate-Smart Agriculture (CSA) overall framework aims at adapting agriculture to climate change and lower emission intensities; thus, addressing the present depletion of the natural resource base, agriculture relies on, and avoiding any further depletion.
The CSA framework is geared towards preserving the vital ecosystem services requiring agricultural production systems to use inputs more efficiently, to have less variability and greater stability in their outputs, and to be more resilient to risks, shocks and long-term climate variability. This requires a major shift in the way land, water, soil nutrients and genetic resources are managed. It also takes into consideration the social, economic, and environmental context where it will be applied.
A key component is the integrated landscape approach that follows the principles of ecosystem management and sustainable land and water use. CSA aims also at reducing greenhouse gas emissions per unit of land and/or agricultural product and increasing carbon sinks in order to contribute significantly to the mitigation of climate change.

Adapted from FAO CSA Sourcebook - introduction

Training in CSA practices, including laser land levelling, alternate wetting and drying, sustainable agricultural waste management, rational use of inputs (water, energy, fertilizers, and pesticides), agro-forestry and soil cover maintenance techniques, anti-erosive landscaping, and other practices leading to reduction of GHG emissions will be delivered by staff of the provincial agricultural development centres, with training-of-trainers delivered by the CS2 Capacity Building Team.. The Team will work with the PPIUs to establish farmer demonstration sites on cooperatives selected by CS1, including 4,000 ha of laser levelling. Farmers and officials will be trained on farmer fields with short classroom-based training courses on delivering a quality: assured value chain. Other members of the Capacity Building Team will contribute as required. Training will be delivered to

- 16 certified trainers on CSA from the General Directorate of Agriculture Department of Industrial Crops and Extension; (IGAP, NGAP, NTC, NFD)
- 40,000 farmers (at least 16,000 women) trained in CSA with productivity increases of at least 15%; (IGAP, NGAP, NTC, NFD)

The CS2 Capacity Building Team is currently working with GDA to develop draft training plan and schedule and agree what the project will define as CSA training – including training provided to maize and cassava farmers and perhaps mango farmers?

Deliver training in Standards compliance: Training in Standards compliance such as CAMGAP and SRP is expected to be delivered by GDA and PADC staff with support from the CS2 Capacity Building Team. External training suppliers will be procured where needed. The CS2 Capacity Building Team will work with GDA to prepare training manuals and materials for SRP standards for sustainable rice cultivation, for CSA, and for CAMGAP for tropical fruit during the second and third quarters of 2021. Farmers and officials will be trained on farmer fields with short classroom-based training courses on delivering a quality assured value chain. Training will be delivered to:

- 20,000 farmers (at least 8,000 women) trained and compliant with SRP, which leads to direct paddy marketing links with SRP affiliated millers and traders;
- 500 farmers (at least 200 women) trained and compliant with CAMGAP in tropical fruit;
- 50 provincial input (agrochemical, fertilizer, etc.) suppliers have received training in CSA and capable to pass on that training to farmers;

SRP is not yet commercially recognized – therefore no price premiums are available to farmers who adopt SRP, and there is no certification process yet. Discussions have been held with the Rice Federation and GDA and it is suggested that training is divided between SRP and CAMGAP. Amru Rice, IFC, CAVAC are currently training 2,000 farmers in Cambodia in SRP but this is on AMRU Rice's own risk because of the lack of commercial recognition. It will be difficult to get other millers or exporters to take such commercial risks. The DMF says "40,000 farmers (of whom 16,000 are women) trained in CSA and agribusiness development skills, of which 50% are SRP compliant with direct links to millers and exporters". It is very unlikely that the project can link 20,000 SRP compliant farmers to exporters because there is no certification process and there will be no price premiums and GDA are suggesting limiting training in SRP to perhaps 5,000 farmers. Training will be delivered in three tranches, starting in 2021 after identification of cooperatives that meet criteria in the PAM and construction of storage, cleaning and drying equipment and after construction of irrigation schemes. The first batch of training is expected to start in the first quarter of 2021. Training for mango farmers will follow CAMGAP for mangos and will start in the fourth quarter of 2020.

Deliver training in Agricultural cooperative management: Training in Agricultural cooperative management and business development plans including bookkeeping, accounting and the importance of access to crop value chains and marketing will be delivered by GDA supported by the CS2 Capacity Building Team. The capacity building program for agricultural cooperatives will

include training in accounting, agribusiness, cooperative management, operation and maintenance of storage units. The Team will ensure that there is (i) good training needs assessment and coordination; (ii) curriculum and course development; and (iii) cooperative management and agribusiness and business development support, training will include not only agricultural cooperative members but also government officials that are involved in agricultural cooperative development.

The Capacity Building Team will assist GDA to prepare training manuals and materials to provide comprehensive training for 150 agricultural cooperative management and board members so that they can fulfil their management and accounting obligations as specified within the law of agricultural cooperatives and they will support the development of business plans so that 50 cooperatives will successfully enter into a profitable agribusiness venture (this does not include establishing a saving and loan scheme) and where possible be linked to green finance opportunities. Training needs assessment and preparation of training manuals and materials will be undertaken in the second and third quarters of 2020 and training will start, using PADC and GDA staff, supplemented by private training suppliers where necessary in the first quarter or second quarter of 2021.

To deliver the capacity building program in relation to standards, cooperatives and both on-farm training and demonstrations as well as formal training at the PADCs and mechanization workshops, the CS2 Capacity Building Team will support GDA to manage and liaise with private sector subcontracted trainers.

9.2.2 DMF Target 2c: 27 FWUCs/FWUGs made operational and 500 FWUC/FWUG members (of which 30% women) developed capacity to operate and maintain their irrigation schemes.

The activity of optimizing the FWUCS will be contracted to special service providers. It is planned that the activity of FWUCs and FWUGs formation and training will be contracted out in 3 contracts for all schemes for which construction will start in years 2020, 2021 and 2022 as shown in Table 33. These contracts will cover a period of 18 months to cover both the construction period and the following maintenance/liability period and have an on-the-Job training approach.

Table 34: Irrigation FWUC Training packaging

Province	2020 Contract (High Priority Nominated Schemes)		2021 Contract (Medium Priority Nominated + Additional schemes)		2022 Contract (Medium Priority + Additional Schemes)	
	Schemes	ha	Schemes	Ha	Schemes	HA
Kampot	3	1,350				
Takeo	2	750				
Tboung Knom	3	995				
Kampong Cham	2	1,100				
TOTAL	10	4,050		5,500	$ 90,904	5,500

The contracts should be let as soon as feasibility studies are completed so that FWUCs / FWUGs can become involved in the construction (preferably with some involvement in un-skilled

construction to engender a sense of ownership) and that a training methodology is developed with substantial field-based training (not just classroom lectures). The CS2 Capacity Building Team will examine MOWRAM training manuals and supplement these with training manuals from Indonesia or elsewhere in ASEAN and will review with MOWRAM whether training will be delivered by MOWRAM trainers or contracted out to private sector training organizations.

Additional specific training in management and O&M of irrigation infrastructure, will be delivered by CS1 and CS2 Capacity Building Teams. The result of the training will be that at least 27 FWUCs or FWUGs and at least 500 FWUC or FWUG members will have the capability to operate and manage their irrigation schemes after training.

Provided FWUGs and FWUCs are established as soon as FS are completed the FWUC / FWUG training program will be able to commence for each batch of irrigation schemes soon after the FS for each batch are completed. This will mean that training will start in 2020 for the first batch of perhaps nine irrigation schemes (category C) and in 2021 and 2022 for the remaining schemes. Training will for FWUGs and FWUCs on each irrigation scheme will be undertaken over two seasons. DMF target: 500 FWUC/FWUG members (of which 30% women) developed capacity to operate and maintain their irrigation schemes (2017 baseline: 0).

9.3 Activity 2.3 Promoting farm mechanization and extension

9.3.1 DMF Target 2d: 4 provincial agricultural development centers and 4 engineering workshops made fully operational to provide agribusiness services and strengthen farmer value chain linkages

The following steps will be undertaken in making the Provincial Agricultural Development Centers (PADCs) and the Engineering Workshops (EWs) operational.

9.3.1.1 Verifications of the Proposed Locations and Designs

Once it is agreed which agency or consulting package will design the new PADCs and EWs, the CS1 provincial consultants can assist with the processes of verification of the proposed locations and the proposed Designs. During the Inception phase the PMU proposed 4 locations for the PACs and also 4 for the Workshops which still have to be reviewed. Final approval of the proposed locations and Designs will be issued by the PMU at the endorsement of the CS1 PIC Team Leader or in his absence the responsible CS 1 PIC DTL.

9.3.2 Procurement

Following approval by the PMU of the proposed location and designs the CS1 team will assist in the process of the preparation of the tender documents and contracts for the actual implementation in collaboration with the CS2 Laboratory / Solar Team (for solar PV units).

It is planned that the construction of these agricultural development centers and engineering workshops should be installed in the dry seasons of 2021 and 2022. Priority will be given to the PADCs because PADC staff will be involved in all aspects of CS2 training.

9.3.3 Construction Supervision

Construction Supervision will be the task of CS1.

9.3.4 Establishment of O&M Capabilities

Regarding the establishment of the O&M capabilities the PAM requires the following to be taken.

Table 35: Sustainable O&M Procedures for ACs

Infrastructure type	Institutional arrangements	Capacity building	Financing	Technical issues
Upgrading agricultural cooperative value chain infrastructure	Each agricultural cooperative, in cooperation with DACP, will develop an O&M plan for post-harvest infrastructure.	The project will train cooperative members on O&M for post-harvest infrastructure.	DACP will seek MEF budget on O&M for a few cooperatives. Farmers will be encouraged to contribute labor or cash to O&M of post-harvest infrastructure.	Good design, proper materials, and appropriate supervision will be ensured.

9.3.4.1 Engineering Workshops

The following steps will be undertaken in the commissioning of the Engineering Workshops.

9.3.5 Verifications of the Proposed Locations and Designs

The CS1 provincial consultants can assist with the processes of verifications of the proposed locations and the proposed Designs. Final approval of the proposed locations and Designs will be issued by the PMU at the endorsement of the CS1 PIC Team Leader or in his absence the responsible CS 1 PIC DTL.

9.3.6 Procurement

Following approval of PMU of the proposed location and designs the CS1 team will assist in the process of the preparation of the tender documents and contracts for the actual implementation.

9.3.7 Construction Supervision

Construction Supervision will be the task of CS1.

9.3.8 Establishment of O&M Capabilities

Regarding the establishment of the O&M capabilities the PAM requires the following to be taken.

9.3.9 Activity 2.3 Capacity Building for farm mechanization and extension

9.3.9.1 Overview

The Project will finance the building of a PADC in each of Takeo, Tboung Khmum and Kampong Cham provinces and the rehabilitation of the existing extension/agricultural development center in Kampot. Technical assistance will be provided to manage the training facilities and undertake a needs assessment to ensure good training unit management and appropriate procurement once construction is completed in the dry seasons of 2021 and 2022. This is to improve the formal training facilities for provincial training and capacity building of CSA, SRP and CAMGAP standards, as well as agricultural cooperatives and FWUC accountancy, bookkeeping and business planning, together with the theory of agricultural machinery and equipment repair,

operation and maintenance. Training and classroom equipment will also be provided. During the Inception phase the PMU proposed 4 locations for the farm PACs which still have to be reviewed.

The Project will also support the construction of three farm mechanization workshops, including classrooms in Kampot, Kampong Cham and Tboung Khmum and commissioning the new workshop and classroom in Takeo. Technical assistance will be provided for agricultural engineering design and fabrication, repair, operation and maintenance once construction is completed in the dry seasons of 2021 and 2022. Equipment and tools for the repair and maintenance of agricultural production and processing equipment will be supplied. The equipment and tools for the manufacture and assembly of agricultural production and processing equipment, together with the supply of design, training and classroom equipment to the provincial workshop units will also be supplied.

Design and equipment specification will be the responsibility of CS1. Training will be provided by CS2.

Deliver training in Management and operation of provincial agricultural development centers and mechanization workshops for government staff: The CS2 Capacity Building Team will work with GDA. The Team will liaise with other specialists that have inputs on farmer demonstrations, mechanization and agribusiness and Public Private Partnership (PPP) / private sector, to coordinate activities and assist GDA to develop an integrated training program, including training of trainers. At least 15 training-of-trainers workshops will be organized for government staff and farmers' groups held on project management, and agronomic resource efficiency, climate resilience in value chains and agribusiness. Training for PADC and mechanization workshop staff will be integrated in the farmer training under 2.2 and will be covered by the same budgets. PADC and mechanization workshop staff will participate in 15 specific training-of-trainers workshops and will then continue their training by involvement in the farmer training program above in section 2.2; which will allow them to learn by doing.
The approach for mechanization workshop staff – where the specific intention is that the project will train them to train repair shop / workshop entrepreneurs / technicians will be a little different and a separate training program and training manuals will be developed during the third and fourth quarters of 2020. The possibility of PPP partnerships for the mechanization workshops will be examined.

10 WORKPLAN OUTPUT 3: Enabling Environment for Climate Friendly Agribusiness Enhanced

10.1 Activity 3.1: Formulating climate friendly agribusiness policies and standards

10.1.1 DMF Target 3a: Climate-smart and gender-responsive agribusiness policy for target commodities, including a PPP framework focusing on agribusinesses formulated

The project will support MAFF and the Ministry of Commerce in creating a favorable policy environment for agribusiness to mobilize the private sector participation through public-private partnerships (PPPs) and contract farming. The project will provide support for farm product certification, quality, and resilience standards, including Cambodia's good agricultural practice and organic fertilizer standards. The project will support cooperatives in becoming sustainable agribusiness ventures by linking up with the private sector and by establishing crop-centric PPP forums. The project will raise financial institutions' awareness on green finance and the integration of environmental and climate risk screening criteria into credit application and reporting procedures. Using information and communications technology (ICT), the project will provide weather, market, and agronomic information to create an environment for more effective climate risk management.

Activities include:

a. (i) formulating climate-friendly agribusiness policies and standards;
b. (ii) promoting green finance and risk-sharing mechanisms; and
c. (iii) supporting climate risk management through ICT.

In Cambodia, there is a need for agribusinesses to achieve competitive advantage, to realize economies of scale and continuity of supply, and to break into new markets. To facilitate competitiveness and growth among agri-businesses, enabling conditions must be set. For instance, MAFF and the Ministry of Commerce (MOC) have not yet developed a comprehensive policy for agribusiness and sought ADB support. Climate change needs to be mainstreamed into an agribusiness policy at national level with a view to developing a strong and dynamic market-driven private agribusiness sector and a long-term agribusiness strategy with a climate-friendly vision. Any agribusiness policy would provide stability in the sector to encourage private investment (including "green" investment) and should fully integrate climate change concerns, to imprint a climate friendly vision for businesses in the sector. The policy should promote both mitigation and adaptation opportunities and socially appropriate best practices.

The CS2 Policy Team will seek to ensure that Climate-friendly SRP becomes more widely utilized with the objective of facilitating eight of the largest Cambodia millers/exporters to be part of the Alliance. However, SRP is not yet commercially recognized – therefore no price premiums are available to farmers who adopt SRP, and there is no certification process yet. The CS2 Policy Team will discuss this with the Rice Federation and GDA and seek to develop an approach to pursuing commercialization of SRP standards.

The CS2 Policy Team has completed and initial review existing policies and strategies relating to agribusiness policy and an initial review the progress of standards relating to CSA, GAP and SRP. Initial discussions have been held with the Department of Planning at MAFF. The CS2 Policy Team is now waiting to be formally introduced to the relevant working groups, technical

committees and focal points so that they can develop a common action plan in cooperation with the relevant persons.

Support MAFF to lead an inter-ministerial and development partner coordination mechanism: The coordination mechanism will especially involve MOC, MRD and MOE among ministries, and International Fund for Agricultural Development, FAO, USAID and Australia's DFAT among development partners. The coordination mechanism will ensure synergies and avoid overlaps with other initiatives and contribute to policy harmonization across the government and needs to be established as soon as possible. The coordination mechanism will also ensure that various projects do not produce different guidelines or policy tools on the same topics. The Project will also provide support to the Technical Working Group on Climate Change in Agriculture, Forestry and Fisheries (TWG-CCAFF) to promote policies to facilitate the adoption of CSA.

Make recommendations on an Agribusiness Steering Committee: As soon as the CS2 Policy Team is introduced to the relevant technical committees and working groups, they will Identify synergy with other donor partner projects that have or are developing policies such as the Japan International Cooperation Agency and the SME Policy, and ADB and the PPP Policy, ADB Rice Commercialization Project and the Seed Policy. This will involve meeting relevant donors, government officials and agribusiness companies. They will assess the lessons learned in the policy development process, and work with the national coordinator(s) to make recommendations on an agribusiness steering committee and meeting schedules and retreats, highlighting the topics for discussions and the roles and responsibilities of the nominated agribusiness policy steering committee members.

Prepare Budget for Study Tours, Retreats, Technical Committees and Working Groups: The CS2 Policy Team will work with PMU, GDA, the coordinator, on the procurement and costing of retreats and study tours for policy development and technical committees and working groups for standards development. This activity is expected to be completed during quarter 2 and 3 of 2020. Procurement will be in accordance with the Government of Cambodia and ADB Guidelines on Procurement. It will also include the identification and contracting of private sector service providers.

Support the Steering Committee and Working Groups: The CS2 Policy Team will provide continued support to the Steering Committee and WGs leading to the development of a draft agribusiness policy up to 2024.

Develop a Draft Agribusiness Policy: Any effective agribusiness policy would provide stability in the sector to encourage private investment (including "green" investment) and should fully integrate climate change concerns, to imprint a climate friendly vision for businesses in the sector. The policy should promote both mitigation and adaptation opportunities and socially appropriate best practices. It is expected that the first draft policy will be developed in 2022.

Review Existing Policies and Strategies: Policies and strategies reviewed have included (a) ADB Country Partnership Strategy (2014-2018); (b) the Agriculture Sector Strategic Development Plan (2014 - 2018); (c) the Government of Cambodia, Industrial Development Policy (2015 -2025); (d) the Government of Cambodia, Policy on the Promotion of Paddy Production and Rice Export (2010); and (v) Cambodia Climate Change Strategic Plan (2014 - 2023). The work also included review of a plethora of climate change policies and strategies, and the draft PPP policy (the latter of which was sponsored by ADB). The Policy Team have also taken into account the Crop

Masterplan that recommends the value chains with the best opportunities for development of comparative advantage in Cambodia[21].

Develop Action Plan In conjunction with the relevant technical committees, the CS2 Policy Team will develop an action plan in the second and third quarters of 2020 with the outcome of presenting a draft agribusiness policy for endorsement by the Minister of MAFF

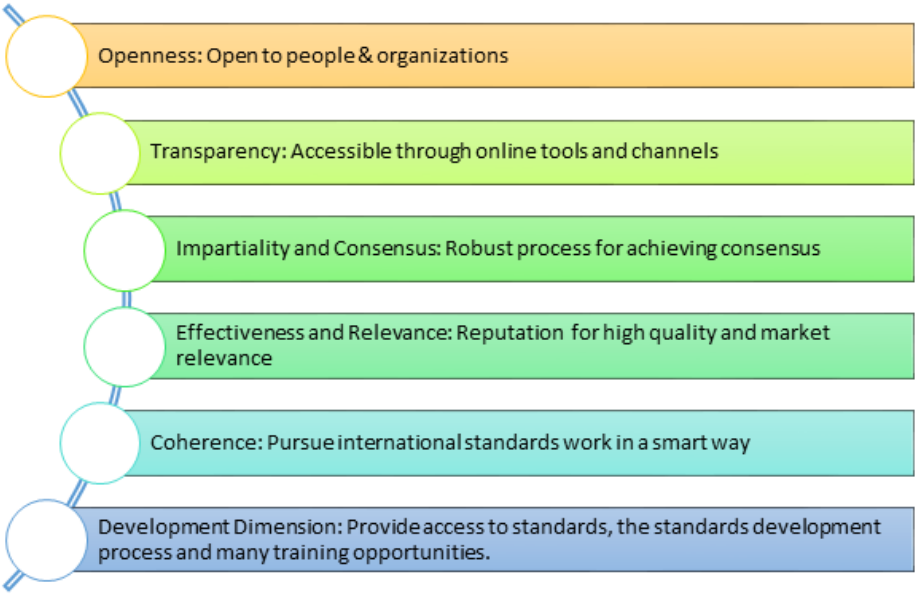
Develop Clear Draft Agribusiness Policy: The climate friendly agribusiness policy development will include:

- identification of measures to remove barriers for private sector investment in climate friendly agribusiness;
- identification of investment strategies for the public sector to enhance climate smart agribusiness growth;
- promotion of the development of climate-friendly infrastructure so that Cambodia's agribusinesses have a comparative and competitive advantage with their regional counterparts;
- creation of institutional and legal frameworks conducive to supporting and assisting climate friendly agribusiness, particularly with respect to regulations, taxes, business registration, licenses and the multiplicity of government institutions involved in the sector. The Project will seek to identify reforms required to ease freedom to do business while promoting adequate social, environmental and climate-related standards, and to improve efficiencies in logistics and administration.
  The CS2 Policy Team suggest that a preliminary activity would be to commission a study on agribusiness competitiveness in Cambodia relative to Thailand and Vietnam (focusing on crop groups identified in Crop Masterplan). The aim of the study would be to identify actions Cambodia needs to take to become more competitive.

[21] Development of Master Plan for Crop Production in Cambodia by 2030, Final Report, Prepared for Ministry of Agriculture Forestry and Fisheries, Tonle Sap Poverty Reduction and Smallholder Development Project (TSSD), Francesco Goletti, Sin Sovith, May 2016

10.1.2 DMF Target 3b: CAMGAP for tropical fruit and organic fertilizers endorsed as national standard for tropical fruit and organic fertilizers

Figure 14: The Six principles of International Standards Development



10.1.2.1.1 Key principles in standard development

ISO standards respond to a need in the market: ISO does not decide when to develop a new standard, but responds to a request from industry or other stakeholders such as consumer groups. Typically, an industry sector or group communicates the need for a standard to its national member who then contacts ISO. Contact details for national members can be found in the list of members.

ISO standards are based on global expert opinion: ISO standards are developed by groups of experts from all over the world that are part of larger groups called technical committees. These experts negotiate all aspects of the standard, including its scope, key definitions and content. Details can be found in the list of technical committees.

ISO standards are developed through a multi-stakeholder process: The technical committees are made up of experts from the relevant industry, but also from consumer associations, academia, NGOs and government. Read more about who develops ISO standards.

ISO standards are based on a consensus: Developing ISO standards is a consensus-based approach and comments from all stakeholders will be taken into account.

Review Progress of Work on Standards: Once introduced, the CS2 Policy Team will work closely with MAFF technical committees to review the progress of standards relating to CSA, GAP and SRP. For GAP and SRP standards, the Team will work closely with the GDA and the SRP Alliance (UNEP Bangkok), respectively. The Team will take into account Rainforest Alliance standards and Australian legislation on carbon trading for farms and farming cooperatives. The CS2 Policy Team are informed that a CAMGAP for mango will be approved this year (and have

reviewed a copy of the text). Work is also on-going on the review of standards for organic bio-slurry (fertilizer). See section 4.5.

Draft and Promote CAMGAP for tropical fruit: The CS2 Policy Team will work with GDA to develop and draft a CAMGAP for selected tropical fruit standards (based on the CAMGAP for mango) and ensure that the draft is developed in consultation with relevant authorities in GDA so that CAMGAP for selected tropical fruit becomes a Cambodia Standard with Cambodia standard mark. This work is expected to be undertaken in quarter 3 and 4 of 2021.

Draft a CSA Policy: The CS2 Policy Team will draft a CSA policy in close consultation with relevant Cambodian authorities and will ensure that the CSA policy will be reviewed by MOC and MAFF and jointly endorsed by both ministries. This process will continue through 2020 and 2021 to allow time for review and consultation.

Prepare Guidance Manuals In the first quarter of 2022, the CS2 Policy Team will prepare guidance manuals for climate neutrality and adaptation standards for agribusiness operations and seek mechanisms and institutions in Cambodia to ensure continued use of the guidance manuals.

Measures to Further Climate-friendly SRP: The CS2 Policy Team will seek to ensure that Climate-friendly SRP becomes more widely utilized with the objective of facilitating eight of the largest Cambodia millers/exporters to be part of the Alliance. This work will continue throughout the project duration.

Develop climate-friendly Industrial Development Policies: As part of the draft Agribusiness Policy, Industrial Development Policy strategies for climate friendly agribusiness will be developed.

10.2 Activity 3.2: Promoting green finance and risk sharing mechanisms

10.2.1 DMF Target 3c: 50 staff, including 30% women, from financial institutions trained in CSA and green finance

10.2.1.1 Overview

The Project will seek to reduce risks associated with impacts of climate change, particularly for smallholder farmers, through creating an enabling environment for climate risk sharing mechanisms such as crop insurance under the guidance of inter-ministerial committee on crop insurance headed by the MEF.

Undertake Comprehensive Landscape and Key Stakeholder Analysis: The CS2 Policy Team will conduct a comprehensive landscape and key stakeholder analysis to determine implementation activities existing in green climate financing, and the key stakeholders involved in each activity, including the implementation agencies and donor partners. The analysis will be undertaken in quarter 2 of 2020. The Team will determine what is required to remove financing aversion into green climate projects. They will analyze potential incentives for financial institutions to increase lending to green climate finance projects. The landscape and key stakeholder analysis will Include research with the United Nations Capital Development Fund, the GCF Consortium (Conservation International, the World Wildlife Fund, and Wildlife Conservation Society), USAID, Australia's DFAT, Agence Française de Développement, and other stakeholders.

10.2.2 DMF Target 3d: 30 agribusinesses, including 30% women-led and/or owned*** trained on green finance and CSA

10.2.2.1 PPP Framework

10.2.2.1.1 Overview

Cambodia has a framework for PPPs, which was supported by ADB. However, the current framework, legal and institutional setting, is not conducive to climate friendly investments. Furthermore, there are no adequate risk-sharing mechanisms between government, local producers and the private sector, meaning that smallholders are often left bearing a disproportionate amount of risk. This limits innovation and the potential upscale of innovative climate friendly technologies and to date there are no examples of PPP projects in the agribusiness sector within Cambodia. The Project will make recommendations to fill these current gaps based on lessons learned and feasibility assessments from previous and ongoing projects, and to introduce innovative mechanisms that can be applied in the Project sites.

The Project will support in the following activities:

(i) creating an enabling environment for PPPs in agribusiness in the four value chains;
(ii) the identification of incentives for private sector participation in agribusiness particularly improving the private sector´s access to green finance and ways to reduce the risk aversion of commercial banks;
(iii) reducing the financial risks associated with the impacts of climate change on the raw material base.

10.2.2.2 Improving the Enabling Environment for PPPs

The CS2 Policy Team has developed an action plan and has submitted it to the PMU. The plan covers a proposed meeting schedule as recommended by the design consultants, and a review of the frequency, type of meetings and recommendations of the participants to be invited.

Convene an Inter-Ministerial Committee (IMC)

To achieve the PPP objectives, the CS2 Policy Team will work with the PMU to support dialogues between public and private sector stakeholders at the national level through convening an Inter-Ministerial Committee (IMC). This activity requires PMU support and should commence in quarter 2 of 2020.

Organize Crop Centric Forums

The Team will also work with the PMU to promote the establishment of crop centric PPP forums for each value chain (cassava, maize, and mango) as well as organize forums within the Cambodia Rice Federation; both of which will meet twice a year. After each forum is held, the IMC would meet to review the crop forum points raised and to respond to the recommendations. The Project Manager will represent the PMU at each of the committee meetings and crop-centric forums. The CS2 Policy Team will undertake an annual costing exercise to present to the PMU to fund the activities within the PPP and private sector participation initiatives. The procurement will be in accordance with the Government of Cambodia and ADB Guidelines on Procurement. It will also include the identification and contracting of private sector service providers or guest speakers to present at some workshop and forums. The CS2 Policy Team will ensure other consultants from CS2 and consultants from CS1, CS3 and the Information and Communication Technology Platform (CS4) participate. The first crop forum (for rice) is planned for quarter 1 2020.

Organize Feasibility Studies for PPP Projects

The PPTA consultants identified eight PPP projects within the value chains. These are initiatives related to other Project activities that would positively impact on the overall Project objectives. In effect the Project will act as the Public Sector and will provide support and some investment in kind to demonstrate the potential for developing value chains through PPP. The Project will conduct detailed feasibility studies within the Project implementation. The PPP initiatives identified were mango nursery development and seedling certification, the establishment of a Mango Producers Association, cassava chip storage, value added product development and sales, paddy cleaning, drying and storage, Mechanization workshop and resource center, seed multiplication and storage and the promotion of aromatic rice seed and licensing and establishing tissue culture enterprises. The Project will hire consultants to undertake the feasibility studies within the first three years.

Organize Study Tours and Training

Two study tours for selected representatives from the government will be conducted during the fourth year of project implementation to learn best practices and benchmarking of potential Cambodian PPP initiatives. The CS2 Policy Team will plan a regional ASEAN study tour that will involve a total of about 50 stakeholders who will visit different sites in the region to acquire a better knowledge of how PPP works, its use in developing value chains, and what opportunities for PPP could exist with the sector in Cambodia. The CS2 Policy Team will also coordinate with third party private sector training service providers to provide training to government officials and agribusinesses and will ensure the capacity building and training work is satisfactory as detailed in the contract. Study tours will be undertaken in 2021.

During the process of identifying 8 PPP projects for feasibility study, 30 agribusinesses, primarily agricultural cooperatives, will receive training in green finance and CSA. Training curricula will be developed by the CS2 Policy Team in cooperation with the CS2 Capacity Building Team during quarter 3 and 4 2020 and training delivered in quarter 4 2020 and throughout 2021.

10.2.3 Bank Staff trained in Green Energy Financing

Undertake Comprehensive Landscape and Key Stakeholder Analysis

The CS2 Policy Team will conduct a comprehensive landscape and key stakeholder analysis to determine implementation activities existing in green climate financing, and the key stakeholders involved in each activity, including the implementation agencies and donor partners in quarter 2 2020. The Team will determine what is required to remove financing aversion into green climate projects. They will analyze potential incentives for financial institutions to increase lending to green climate finance projects. The landscape and key stakeholder analysis will Include research with the United Nations Capital Development Fund, the GCF Consortium (Conservation International, the World Wildlife Fund, and Wildlife Conservation Society), USAID, Australia's DFAT, ***Agence Française de Développement***, and other stakeholders.

Organize Workshop on Climate Friendly Investments in Cambodia

The CS2 Policy Team will plan, organize and facilitate a financial institution training session / workshop on green climate friendly investments in Cambodia, in coordination with other stakeholders in quarter 2 2020.

Provide Policy Support

Because penetration of crop insurance and other risk sharing instruments is extremely low, the Project will first provide policy support by examining financial and regulatory constraints specific to target provinces and identify mechanisms to overcome such barriers. The Project will build on the experiences of the Climate Resilient Rice Commercialization project which focuses on Battambang, Kampong Thom, and Prey Veng provinces and the work of the Cambodian Center for Study and Development in Agriculture in five provinces, including Kampot and Takeo. The Project will examine opportunities to expand such services to Kampong Cham and Tboung Khmum and consider including cassava and maize to rice as the portfolio of insurable crops.

Explore Opportunities for First-loss Guarantees and Warehouse Receipt Financing

As part of the policy support on green finance and risk sharing mechanisms, the Project may explore additional opportunities to enhance financial sector participation in agribusiness investments during quarter 2 2020. The opportunities for establishing an agricultural supply chain adaptation facility, in which a partner financial institution (e.g., Rural Development Bank which is being encouraged to lend to cooperatives) can share some of the contract farmers' credit risk through first-loss guarantee, may be explored. Feasibility of climate smart lending platform and value chain financing options such as warehouse receipt financing scheme may also be considered.

Develop Climate Safe Screening Criteria

The credit facility and guarantee scheme[22] are expected to be available for only those projects that meet specific climate safe screening criteria. Appropriate criteria will be developed by the CS2 Policy Team in quarter four, 2020. The schemes can also be made available for commercial banks when lending to SMEs meeting those same criteria. This will serve two purposes, to provide: (i) a commercial incentive for banks to abide by the agreed best practice and climate change screening principles; and (ii) an extra degree of confidence for commercial banks to lend to the underserved SME market, provided the borrowers meet the guaranty eligibility criteria.

Finalize Design of the Credit Guarantee Program

The CS2 Policy Team will finalize the design of the guarantee scheme with all key stakeholders (Cambodian banks and ADB, Micro-finance Institutions (MFIs), and the Rural Development Bank) in such a way that the scheme remains simple to operate while offsetting against additional risks. This task will be undertaken in quarter 4, 2020.

Design and Implement Guarantee Training Program

The CS2 Policy Team will design a guarantee training program for banks / MFIs and the Rural Development Bank to understand guarantee criteria and eligibility, usage, and administration. The Team will design a training program for financial institutions which will assist banks / MFIs to understand environmental and climate screening criteria, and to evaluate loans against these criteria. Training topics could include: (1) What is green lending - identification, benefits and opportunities; (2) Awareness of green climate financing projects and the Cambodia Climate Fund operations and requirements; (3) Integration of green climate finance criteria into current credit application process; and (4) reporting on the credit guarantee. The training program will be designed in quarters 3 and 4 2020 and implemented in 2021.

[22] Believed to be a separate ADB project

Field Visits to Green Investments

The CS2 Policy Team will conduct field visits with banks to review potential green financing projects during 2020 and 2021.

Establish Accreditation Scheme for FIs

The CS2 Policy Team will design and manage a bank "climate friendly" financing accreditation process during 2021. This accreditation process will ensure that banks have climate friendly criteria included in their credit application process. These accredited banks will then become eligible for Cambodia Climate Fund lending for them to on-lend to climate friendly projects. Conduct awareness workshops and accreditation seminars, as needed.

10.2.4 DMF Target 3e: 20,000 households, including 20,000 women, provided with information on climate risk sharing instruments

The project will seek to reduce risks associated with impacts of climate change, particularly for smallholder farmers, through creating an enabling environment for climate risk sharing mechanisms such as crop insurance under the guidance of inter-ministerial committee on crop insurance headed by the Ministry of Economy and Finance (MEF). Because penetration of crop insurance and other risk sharing instruments is extremely low, the CS2 Policy Team will first provide policy support by examining financial and regulatory constraints specific to target provinces and identify mechanisms to overcome such barriers, The Team will build on the experiences of the Climate Resilient Rice Commercialization project which focuses on Battambang, Kampong Thom, and Prey Veng provinces and the work of the Cambodian Center for Study and Development in Agriculture (CEDAC)in five provinces, including Kampot and Takeo. The Team will examine opportunities to expand such services to Kampong Cham and Tboung Khmum and consider including cassava and maize to rice as the portfolio of insurable crops. The CS2 Policy Team will work with the CS2 Capacity Building Team to ensure that CSA training incorporates modules on climate risk sharing instruments in all provinces. This task will commence in quarter 2 2020 and continue throughout the project duration.

10.3 Activity 3.3: Supporting climate risk management through Information and Communication Technologies (ICT)

10.3.1 DMF Target 3f: ICT platform for climate friendly agribusiness established in Kampong Cham province (2017 baseline: 0)

10.3.1.1 Establishment of ICT Platform

Awaiting mobilization of the CS4 consultants.

10.3.1.2 Procurement of CS4

Still to be planned awaiting finalization of the RFP.

11 WORK PROGRAM CS1 Project Implementation Consultants

11.1 General

The PIC consultancy has a wide range of activities which are grouped on 10 Main Tasks as is shown in Table 36. Due to the minimum input of the International Team Leader (ITL) and also the intermittent input of the 3 National Team Leaders, many of these activities will have to be done more by the sector specialist on their own without supervision of a (deputy) Team Leader. Annex 7 shows the workplan and assignment schedule of the CS1 consultancy.

Table 36: CS1 Main ToR Tasks

0	**Start Up**
1	**Review and advice on subproject identification and feasibility studies of Infrastructure** [23] 1.1: Assess the suitability of proposed water management and irrigation subprojects 1.2: Assess the suitability of the proposed infrastructure related to cooperative stores, including roads, 1.3: Assist in undertaking environmental and social due diligence; 1.4: Assist in the preparation of safeguard documents 1.4: Preparation of Project Implementation Plans for all
2	**Social Development and Gender**
3	**Support, Strengthen, Coordinate and Guide PMU, PPIUs, IAs and Contractors in review of the Design of Infrastructure** 3.1: Design of the infrastructure related to water management and irrigation 3.2: Design of the infrastructure related to cooperative stores, including roads 3.3: Design of the infrastructure related to the Provincial Agriculture Development Centres (PADCs) 3.4: Design of the infrastructure related to mechanization workshops
4	**Procurement of Infrastructure and Equipment**
5	**Financial Loan Management**
6	**Provision of Capacity building and training**
7	**Assist in the supervision of construction and/or purchase of the Infrastructure** 7.1: Infrastructure for water management and irrigation 7.2: Equipment for cooperative stores and road infrastructure 7.3: Infrastructure for Provincial Agriculture Development Centres 7.4: Equipment for mechanization workshops
8	**Assist to establish efficient and sustainable operation and maintenance (O&M) of the Infrastructure and/or Equipment** 8.1: O&M of the water management and irrigation infrastructure 8.2: O&M of the cooperative stores and roads infrastructure 8.3: O&M of the Provincial Agriculture Development Centres (PADCs) infrastructure 8.4: Operation of the mechanization workshops infrastructure
9	**Monitoring and Evaluation**
10	**Reporting**

23 including the PMU, the Provincial Project Implementation Units (PPIUs), and Implementing agencies, and their consultants and contractors

11.2 Task 0: Project Start-up

Under this Task 0: Project Start-up a total of 12 activities have been done in the period October to December 2019 as follows:

Task 001: Mobilization

The team started to mobilize on 24 October 2019 and the International Team leader mobilized on 02 November 2019. MAFF has provided the Consultants' with minimum serviced office space in Phnom Penh awaiting planned improvements and implementation of procurement. MOWRAM has also made available appropriate office facilities for the 3 CS1 experts to be stationed there, but MRD currently has no office facilities available and agreed with MAFF that the 3 CS1 MRD experts were to provided office facilities for the time being. At project start-up there were no vehicles available but in the second week some (rented) vehicles were made available for field work. During negotiations it was agreed that the Client will provide furniture, payment of electricity and four pickups. The Client is responsible for all these costs. A CS1 Office Manager was mobilized on 01 December 2019.

Task 002: Procurement

During negotiations it was agreed that all allocations for furniture, computers, scanners, and communications and technical equipment would be provided by MAFF and the CS1 contract only includes a minor allocation for the purchase of printers and computers. As MAFF has not yet made available any printers awaiting the procurement, early December CS1 obtained approval from MAFF to purchase 1 laptop for the Office manager and 2 printers, one for the CS1 MAFF office room and one for the CS1 MOWRAM office. Also did the consultant install a Wifi connection in the MOWRAM office.

Task 003: Collect and review all relevant reports and data

While many reports, designs and drawings have been collected during the course of proposal preparation it would be important to visit all related MAFF/MOWRAM/MRD/PPIU offices and the offices of their consultants engaged on similar ongoing projects to collect relevant materials.

The ongoing projects include: CAVAC, IFAD Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE), IFAD Credit and Financial Services: Accelerating Inclusive Markets for Smallholders (AIMS), Rice Commercialization Sector Development Program and the Agriculture Value Chain Investment Project. Reports from relevant completed projects would also be collected. The findings and lessons learnt from these on-going and previous projects would be reviewed and summarized and circulated amongst the specialists. It would be hoped that synergies would develop with many on-going projects.

As the assignment progresses it would be important to create a Project Archive containing all material, hopefully mainly in electronic format but also in hard copy. Consultant staff would be encouraged to contribute to the archive and not create their own personal libraries.

Task 004: Hold preliminary discussions, establish lines of communication and maintain good coordination between ADB, PMU, MAFF, MOWRAM, MRD and other stakeholders and assure links with key institutions including MEF

After mobilization of the International Team Leader on November 3, 2019 official introductory meetings were conducted with MAFF (November 4, 2029), ADB (November 5, 2019), MOWRAM (November 6, 2019) and MRD (November 12, 2019). The meeting at ARB was a video-conference with the ADB project officer in Manila.

Task 005: Establish and maintain close working relationships with consultants engaged under Packages CS2 and CS5.

It would be vital for all the consultants working on the Project to work as closely together as possible. To this end regular meetings should be held, probably at weekly intervals to exchange information and keep each other abreast of progress and plans.

Task 006: Undertake a round of Joint CS1/CS2/CS5 Introduction Visits to the Participating Provinces.

In the period 14 - 29 November a joint CS1? CS2? CS5 team visited all 4 participating provinces and inspected the fast-action schemes of Trapiang Run and the Mango drip – irrigation farm and to meet with all Project Provinces the key stakeholders PDAFF, PDWRAM and PDRD. These field visit teams included both Consultants and PMU staff.

Task 007: Update and complete the PPMS framework

The PAM includes only a draft PPMs framework and a more detailed version has been developed.

Task 008: Prepare Inception Report including Detailed Workplan

The TOR require the Consultants to prepare the Inception Report (IR) within three months of mobilization and every effort would be made achieve this. An important element in the IR is the Update of the CS1 Consultants' Workplan. At the request of Dr. Srinivasan Ancha, the involved ADB project officer at ADB head office, this Inception Report covers the work-programs of the 3 in the CFAVC participating IAs, MAFF, MOWRAM and MRD, and also to this end also the work-program of the 3 Consulting Teams mobilized so far, which support and facilitate these 3 IAs. These 3 Consulting Services Packages (CS) of the CFAVL project are CS1/PIC, the Project Implementation Consultants, CS 2 (Capacity Building and Climate Smart Agribusiness Consulting Team) and CS 5 (Feasibility Studies and Detailed Engineering Design Consulting Firm (FSDD)). To this end certain sections of the Inception Reports of those 2 packages are included in this report. In addition, this Inception Report includes updates to all major project features, such as a) procurement plan, b) Integrated Work Plan, and c) PPMS, while it also highlights all inter-related activities and provides an estimate for the 2020 program. Administrative matters of the other CS packages are not dealt with in this report but in their separate inception Reports.

Task 009: Provide necessary technical and management support to the executing and implementing agencies for effective project implementation

The International Team Leader (ITL) and in his absence the senior National Deputy Team Leader (NDL) would retain overall responsibility for the provision of the necessary support to the PMU, and the executing and implementing agencies. This support would cover all disciplines, engineering, safeguards and economics. The ITL/NDL would be responsible for bringing together the various disciplines and ensuring that all required aspects were reported upon in a coherent manner. All experts' outputs would be submitted in the first instance to the ITL/NDL who would review them for compliance with their TOR and for their overall quality. Another important task for ITL/NDL would be to ensure timely mobilization and inputs for the experts in accordance with agreed plans and as required by the project.

Task 010 Assist in ensuring coordination between central level agencies, relevant technical support departments and stakeholders at the provincial, district and commune level

Building upon contacts made under **Task 004**, regular meetings would be held, at the very least at monthly intervals to exchange information and keep each other abreast of plans, progress and any obstacles.

Task 011: Actively participate in field visits and in project supervision at project sites as required

It would be vital for the ITL/NDL to make regular field visits both to implementation agency offices and subproject sites to learn at first hand precisely what is going on and to appreciate where any different resources might be required. As noted in **Task 001**, key experts are expected to spend some 85% of their working time 'in the field.

Task 012: Update the Project Implementation Schedule (PIS)

This Inception Report includes an updated Project Implementation Schedule to be used to monitor progress against the targets set in the PIS. While monthly reports are not required as Deliverables, at least in the first year of the project, individual experts world be required to prepare such reports which would then be discussed at the proposed Monthly Meetings

11.3 Task 1: Advise on Scheme Selection and Feasibility Study

Consultants engaged under Contract CS5 Feasibility and Detailed Design Consultant will, as the name implies, be responsible for the preparation of feasibility studies and detailed designs for the medium irrigation and farm road subprojects. These are valued at US$ 68 million and comprise some 57% of total project expenditure.

The role of PIC-CS1 is generally to provide advice to CS5 particularly in the areas of preparation of social and environmental safeguard studies, economic analysis to ensure compliance with the borrower's and ADB requirement, and climate change resilience and adaptation options, as required [24]. PIC-CS1 is also responsible for reviewing CS5 final output and submitting it to PMU and ADB.

Other consultants may be engaged to prepare small scale irrigation (drip irrigation and water catchment ponds), storage units, PADCs and MWs. If so PIC-CS1 will generally provide similar advisory services to such consultants. However, it is likely that these consultants will require more support when addressing safeguard issues, which PIC-CS1 will provide.

11.3.1 Assess the Suitability of the Proposed Sub-projects

Task 101: Review feasibility studies for subprojects prepared by the feasibility and detailed design consultants
Consultants for medium scale irrigation (greater than 100 ha in extent) and road subprojects under MOWRAM/PDWRAM and MRD have been pre-selected and will be contacted out in package CS5. Consultants for small scale irrigation under MAFF/PDAFF will, if required, be recruited by MAFF/PDAFF after subproject selection. PIC-CS1 will assist IAs with consultant selection if necessary.

The PIC specialists will liaise closely with CS5 and other consultants as the latter's feasibility report preparation progresses. In this way it is hoped that the final review[25] will not result in any major request for revisions.

[24] PIC social development and gender specialists will work more closely with SC5 as noted under 4.3.5 2 above
[25] A review of subproject economic viability will be required while the RFP makes no provision for any economics input. This is discussed in TECH 3A

Task 102: Review the designs prepared by the PPTA consultants and make recommendations for revision and updating the bill of quantities, if necessary
Storage unit designs[26] prepared by the PPTA consultants would be reviewed. This review would include a visit to the proposed site, visits to other existing storage units and meetings with IAs staff. A Design Review Report would be prepared.

Task 103: Assess proposals for off-farm and on-farm irrigation systems, evaluate requests for drip irrigation and water catchment ponds and irrigation systems considering their location etc. with respect to selection criteria in the PAM

Task 104: Make field trips to confirm eligibility criteria are satisfied and report back to the team leader, deputy team leader and PMU
These three Tasks are clearly linked. While some potential subprojects were pre-screened during the PPTA assignment, none, as far as is known have yet been formally approved for development. PIC specialists would assess all proposals made by the various IAs and prepare a Subproject Identification Report (SIR). In preparing this report visits would be made to IA offices and subproject sites, and hold discussions with potential beneficiaries. The SIR would confirm or otherwise if the subproject was suitable.

Task 105: Provide guidance in screening subprojects and conducting feasibility studies
Subproject selection criteria are included in the PAM for each different type of subproject, and all PPIU suggested subproject should be checked against these criteria. If any new criteria are indicated on the basis of the work carried out under **Tasks 201-204** above than then these should be proposed initially to PMU.

As mentioned, a Pro-Forma Subproject Feasibility Report List of Contents is given in the PAM. This seems fairly comprehensive and provided the basis for the three representative subproject feasibility reports prepared by the PPTA consultants. The Annex entitled Social and Gender Impact Assessment and Gender Action Plan should be re-instated.

Task 106: Assist in identifying high priority value chain subprojects based on established criteria (e.g. contribution to food, energy and water security, environmental sustainability, positive social impacts, including gender equality and poverty reduction)
The value chains prepared under AVC-IIP should facilitate the identification of the types of subprojects that should be given priority. The results of AVC-IIP should be the subject of a Workshop to which all PPIUs and representative beneficiaries (including FWUCs and Agricultural Cooperatives) should be invited. Thereafter PIC specialists should work with all stakeholders to identify high priority subprojects, including those pre-screened by the PPTA consultants.

Task 107: Ensure the subproject proposed are appropriate, make field trips to confirm eligibility criteria are satisfied and report back to the Team Leader and PMU

Task 108: Provide necessary technical and management support to the MAFF and IAs for effective project implementation relating to off-farm and on-farm irrigation and water catchment ponds

Task 109: Assist in the preparation of a detailed work plan for the irrigation system's infrastructure activities with the IAs, this includes establishing an appropriate management and monitoring system
Having confirmed a number of subprojects, PIC specialists would work with the IAs (PDAFF and PDWRAM) to prepare a detailed work plan, which would cover engagement of consultants for small works (as CS5 already in place for medium irrigation), feasibility, detailed design and construction. Regular meetings and site visits would be held and necessary adjustments made to the work plan.

[26] For the Representative Subproject entitled Agricultural Cassava Drying, Processing, and Storage Facility

11.3.2 Review of the Environmental and Social Due Diligence Assessment of CS5 of the proposed Sub-projects

While CS5 have environmental and social safeguards specialists in their consultancy team, they lack climate change specialists and have a very limited social development and gender specialist input. Thus PIC-CS1 specialists may be called upon to offer support to fill any gaps.
Other consultants, if any, engaged to prepare small scale irrigation, storage units and PADCs and MWs will likely have limited safeguards inputs and PIC-CS1 specialists will have to fill any gaps.

Task 110: Assist the PPIUs to design and implement additional socioeconomic and other surveys required in each target area, data to be disaggregated by sex, ethnicity and income to establish baselines, targets and measure change over time

Task 111: Assist the IAs to design and help manage the implementation of new socio-economic surveys as appropriate and which are relevant to the subprojects in the target areas, including gender, poverty and community development
Basic social data for every subproject is required in accordance with the recommendations in ADB SPS 2009. For the three Representative Subprojects, the PPTA consultants prepared annexes on a socio-economic survey, social and gender impact assessment and GAP. These would be reviewed by PIC specialists who would hopefully find that they satisfied SPS 2009, and, if so, similar surveys and assessments would be required for all new subprojects. If the PPTA consultants work was not acceptable PIC-CS1 would prepare necessary revisions to the new consultants TOR.

Task 112: Work closely with PPIUs in all subproject areas to support them in implementing the activity plans that constitute part of the Summary Poverty Reduction and Social Strategy (SPRSS)/GAP

Task 113: Assist PPIUs to design and implement information campaigns and community mobilization, and further programs and projects to develop livelihoods, social development and vocational needs with emphasis on poor and vulnerable HHs
As each new subproject was identified, PIC-CS1 specialists would visit concerned officials at provincial, district and/or commune level and representative beneficiaries. The activity plans would be discussed to confirm their relevance, and how they were to be implemented. Information campaigns to assist with the mobilization of communities would be discussed and agreed action initiated. Additional initiatives to further promote livelihoods, social development and vocational needs of the poor in subproject affected-area would be considered.

PIC-CS1 specialists would offer any support that they could realistically provide.

Task 114: In close coordination with WFN, consult with project-related beneficiaries to ensure women's needs and aspirations are addressed in the subproject design, construction and subsequent monitoring
During the course of subproject design, meetings would be held with design consultants WFN and PIC-CS1 to ensure that women's needs and aspirations will be addressed both during construction and the subsequent operation of the subprojects.

Task 115: Assist the IAs by acting as a gender focal point and facilitator for poverty and gender mainstreaming
PIC-CS1 specialists would work with the Counterpart Safeguard/Gender Officer posted in the PMU to act as the gender focal point for the project. Such a focal point would be important when considering smaller subprojects, the consultants for which may have very limited gender and poverty-related input.

Task 116: Coordinate with the project safeguard specialists regarding the livelihood and social development aspects
Under Tasks 005/006 it was suggested that PIC-CS1 might convene a weekly meeting of all consultants engaged on the project. A sub-group might be formed to address livelihood and social development aspects which should be very useful for the consultants responsible for preparing the smaller subprojects.

Task 117: Collect human stories during project implementation to demonstrate how the project contributed to enhanced gender equality, women's empowerment and greater inclusion in the sector that can be used in the PCR to document achievement of gender equality results
In the course of their field investigations and discussions with beneficiaries and officials, PCI-SC1 specialists should try to obtain some stories with human interest to show how the project has enhanced gender equality, women's empowerment and greater inclusion in the sector.

Task 118: Assist and direct community consultations as per LARF to identify land acquisition needs for subprojects
PIC-CS1 specialist would work with other consultants, concerned officials and beneficiaries to identify any land acquisition required both in the short-term during construction and in the long term during the life of the project. As mentioned previously CS5 responsible for medium scale irrigation and roads have resettlement specialists in the staffing establishment so will require limited support. Other consultants handling smaller subprojects may need support but land acquisition requirements are likely to be very small given that most is not all the drip and water management ponds will be located on the direct beneficiary's land.

Task 119: Review all subprojects to ensure that no land has been acquired through coercion, that any compensation has been paid, and that land purchased or acquired by cooperatives was done so under free private commercial transparent transactions

Task 120: Ensure that any negotiated settlement case is reported in the social monitoring reports and communicated to ADB for further follow-up

Task 121: Assist IAs to ensure that any land acquisition is voluntary only through strict application of the voluntary and involuntary screens, in accordance with ADBs SPS 2009 and relevant Cambodian regulations and laws

Task 122: Ensure that witnessed donation forms are obtained for well substantiated cases of voluntary land donations in strict compliance with the provisions of the approved LARF

Task 123: Ensure land acquisition agreements are duly signed by the husband and wife and witnessed by village and commune authorities
These five Tasks are closely related and require PCI-SC1 specialists to ensure that to the best of their ability land acquisition procedures follow agreed protocols to the letter, especially those where 'donation' is involved.

Task 124: Assist PMU to establish and publicize a grievance redress mechanism (GRM) for ensuring that GRM publicity is appropriate to the scale and complexity of the subproject and includes the disclosure of all contact persons with whom to lodge complaints
Inevitably some stakeholders will have complaints about some aspect of the project, most commonly related to land acquisition but not always. PIC-CS1 specialists, following a review of recent GRMs in Cambodia, will work with PMU to devise a GRM that is appropriate to the scale and complexity of the subprojects and includes the disclosure of all contact persons with whom to lodge complaints.

Task 125: Ensure understanding and compliance with the Climate Risk Assessment and Management for the whole project including construction and operational (post construction) periods
The Project RRP included two Annexes: Annex 11: Risk Assessment and Risk Management Plan and Annex 12: Climate Change Assessment

Together with PMU, PIC-CS1 specialists will discuss these documents and their implications for the project at both routine progress meetings with officials and their consultants and at special design review discussions with IAs and consultants.

Task 126: Document local knowledge and best practices in mainstreaming and implementing climate change adaptation and disaster relief reduction (DRR) at the commune level

Task 127: Assist with the conduct of surveys and feasibility studies, and the preparation of proposals on climate change adaptation;
DRR is defined as the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

In their travels around the project area, PIC-CS1 specialists will discuss climate change and disaster related incidents and draw lessons for the future. It might be appropriate, if PMU is in agreement, to mount workshops at both central and provincial level, with participants drawn not only from this project but also from others, to address these issues and if appropriate to follow up with surveys and further studies.

Task 128. Assist in developing guidelines on integrating climate change adaptation into commune development plans and investment programs
One output of the workshops mentioned in Tasks 633/634 might be an outline guideline on climate change and disaster which could be developed into a set of guidelines on integrating climate change into commune development plans and investment programs

11.3.3 Assist in the finalization of the Social Safeguard Documents

Task 130: Prepare reports and documents covering social development and gender analysis following the government and ADB rules and guidelines
As an aid to CS5 and other consultants engaged on project-related works, PIC-CS1 specialists will prepare a Project Manual on Social Development and Gender Analysis. In preparing this, they would draw on papers prepared by the PPTA consultants, manual prepared by similar projects in recent years and government and ADB rules and guidelines.

Task 131: Provide guidance in preparing DDRs, LARP, IPP and EMDP according to ADB SPS (2009), the LARF and EMDF prepared for the project

Task 132: Assist preparation of DDRs or LARP as required, in accordance with the approved LARF and ADB SPS (2009)

Task 133: Assist in identifying impacts on ethnic minority households and communities in accordance with the ADB SPS (2009) Safeguards Requirement 3 and, where identified, prepare an EMDP as recommended under the EMDF
These three Tasks are closely linked. PIC-CS1 specialists will provide necessary guidance to consultants preparing safeguard documents in accordance with the documents below which were mainly prepared by the PPTA consultants:

- ADB-SPS 2009
- 16. Indigenous Peoples Planning Framework: Ethnic Minority Development Framework
- 17. Land Acquisition and Resettlement Framework
- 21. Due Diligence Report on Land Acquisition and Resettlement for Trapaing Run Irrigation Subproject

Task 134: Ensure that the steps of the EARF covering environmental screening and impact assessment are followed by PMU, PPIUs and the CS5: Feasibility Study and Detailed Engineering Design consultants

Task 135: Assist in all aspects of the implementation of the project's EARF and preparation of subproject initial environment examinations (IEEs)
PIC-CS1 specialists will provide necessary guidance to PMU, PPIUs, consultants and contractors taking action as required by the project's EARF[27], which was prepared by the PPTA consultants, and in preparing the IEEs required for each subproject.

11.4 Task 2: Social Development and Gender

The PIC social development and gender specialists are a 'whole project' resource based in the PMU.[28] They would overview all project activities ensuring that the various provisions of ADB-SPS 2009 and the Project's Gender Action Plan (GAP) as well as relevant provisions of other project safeguards protocols[29] were complied with in full. It may be noted that social development and gender (SDG) specialists are in effect absent[30] in the suggested staffing schedule for CS5 Consultants who are tasked with preparing feasibility studies and detailed designs for medium irrigation and road subprojects. This implies that PIC specialists should assist CS5 consultants with their tasks to the fullest extent possible.

Another important Task for the SDG specialists will be to manage the Sub Contract for Gender Analysis in Agriculture Value Chains.

Task 201: Report on subproject poverty and social assessments, stakeholder communication strategy, and consultation and participation for community engagement to ensure beneficiaries leverage full impact of project's activities

Task 202: Review the Summary of Poverty Reduction and Social Strategy (SPRSS) and the GAP and their application in the three representative subprojects
Feasibility Study Reports for the three representative subprojects: Trapaing Run Irrigation; Tram Kak On-farm Water Management and Cassava Drying, Processing, and Storage include annexes entitled: Annex 2: Socio Economic Survey, and Annex 8: Social and Gender Impact Assessment and Gender Action Plan.

These Annexes as well as other sections of the feasibility reports would be reviewed to confirm or otherwise if the subprojects were acceptable. It is interesting to note that in the Pro-Forma Subproject Feasibility Report List of Contents no Annex entitled Social and Gender Impact Assessment and Gender Action Plan is now proposed (PAM pp160/1 Annex 7). The RRP[31] includes Annexes entitled: Annex 27: Stakeholder Consultation and Participation Plan and Annex 28: Stakeholder Communication Strategy.

[27] RRP Annex 14. Initial Environmental Examination: Trapaing Run Irrigation Subproject and
RRP Annex 15. Environmental Assessment and Review Framework
[28] PMU would also be assisted by the PIC social safeguard, environment and climate change specialists (see
[29] Summary Poverty Reduction and Social Strategy; Detailed Poverty and Social Impact Analysis; Detailed Gender Analysis; Indigenous Peoples Planning Framework: Ethnic Minority Development Framework
[30] Only 4 months of National Social Development & Gender specialist are suggested
[31] Climate Friendly Agribusiness Value Chains Sector Project: Report and Recommendations of the President to the Board of Directors, ADB Manila June 2018

These would be thoroughly reviewed, and if necessary, discussed with both IAs and representative beneficiaries. If any modifications to more likely ensure that beneficiaries receive the full impact of project's activities such would be recommended to PMU and if appropriate ADB.

Task 203: Review and reconfirm the subprojects developed during project preparation in close association with the PMU and PPIUs and MAFF Gender Focal Points (i.e. the Gender and Children's Project Support Unit [GCSPU])

During the PPTA assignment, three subprojects were taken to feasibility level, as mentioned in Tasks 201/202 above. These covered three types of development: medium scale irrigation improvement, drip irrigation pilot development and drying, processing and storage (DPS) facilities. It is expected that the reviews undertaken in connection with Tasks 201/202 would enable PIC experts to confirm the suitability of the three representative subprojects.

The PPTA pre-screened a further 21 medium irrigation and 25 DPS subprojects (Table 6 and Table 7). No information apart from 'names' have yet been found but it is expected that some basic data do exist and these would be reviewed as soon as possible. addition to these types of subproject, significant project resources are earmarked for the improvement of 250 km of farm roads and 800 On Farm Water Catchment Ponds. To date, no details of these proposed investments have been found. A priority for PIC on appointment would be to prepare in effect two Representative Subproject, a road and an On-Farm Water Catchment Pond. On a smaller scale, some 12,000 bio-digesters (benefitting 80,000 people (50% female0 and 6,000 compost huts are planned. A pro-forma check list to assess impact might be prepared.

Task 204: Provide technical leadership related to the future proposed subprojects from the social development and gender perspectives, based on the gender analysis of the four agricultural value chains (AVCs)

The four AVCs are assumed to cover rice, cassava, maize and mango. It appears that no recent AVC analyses have been carried in Cambodia although under ADB assisted TA-9545 CAM: Agricultural Value Chain Infrastructure Improvement Project (AVC-IIP) such AVCs should be available by April 2019. This should be well in time for the experts to review the gender analysis provided in these studies and make appropriate recommendations for new subprojects.

Task 205: Coordinate with MAFF-GCSPU to ensure alignment with and support the operationalization of MAFF Gender Policy and Strategy

In developing new subprojects, the specialists would be conscience of the need to align the project with MAFF Gender Policy and Strategy and to this end close coordination would be made with MAFF-GCSPU.

Task 206: Develop a detailed baseline and targets for overall GAP and poverty reduction indicators for each sub-project

A detailed baseline and targets for overall GAP and poverty reduction indicators were prepared for the three Representative Subprojects. Similar baselines, targets and indicators, suitably modified if activities under **Tasks 201/202**, indicate some gaps, would be undertaken by the specialists.

Task 207: Assist implementation of specific activities included in GAP

Task 208: Support mainstreaming of gender into the project through the application of GAP

Task 209: Ensure that social development and gender issues are appropriately covered within all phases of the project

These three Tasks are linked and specialists will liaise with and advise all stakeholders to ensure that all project activities are undertaken in conformity with the project GAP considering also that other social development and gender issues are appropriately addressed.

Task 210: Provide advice to PMU, GCSPU, and PPIUs and the project affected communities on implementing GAP, regularly monitor and report (at least semi-annually to ADB) using the GAP Monitoring Table (PAM Annex 4)

Task 211: Assist PMU, IAs and other stakeholders (GCPSU, WFN, gender focal points) to implement and monitor the GAP and report on progress of the GAP implementation in accordance with ADB and RGC gender related policies and guidelines
The specialists would provide all necessary advice and assistance related to GAP issues to all agencies involved with project implementation. Regular meetings, perhaps at monthly intervals, would be arranged with all agencies when progress and any difficulties would be raised and discussed. The GAP Monitoring Table might provide a useful checklist agenda for these meetings. The specialists would formally prepare and submit to ADB and others at six-monthly intervals.

Task 212: Support PMU and PPIUs in the preparation of Annual Work Plans and Budgets (AWPB) for GAP implementation
The specialists would work closely with PMU and PPIUs to develop AWPBs. In preparing such AWPB, agreed targets and actual achievements in previous periods would be considered. If performance was poor, the reasons for this would be identified and necessary remedial action proposed, conversely if performance was better than expected lessons would be learnt and targets raised.

Task 213: Assist with assessment and carefully track ID poor and women's livelihood needs
Commune offices would be visited to identify and locate ID poor (that is formally recognized poor HHs). These HHs would be regularly monitored over the life of the project to assess impacts, both on men and women. Field surveys would be undertaken to representative HHs to more fully understand women's livelihood needs. All HH types from ID poor upwards would be covered and the surveys might be undertaken over one year with four quarterly visits to each HH.

Task 214: Assist PPIUs with provision of guidelines to support vulnerable households and groups
On the basis of the investigations carried out under **Task 215 and review of relevant reports,** the specialists, in cooperation with PMU and PPIUs would prepare Guidelines on how best to support vulnerable households and groups.

Task 215: Facilitate knowledge sharing on social development and gender related issues, including from the Climate-Friendly Agribusiness Value Chains Sector projects in Laos and Myanmar

Task 216: Facilitate knowledge sharing on social development and gender related issues, including sister CFAVC projects, through partner forums, web pages and reports, including lessons learned/best practice from elsewhere in Cambodia
The specialists would consider how best to share knowledge gained on similar projects elsewhere as well as lessons learned and best practice from elsewhere in Cambodia. For officials, the setting up of a Project Website (perhaps based in PMU) is an obvious choice. For other stakeholders a newsletter and perhaps TV coverage might be considered while radio shows and podcasts are effective in rural areas and the country in general. Project workshops at Project workshops at both central and provincial should be considered.

Task 217: Manage the Sub Contract for Gender Analysis in Agriculture Value Chains
Under the PIC SC1 main contract a sub contract will be let that will investigate the role of gender in agriculture value chains. The overall objective of sub contracted assignment is to undertake a detailed gender analysis of and along the key agricultural value chains being addressed by the CFAVC project (rice, maize, mango and cassava), in order to provide evidence-based information to inform (i) the agribusiness value chains sector policy, strategies and programs in

Cambodia and ensure they are gender sensitive (especially the policy to be drafted with support from the project) and (ii) the design of sub-sector project activities and contribute to increased effectiveness of the project. The role of PIC SC1 specialists will be to: prepare bidding documents, identify suitable sub-contractors, award the sub-contract (following approval from MAFF and ADB) and oversee the assignment, ensuring the Final Report is acceptable to all.

11.5 Task 3: Support, Strengthen, Coordinate and Guide the PMU, PPIUs, IAs, Consultancy and Contractors in Selection of and Design of Infrastructure

11.5.1 Task 3.1 Design of the Water Management and Irrigation Systems

Task 301: With support from others, update the land acquisition Due Diligence Report (DDR) for the Trapaing Run irrigation scheme with reference to the final detailed design and obtain witnessed donation forms

The first subproject for which detailed design will be complete will be Representative Subproject Trapaing Run irrigation scheme. It will therefore be important that all aspects of the final design papers and drawings are correct and comprehensive. PIC-CS1 specialists will work closely with CS5 consultants to ensure that all is in order including witnessed donation forms (if required)

Task 302: Supervise and liaise with the consultants that are contracted to conduct the irrigation infrastructure work and offer guidance to them when needed and for each water management and irrigation site

Task 303: Review the designs prepared by the design consultants and make recommendations for revision and updating of the bill of quantities (BOQs), if necessary

Task 304: Assess compliance with climate resilience guidelines in the design of each water management and irrigation subproject site
As mentioned above, PIC specialists will meet regularly with all feasibility and design consultants and any compliance issues relating to climate resilience will be fully discussed. It is hoped that no significant other issues will arise when the PIC-CS1 formally review the feasibility designs, but if necessary, changes will be made to drawings and BOQs.

11.5.2 Task 3.2 Design of the Cooperative Stores and Roads

Task 305: Assess the plan for the construction of the cooperative storage units and evaluate the requests from PDAFF and Agricultural Cooperative Promotion for the siting of units

Task 306: Make field trips to confirm eligibility criteria is satisfied and report back to the team leader, deputy team leader and PMU
These two Tasks are clearly linked. While some potential subprojects were pre-screened during the PPTA assignment, none, as far as is known have yet been formally approved for development. PIC specialists would assess all proposals made by the various IAs and prepare a Subproject Identification Report (SIR). In preparing this report visits would be made to IA offices and subproject sites, and hold discussions with potential beneficiaries. The SIR would confirm or otherwise if the subproject was suitable.

Task 307: For each cooperative store that is approved, assess the need to climate resilient rural roads and make recommendations as necessary

The project has provision for 178.15 km concrete roads and 435.69 km laterite roads, with the laterite roads from the irrigation schemes to the ACs and the concrete roads from the ACS to the Markets. MAFF suggests to first connect ACs to markets with concrete roads as they are vital for the ACs. I second stage, laterite roads from irrigation schemes are connected to ACs. PIC-CS1 will recommend that the IAs include their proposals for related roads when they submit their proposals for storage unit. In this way, the relevant SIR will include PIC-CS1's comments on the road.

Task 616: Provide necessary technical and management support to the executing agencies for effective project implementation relating to cooperative storage units and rural roads

Task 617: Assist in the development of a detailed work plan for cooperative storage units and rural road infrastructure development in consultation with IAs, includes establishing an appropriate management and monitoring system
Having confirmed a number of subprojects, PIC specialists would work with PDAFF to prepare a detailed work plan, which would cover engagement of consultants for the storage units (as CS5 already pre-selected for the farm road component), feasibility, detailed design and construction. Regular meetings and site visits would be held and necessary adjustments mutually made to the work plan.

Task 618: Supervise and liaise with the consultants that are contracted to conduct the infrastructure work and offer guidance to them when needed
The PIC specialists will liaise closely with CS5 and other consultants as the latter's feasibility report preparation progresses. In this way it is hoped that the final review will not result in any major request for revisions.

Task 645: Ensure detailed engineering design documentation provides details of all land that needs to be acquired

Task 646: Assist with the preparation of LARPs for the subprojects related to the final detailed engineering design in cooperation with General Department of Resettlement (GDR) and the design engineers
Using the model developed for Trapaing Run, PIC-CS1 will check and to ensure that all subproject detail designs and drawings give full details of all land to be acquired, both temporarily during implementation and in the long term. If required by the consultants, PIC-CS1 will assist in preparation of the subproject LARPs, in cooperation with GDR.

Task 647: Assist conduct of social safeguards Due Diligence for subprojects following completion of detailed design in accordance with the outline provided in the approved LARF, submit them to the EA for further concordance with GDR and solicit ADB's concurrence
PIC-CS1 would work with CS5 consultants to prepare the necessary DD report and thereafter submit it to the EA (MAFF) for onward processing by SDR and ADB.

Task 650: Review and approve Detailed Engineering Design of storage and roads subprojects

Task 651: Review the detailed technical specifications of equipment, materials and civil works completed by the feasibility and detailed design consultants
PIC-CS1 specialists would review detailed designs of all works in detail, those prepared by CS5 (medium irrigation and roads) and other consultants (on-farm water management ponds and storage units). All aspects of designs including calculations, soil test results, topographic survey data, drawings, specifications, lists of equipment, quantity computations and priced bills of quantities, and overall cost estimates would be required.

Task 103: Propose appropriate options for PPP arrangements for storage subprojects
Project modalities envisage subprojects involving storage being given to suitably qualified agricultural cooperatives[32]. The project would fund the capital works with the cooperative being responsible for operation and maintenance. A wholly privately financed and operated storage facility is quite feasible and viable and many exist in Cambodia. However, an aim of the project must be to strengthen agricultural cooperatives so such a wholly private facility would not be encouraged.

Task 104: Review design options for storage subprojects, including associated farm roads
Currently, agricultural cooperatives' drying, storage, and processing facilities are usually rudimentary and highly vulnerable to the impacts of climate change with the drying process being undertaken on the ground on a tarpaulin. Various drying, processing and storage facilities with capacities of 50, 100 and 200 tonnes are proposed with the size depending on the crop commodity or the trade that the cooperative deals in seed grain, grain for processing or cassava chips. Twenty-five potential cooperatives with sites for storage and related facilities were pre-screened by the PPTA consultants. (**Table 17**).

Storage units will be climate-proofed by considering current climate variability and projected climate change extremes and associated pests and diseases. The measures will include providing for improved aeration, drainage and runoff management, humidity control, pest control, and waste management. In addition, solar power will be introduced within the stores for ventilation and drying, lighting and powering management systems. Energy efficiency measures will be implemented in the infrastructure for drying, processing and storage to reduce carbon emissions from fuel wood which is currently used to operate facilities.

Some 250 km of improved farm roads that provide access to markets and road networks within communes are proposed. The roads planned will focus on linking the cooperative storage and drying units in two ways: (i) linking farm units and the production zones to the storage units; and (ii) connecting the stores to all-weather and climate-resilient roads, the latter having more durable structures to tolerate heavy transport and delivery trucks. The form of construction proposed will be based upon gravel, laterite or concrete depending on the traffic volumes and community needs.

11.5.3 Task 1.1 Design and Operate the Infrastructure Related to the Provincial Agricultural Development Centers (PADC)

The lack of access to reliable extension services is a critical constraint in target provinces. The project will provide the training facilities at the provincial level by establishing four PADCs so that they are fully operational to improve and create resource and training centres for service provision, agribusinesses and farmer value chain linkages. The project will finance the building of a PADC in Takeo, Tboung Khmum and Kampong Cham provinces and the rehabilitation of the existing extension/agricultural development center in Kampot.

Task 105: Provide necessary technical and management support to the executing agencies and IAs for effective project implementation relating to PADCs
The PIC PADC Operations and Management specialist will be able to provide the necessary technical and management support being a qualified civil engineer with experience in the design and supervision of training establishments and offices. S/he will be familiar with climate resilient infrastructure and the use of renewable energy in building design.

Task 106: Assess the plan for the construction of PADCs and requests from PDAFFs for changes of design (if any) including undertaking field trips to verify the need for any design changes, report back to the Team Leader and PMU

[32] Recognized by the Department of Agricultural Cooperative Promotion (DACP) of General Directorate of Agriculture, MAFF

Task 107: Review the designs prepared by the PPTA and make recommendations for revision and updating the bill of quantities, if necessary

Task 108: For each PADC, ensure renewable energy systems are optimal and make recommendations as necessary
These three Tasks are clearly linked. The specialist would initially review the PPTA proposals, in particular checking the renewable energy proposals. S/he would then visit the concerned PPIU and obtain their views. A joint site visit would then be made. On the basis of these activities a comprehensive report would be prepared, in which any changes considered necessary would be discussed and any cost and programming issues presented. After full discussion and, hopefully agreement the final designs would be submitted for approval to PMU and, if necessary, to ADB.

Task 109: Assist in the development of a detailed work and management plan for PADC infrastructure development in consultation with the PPIUs, including the establishment of an appropriate management and monitoring system
A detailed work plan for each of the PADCs would be prepared jointly by the specialist and the concerned PPIU and their consultants (if any). The plan would include: preparation of final design, safeguards review, preparation of bidding documents, selection and award, supervision and construction (groundworks, walls, roofing, first-fix services, internal plastering and decoration, second-fix services), completion, preparation of maintenance plan and hand-over. Regular meetings would be held between the PPIU, consultant, contractor and specialist.

Task 110: Supervise and liaise with consultants and contractors contracted to conduct the infrastructure work and offer guidance to them when needed
The specialist would monitor the PPIU consultants, engaged to supervise the contractors building the PADC, and also provide top-level supervision of the contractor directly mainly through the monthly meetings (included under Task 109) and associated site visits.

Task 111: At handover, submit an operation and maintenance (O&M) plan for the PADC and prepare procedures and guidelines to facilitate the adoption of the O&M plan
The specialist would prepare in consultation with the PPIU, consultants and contractors what would more usually be termed a Maintenance (or Asset Management) Plan[33]. This MP would cover all aspects of site and building maintenance, including: internal and external drainage, walls, rooves, internal decoration, expected life and replacement. The MP would cover activities to be undertaken and the staff responsible for carrying them out and budget costs.

11.5.4 Task 1.2 Design and Operation of the Infrastructure Related to Mechanical Workshops (MW)

The lack of access to reliable farm mechanization services is a critical constraint in target provinces. The project will provide and fully equip four provincial agricultural engineering workshops so that they are fully operational to improve and create resource and training centres for service provision, agribusinesses and farmer value chain linkages. Three new workshops with classrooms will be constructed in Kampot, Kampong Cham and Tboung Khmum, while the already-constructed new workshop and classroom in Takeo will be fully equipped and commissioned.

Task 112: Provide necessary technical and management support to the executing agencies and IAs for effective project implementation relating to Mechanical Workshops
The PIC Mechanical Workshops Operations and Management specialist will be able to provide the necessary technical and management support being a qualified civil or mechanical engineer with experience in the design and supervision of mechanical workshops and also with experience in the actual operation and maintenance of a mechanical repair or fabrication facility. S/he will be

[33] Operation of the PADCs would be undertaken by various PDAFF entities

familiar with climate resilient infrastructure and the use of renewable energy in building design and operation.

Task 113: Assess the plan for the construction of MWs and requests from PDAFFs for changes of design (if any) including undertaking field trips to verify the need for any design changes, report back to the Team Leader and PMU

Task 114: Review the designs prepared by the PPTA and make recommendations for revision and updating the bill of quantities, if necessary

Task 115: For each MW, ensure renewable energy systems are optimal and make recommendations as necessary
These three Tasks are clearly linked. The specialist would initially review the PPTA proposals, in particular checking the renewable energy proposals. S/he would then visit the concerned PPIU and obtain their views. A joint site visit would then be made. On the basis of these activities a comprehensive report would be prepared, in which any changes considered necessary would be discussed and any cost and programming issues presented. After full discussion and, hopefully agreement the final designs would be submitted for approval to PMU and, if necessary, to ADB.

Task 116: Assist in the development of a detailed work and management plan for MW infrastructure development in consultation with the PPIUs, including the establishment of an appropriate management and monitoring system

A detailed work plan for each of the three new MW would be prepared jointly by the specialist and the concerned PPIU and their consultants (if any). The plan would include: preparation of final design, safeguards review, preparation of bidding documents, selection and award, supervision and construction (groundworks, walls, roofing, first-fix services, internal plastering and decoration, second-fix services), completion, preparation of maintenance plan and hand-over. Regular meetings would be held between the PPIU, consultant, contractor and specialist

Task 117: For each MW, review the procurement list relating to tools and equipment and make revisions where necessary prior to procurement
PPIU with assistance from the PPTA consultants will have prepared a list of tools and equipment required in each MW. This list will be reviewed by the specialist in cooperation with the concerned PPIU and a final list prepared.

Task 118: Supervise and liaise with consultants and contractors contracted to conduct the infrastructure work and offer guidance to them when needed
The specialist would monitor the PPIU consultants, engaged to supervise the contractors building the MW, and also provide top-level supervision of the contractor directly mainly through the monthly meetings (included under Task 117) and associated site visits.

Task 119: At handover, submit an operation and maintenance (O&M) plan for the MW and prepare procedures and guidelines to facilitate the adoption of the O&M plan
The specialist would prepare in consultation with the PPIU, consultants and contractors what would more usually be termed a Maintenance (or Asset Management) Plan[34]. This MP would cover all aspects of site and building maintenance, including: internal and external drainage, walls, rooves, internal decoration, expected life and replacement.

A separate Operations Plan would also be prepared. This OP would be prepared in cooperation with concerned PDAFF entities responsible for operations. The OP would list all tools and equipment installed with their expected life as well as materials required in operation including fast-moving spare parts, steel, and oxygen. The MP and OP would cover activities to be undertaken and the staff responsible for carrying them out together with budget costs.

[34] Operation of the MW would be undertaken by various PDAFF entities

11.5.5 Task 3.5: Preparation of Detailed Annual Plans

Task 120: Overall responsibility for preparation and implementation of work plans

Task 121: Develop and prepare annual detailed work plan in consultation with the executing and implementation agencies to be used and submitted annually
The ITL and NDL would prepare and keep updated a detailed Project Implementation Plan (PIP) building upon the plan given in the PAM pp 3-5 Table 2 and the plan to be prepared for the Inception Report (Task 007). Compliance with or divergences from Plan would be discussed at each monthly meeting and remedial action (if any) decided.

11.6 Task 4: Support in Procurement of Infrastructure and Equipment

All procurement of goods, works, and consulting services will be undertaken in accordance with ADB Procurement Guidelines (2015, as amended from time to time). An 18-month procurement plan indicating threshold and review procedures, goods, works, and consulting service contract packages and national competitive bidding guidelines is included in the PAM pp 28-40.

International competitive bidding (ICB) procedures will be used for works contracts estimated to cost from $3 million and above, and for goods contracts estimated to cost $1 million and above. Works contracts estimated to cost below $3 million up to $100,000, and goods contract below $1 million up to $100,000 will be procured through the national competitive bidding (NCB) procedures. Minor items estimated to cost below $100,000 for both works and goods will be procured through shopping method. When NCB is proposed, before the start of any procurement, ADB and the government will review the public procurement laws of the central and provincial governments to ensure consistency with ADB guidelines.

The PIC procurement specialists will have the appropriate academic qualifications and significant experience in the procurement of works and goods, preparation of tender and contract documents, evaluation of bids, and contract management They will have had experience of at least one ADB financed project and of developing and managing a FIDIC contract for large works.

Task 401: Review and update existing procurement manuals for the project
No Procurement Manual as such has been identified but full details of procedures and as stated above a Procurement Plan is included in the PAM. If indeed a Manual is required, this could be developed from the PAM papers.

Task 402: Provide guidance to PMU and implementing agencies in preparing bidding documents, evaluation of bids, contract negotiations and in finalizing contract agreements for works, goods and services
The PIC specialists based upon their previous experience will be able to provide the required guidance to PMU at all stages in the procurement process. ADB has two forms of Standard Bidding Documents (SBD) one for Small Works and one for all other works. Both are based upon Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer, Multilateral Development Bank Harmonized Edition, prepared by FIDIC. ADB has published a User's Guide for both forms SBD which set out the full bidding process.

Task 403: Guide the PMU in preparing request for proposal for engaging consulting services and other services, reviewing proposals; negotiating contracts and finalizing contract agreements for services
ADB have prepared guidelines[35] on the use of consultants. These guidelines set out in detail the processes that should be followed to recruit consultants. PIC experts are well versed in the guidelines and can provide any assistance required by PMU.

[35] *Guidelines on the Use of Consultants by Asian Development Bank and Its Borrowers* (April 2010 as amended from time to time), ADB Manila

Task 404: Assist PMU to prepare bidding documents
Bidding documents are likely to comprise the documents listed below:

1 - Instructions to Bidders (ITB)
2 - Bid Data Sheet (BDS)
3 - Evaluation and Qualification Criteria (EQC)
4 - Bidding Forms (BDF).
5 - Eligible Countries (ELC)
6 - Employer's Requirements (ERQ includes Specifications and Drawings
7 - General Conditions of Contract (GCC)
8 - Particular Conditions of Contract (PCC) includes Bills of Quantities.
9 - Contract Forms (COF)

While many of the documents are 'common' to all contracts. However, 6 and 8 include specific details of the works to be undertaken and their required quality, while the Bills of Quantities set out the quantities of work.
PIC specialists would assist PMU to prepare the 'common' documents and could assist with preparation of the specific documents but it is more usual for the consultants who have designed the works (in this case mainly CS5) to prepare the specific documents.

Task 405: Provide inputs to PMU on the PADC preparation of bidding documents, evaluation of bids, contract negotiation and contract administration
Task 406: Provide inputs to the PMU on the preparation of Mechanical Workshop bidding documents, evaluation of bids, contract negotiation and contract administration

Task 407: Work with PMU on the preparation of bidding documents and selection of eligible bidders and provide guidance to the Procurement Selection Committee on choice of contractor

Task 408: Provide inputs in the preparation of the bidding documents, evaluation of bids, contract negotiation and contract;

Task 409: Assist PMU to evaluate bids and proposals, prepare Evaluation Reports and submit for award

Task 410: Assist PMU to undertake negotiations and finalize Contracts for good, works and services
These six Tasks all concern the bidding and award process of project works, including PADC and MW facilities and irrigation and works. The PIC team would provide would provide any assistance required by PMU in carrying out the procurement of the project works. However, as mentioned above specific contract data, including drawings, Specifications and Bills of Quantities are usually prepared by any consultants responsible for detailed design of works.

Task 411: Prepare progress report formats and quality control and inspection systems to be followed during execution of civil work contracts
A progress report format is given in PAM Annex 5 p 151. This would adopt initially and if necessary modified over time. It is usual to prepare a Contract Management and Construction Supervision Manual. This manual sets out in detail the inspection and materials testing regime that should be followed. Such a manual would be prepared if PMU requested it.

Task 412: Review progress reports and identify issues relating to or that might affect procurement and implementation of contracts
Progress reports would as a matter of course highlight issues relating to or that might affect procurement and implementation of contracts and would recommend actions to be taken to remedy any deficiencies.

11.7 Task 5: Financial Loan Management

The financial management capacity of MAFF, the executing agency, and the provincial offices of MAFF, MOWRAM and MRD in the four project provinces, as implementing agencies including funds flow arrangements, staffing, accounting and financial reporting systems, financial information systems, and internal and external auditing was assessed in 2016. A Financial Management Assessment (FMA) was conducted in accordance with ADB Guidelines for the Financial Management and Analysis of Projects, and the Financial Due Diligence: A Methodology Note. Based on the FMA, the key financial management risks identified were:

(i) need improvements in control of budget execution; accounting and reporting, and budget credibility;
(ii) limited financial management capacity of the public-sector institutions;
(iii) transfer of responsibilities for budget management from MEF to line ministries, including the rolling out of the Financial Management Information System;
(iv) transfer of functions and resources to sub-national administrations (SNAs); delays in the delegation of functions, and inadequate delegation will postpone the build-up of capacity in SNAs; and
(v) quality of both internal and external audit reports is improving but remains a concern.

The FMA concluded that the overall pre-mitigation financial management risk of the executing and implementing agencies was moderate. The borrower, executing and implementing agencies agreed to implement an Action Plan as key measures to address the deficiencies, this included recruitment of PIC accounts and finance specialists. The PIC experts will have appropriate academic qualifications in Finance and/or Accounting. They will have significant work experience with international consultants and/or organizations preferably in donor funded projects and government institutes and preferably experience in financial management and accounting of an ADB-financed project.

Task 501: Develop a financial planning system for project implementation and operation, with long, medium-term and annual operating plans and schedules as agreed by ADB, MEF & MAFF for project implementation and operation

PIC specialists will assist PMU is to prepare budgets for significant activities as stated in the three financing agreements in sufficient details to allow meaningful monitoring of the subsequent performance. Actual expenditures are required to compare with the budgets. Any variation between the actual expenditure and budgets need to be justified. The detailed budget preparation and financial planning system is set out in the Financial Management Manual (FMM).

Task 502: For accounting oversight: develop and establish a manual and standard procedures for project accounting acceptable to ADB, MEF and the EA

Most proposed IAs/PPIUs do not have accounting systems to record financial transactions and prepare the required financial reports. Hence, based upon their previous experience in similar projects the PIC specialists will prepare and Accounts Manual in cooperation with the PMU and PPIU accounts staff.

Task 503: For internal control, funds flow management, financial reporting: develop and make operational a manual and procedures acceptable to ADB, MEF and the EA for project financial management

Limited internal audit capacity was identified during the FMA. The key steps to be taken to improve the situation include recruiting qualified accountants to each EA and IU office and the preparation by PIC specialists of an Internal Audit Manual covering funds flow management, financial reporting and project financial management.

Task 504: For audit planning: assist preparation of TORs for independent external auditor for approval by MEF, MAFF and ADB and advise/assist MAFF on recruitment of internal auditors to audit project accounts and advance account activities

On the basis of their previous experience, the PIC specialists will work with PMU and PPIUs to develop terms of reference for a regular independent external audit. They will also advise and assist MAFF as executing agency to recruit suitably qualified accountants, including being members of interview panels and using their own professional networks.

Task 505: For audit management: advise and assist PMU in facilitating external and internal audits
PIC specialists will advise and assist PMU to undertake audits in a timely manner, in part by training the newly recruited accounts staff.

Task 506: Following the establishment of financial and accounting procedures, the specialist will be in charge of all operations and administrative control;
Having developed all the accounting and finance procedure manuals the PIC specialists will assume control of all operations and the administration.

Task 307: Assist in the review and preparation of Withdrawal Applications for submission to MEF and ADB
Before the submission of the first withdrawal application (WA), the borrower should submit to ADB sufficient evidence of the authority of the person(s) who will sign the withdrawal applications on behalf of the government, together with the authenticated specimen signatures of each authorized person. The minimum value per WA is stipulated in the Loan Disbursement Handbook (2017, as amended from time to time)[36]. WA must be sequentially numbered starting with number one.

11.8 Task 5: Provision of Capacity Building and Gender

An Institutional Capacity and Training Plan (ICTP) was prepared during the PPTA assignment (Annex 29 of the RRP). ICTP recommendations for various entities are listed in **Box 1**. Consultancy Contract SC 2 Capacity Building and Climate Smart Agriculture Consulting Firm will/has field(ed) amongst others the following training specialists:

- **National Training and Capacity Building Specialist** for 60 person-months S/he will be responsible for the whole project's capacity building program in relation to standards, cooperative and FWUC organization and the development both on-farm training and demonstrations as well as formal training at the PADCs and Mechanical Workshops;
- **FWUC Training Specialist** for 37 months
- **Agricultural Machinery O&M Training Specialist** for 54 months
- **Public Private Partnership Specialist** for 30 months

The Terms of Reference for most, if not all, PIC-CS1 specialists have training and capacity building Tasks and they will work in full cooperation with the SC2 specialists.

[36] ADB. 2017. *Loan Disbursement Handbook*. Manila

Box 2: Training Topics Recommended in PPTA Institutional Capacity and Training Plan

For PMU	infrastructure investments, tendering processes and public-private partnership (PPP)
For PDA as well as AC board and its farmer members	The main thrust of the capacity building will be to (i) ensure effective provincial oversight of the contractors; and (ii) monitoring and evaluation of the irrigation subproject investments and the support to the establishment and development of FWUCs. Trainings will include: (i) on-farm demonstration of drip irrigation, ponds agricultural machinery operations, including laser land levelling (its operation and its use) and the practical applications relating to standards compliance; (ii) formal training on CSA, CAMGAP and the SRP, in relation to record keeping and following the control criteria; (iii) formal training on AC management and, agribusiness development including book keeping and accounting; (iv) management and operation of provincial agricultural development centers and mechanization workshops for government staff; (v) management and operation of AC drying and storage units for maize, rice and cassava; and (vi) a course on the importance of the access to crop value chains and marketing.
For MOWRAM/ PDWRAM	For construction and contracting the irrigation subprojects, the MOWRAM Technical Department and PDWRAM will be supported by the PIC who has rural infrastructure responsibilities. However, MOWRAM have ADB procurement systems in place that have been perfected during implementation of a number of ADB irrigation projects and programs. More importantly is the PDWRAM training on establishing, organizing and implementing **FWUCs** which will include (i) FWUC roles and responsibilities; (ii) problems and factors for success; (iii) on revamping dysfunctional FWUCs; and (iv) on establishing and strengthening FWUCs With respect to **climate change,** training will look at the resilience of the irrigation subprojects already completed and how to improve designs on schemes yet to be implemented.
For MRD/PRD	For **construction of and contracting** for the rural roads, the MRD Department of Technical Affairs will support the PDRD and will be supported by the PIC. Only Kampot province has not received support from the ADB Rural Roads Improvement projects and, as such, the PDRD will **need capacity building in ADB procedures** and processing for monitoring construction. With respect to **climate change**, the training will also look at the resilience of the supported rural roads and how to improve the designs on schemes to be implemented (as recommended under Climate Change Action Plan (CCAP) for Rural Infrastructure (MRD) 2014)

For all training and capacity building, the basic Training Process will involve the following Steps:

(i) selection of topic(s)
(ii) identification potential trainees
(iii) undertake training needs assessment (TNA)
(iv) prepare course outline
(v) prepare training materials
(vi) identify training venue(s)
(vii) impart training
(viii) assess training outcome.

The training related Tasks of the PIC-CS1 specialists are grouped together below by discipline.

Procurement Specialists
Task 501: Develop and organize contract management capacity building and training covering FIDIC conditions and ADB procurement guidelines and procedures for project implementation staff;

Task 502: Recommend and ensure implementation of contract management capacity building training covering FIDIC, and ADB procurement guidelines and procedures for the project implementation staff in the PMU, PPIU, and other IAs

Social Development and Gender Specialists
Task 503: Prepare and assist in delivering training courses in project implementation, including gender & inclusion (poor, landless, etc.) related issues for all the project implementation agencies and other stakeholders as appropriate;

Task 504: Build capacity to collect and document GAP quantitative and qualitative data;

Task 505: Advise PPIUs on a training needs assessment of impacted households, including disaggregation of livelihoods by gender and ethnicity if relevant

Task 506: Assist PPIUs with provision of technical assistance and coordination of demand-driven awareness building and training

Task 507: Provide gender awareness training and strengthening national systems for gender mainstreaming through the MAFF GCSPU, and strengthening capacity of the Women's Farmers Network (WFN) in the four project provinces.

Task 508: Support capacity building for GCPSU and the WFN through their active involvement in project activities and training events;

Task 509: With GCPSU and WFN, contribute to preparation and delivery of training courses and stakeholder workshops to inform and raise awareness of project related and other social development and gender issues in subproject areas;

Social Safeguards Specialists

Task 510: Prepare training guidelines for preparation of LARP, and EMDP in accordance with Cambodian Laws and Regulations, ADB's SPS, LARF and EMDF

Task 511: Assist the international specialist to prepare and deliver training for preparation of an RP, and EMDP in accordance with the Cambodian Laws and Regulations, ADB's SPS, the project's LARF and EMDF

Task 512: Provide safeguard concept and monitoring training to executing and implementation agencies staff

Environment and Climate Change Specialists

Task 513: Deliver training in (a) EARF procedures for screening, and assessing environmental impact (IEEs); and (b) record- keeping and reporting

Task 514: Map out capacity needs of policymakers and other stakeholders

Task 515: Identify priority activities for strengthening the capacity of policymakers and relevant stakeholders

Task 516: Advise on knowledge management on climate change adaptation (CCA) and disaster risk reduction, including unearthing existing and indigenous knowledge and putting together in usable form

Task 517: Prepare training materials/guidelines/sector manuals, conduct training/workshops focusing on integration of CCA to subnational planning/development, gender/CCA investment, & indicators related to national, sectoral and project M&E systems.

Task 518: Organize capacity building events for relevant stakeholders at the provincial, district and commune levels

PADC and MW Operation and Management Specialists

Task 519: Work with the National Training and Capacity Building Coordinator to incorporate design and operation parameters into the training program for all beneficiaries

Task 520: Work with the Mechanization Capacity Building and Training experts and specialists to incorporate design and operation characteristics into the training program for all beneficiaries;

Financial Management Specialists

Task 521: Support capacity building of financial and accounting staff following terms agreed by ADB, MEF and MAFF, organize training in accounting and financial management for PMU and IAs staff assigned to project implementation and operation;

Task 522: Ensure effective training of PMU's government appointed Finance Officer

Water Management and Irrigation Engineering Specialist

Task 523: Collaborate with those responsible for FWUC capacity building (MOWRAM, PDWRAM and consultants) to develop the training program and wherever possible make recommendations for improvement;

Cooperative Storage and Rural Roads Engineering Specialist

Task 524: Ensure the subproject proposed are appropriate, make field trips to confirm eligibility criteria are satisfied and report back to the Team Leader and PMU;

11.9 Task 7: Construction Supervision

Task 701: Supervise construction of civil works in conjunction with the civil engineers assigned in the PMU under MOWRAM and MRD

Task 702: Supervise the civil works carried out under the project, in coordination with the PMU and PPIUs at the provincial, district, and commune level

Task 703: Monitor the on-site construction to ensure the work is compliant with the quality required and it will be handed over on-time, if not report back to PMU highlighting issues identified

RFP Terms of Reference for all PIC-CS1 engineering specialists include supervision or monitoring of construction. Most if not all of the construction contracts will be formally supervised by a Project Manager designated by the client which is likely to be PMU or a PPIU. If the Project Manager wishes to delegate some of his contractual duties to anyone else, including PIC-CS1 specialists he can do it under Clause 5 of the Conditions of Contract where at point 5.1 it is written:

"The Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator, after notifying the Contractor, and may cancel any delegation after notifying the Contractor."

The most effective contract supervision is provided by a sufficient number of honest, suitably qualified and experienced resident supervision staff and there is no real substitute for that. Random unannounced visits by the PIC-CS1 team, both engineering and safeguard specialists are of value and major deficiencies may be identified. Attendance at site progress meetings by specialists would also be encouraged.

11.10 Task 8: Assist in the Set-up of Efficient O&M

11.10.1 Task 8.1: O&M of the Irrigation and Water Management Infrastructure

Task 801: Propose appropriate operation and maintenance regimes for irrigation and on-farm water subprojects

PIC-CS1 specialists would work with the concerned design consultants to prepare appropriate operation and maintenance manuals for irrigation and on-farm water subprojects. These manuals would set out in clear language with diagrams the basis on which the particular subproject had been designed. It would also give suggested watering regimes for the crops likely to be grown, with an emphasis on water efficiency. The need to cooperate with others served by the subproject and to form a strong FWUC would also be highlighted.

Various training and capacity building activities would be arranged for the FWUCs in cooperation with SC2's:
National Training and Capacity Building Specialist and the FWUC Training Specialist.

11.10.2 Task 8.2 Assist the MRD to Establish Efficient O&M of the Roads

Task 802: Propose appropriate operation and maintenance regimes for road subprojects
PIC-CS1 specialists together with PMU and CS5 consultants would liaise with MRD/PRD to learn of the latest procedures concerning maintenance of rural roads under the on-going ADB assisted Rural Roads III, in particular to understand the role of the beneficiaries. An appropriate Maintenance Manual would then be prepared as a joint undertaking by PMU/PIC-CS1 and CS5.

11.10.3 Task 8.3: Assist the Cooperatives to Establish Efficient O&M of Cooperatives

Task 803: Propose appropriate operation and maintenance regimes for storage subprojects

Task 804: At handover, submit an O&M plan for the cooperative storage units and lay down guidelines and procedures to ensure O&M is complied with
PDAFF is responsible for supporting agricultural cooperatives and will, with assistance from PIC-CS1, maintain close contact with the agricultural cooperative storage unit. The project will support the agricultural cooperative agribusiness directly or indirectly through PDAFF to undertake the following activities: (i) in association with SC2 training advisers assist in the development of a suite of capacity building programs related to post-harvest management, storage operation, and agribusiness development; (ii) ensure that there is coordination with the JICA agricultural cooperative business orientation work to either use JICA's training manual or make sure the manuals are compatible with the aims of the Law on Agricultural Cooperatives; (iii) assist in the recruitment, training and part payment of a drying and storage unit operations manager. The key to ensuring subprojects sustainability is to provide the maximum capacity building and advisory input in the first two years of operation.

PIC-CS1 specialists in consultation with the PDAFF, consultants and contractors would prepare what now is more usually termed a Maintenance (or Asset Management) Plan[37]. This MP would cover all aspects of site and building maintenance, including: internal and external drainage, walls, rooves, internal decoration, expected life and replacement. The MP would cover activities to be undertaken and the staff responsible for carrying them out and budget costs.

11.11 Task 9: Monitoring and Evaluation

Most if not all PIC-CS1 specialists have monitoring Tasks in their Terms of Reference and these are listed by discipline below. These Tasks need to be put in perspective and **Box 2** summarizes the project Monitoring and Evaluation procedures

Overall Project Monitoring and Evaluation
Task 901: Assist monitoring and evaluation staff in the PMU to establish an appropriate management and monitoring system

Task 902: With others, review and collate reports from the other consultants, PPIUs, and implementation agencies, highlighting discrepancies, and where applicable implement recommendations

Task 903: Quality check the progress reports, safeguard monitoring reports, and other compliance reports prior to submission to MAFF and ADB

[37] Operation of the storage units would by the concerned agricultural cooperative

Task 904: Contribute to the preparation and submission of the progress reports for submission to PMU and M&E staff, the frequency of reporting will be in accordance to that specified in the PAM

Safeguard Monitoring (including Environment and Climate Change)

Task 905: Provide input to PPMS and monitoring & evaluation reports on social safeguard indicators

Task 906: In accordance with ADB's SPS (2009) and the EMDP establish monitoring procedures;

Task 907: Provide inputs to the monitoring and reporting systems and provide information required for third party audit of land acquisition and voluntary donation case

Gender
Task 908: Regularly monitor and report (at least semi-annually to ADB) using the GAP Monitoring Table (PAM Annex 4)

Task 909: Ensure that gender indicators and targets in the DMF and GAP, as well as indicators to measure ID Poor status changes over time are included in PPMS for the project and build capacity to collect and document the relevant quantitative and qualitative data

Procurement
Task 910: Assist in establishing an appropriate procurement monitoring system

Box 3: Brief Overview of Project Monitoring and Evaluation Procedures

A. Monitoring
Project Performance Monitoring System (PPMS): A PPMS has been developed[38] based on the key indicators and targets outlined in the DMF. It will be implemented by PMU in conjunction with the IAs and support from PIC-CS1 in accordance with the current ADB guidelines [39] within six months of project effectiveness. PPMS procedures, performance indicators, and their targets will be reviewed and approved by ADB. Benchmark review mainly focusing on secondary data will be conducted. With the help of PIC-CS1, the PMU will then undertake every six months quantitative and qualitative project-performance monitoring for each subproject activity to evaluate the delivery of planned facilities and the project benefits that accrued. **Safeguards Monitoring:** The implementing agencies, assisted by PIC-CS1, will prepare and submit to the EA semi-annual reports on the environmental impacts identified during implementation. The report will cover environment performance based on implementation of the environmental management plans. The EA, through PIC-CS1, will be responsible for the consolidation and submission of the reports to ADB in accordance to the format and process described in the IEEs and EARF.
Climate Change: The overall project is categorized as medium. However, it was rated high as per the AWARE risk screening tool. It is therefore important that the PIC-CS1 responsible for infrastructure development and capacity building have sufficient climate change experience and capability to ensure and maximize adaptation possibilities, promote climate smart agricultural practices, and ensure that the project satisfactorily ensures that farmers are aware of the risks and the steps they can take to adapt
Gender and social dimensions monitoring. Sex-disaggregated data will be collected wherever relevant and gender specific and sensitive indicators (from the DMF and GAP) will be integrated as part of the PPMS. The progress of gender and social activities and targets outlined in the GAP will be monitored and reported regularly (at least semi-annually) by the PMU together with the project progress reports; the template to be used for GAP monitoring and reporting is included in PAM[40]. Achievement of performance indicators of the GAP outlined in the DMF will be updated semi-annually in the PPMS.
B. Evaluation:
ADB will conduct regular (i.e. at least twice per year) reviews throughout project implementation to (i) assess the progress of project activities and outputs and effectiveness of implementation arrangements; (ii) monitor safeguard compliance with ADB SPS (2009); (iii) review compliance with loan and grant agreements and related matters; (iv) follow up on decisions and actions agreed during previous review missions; and (v) resolve any project implementation issues that may arise.

[38] PAM Annex 3
[39] Project Performance Monitoring System Handbook, ADB Manila
[40] PAM Annex 4

11.12 Task 10: Reporting

Most if not all PIC-CS1 specialists have monitoring Tasks in their Terms of Reference and these are listed by discipline below. These Tasks need to be put in perspective and **Box 2** summarizes the project Monitoring and Evaluation procedures. The RFP-TOR lists six primary deliverables as shown in Table 20.

Table 37: CS1 Reporting Schedule

	Deliverable	Due x months after commencement
Inception Report	43 (i)	3
Quarterly Report (QPR)	43 (ii)	every 3 months, 19 QPRs in all
PPMS Reports	43 (iii)	every 6 months, 9 reports in all
Borrowers Completion Report	43 (iv)	before 72 (see comments to ToRs Tech 3)
Safeguard Monitoring Reports	43 (v)	every 6 months, 9 reports in all
Gender Action Plan	43 (vi)	every 6 months, 9 reports in all
Other Reports (SIRs)	not specified	as soon as investigations completed
Reports prepared under Sub Contract for Gender Analysis in Agricultural Value Chains	42	10,14, 15 project months
Advice to EA, IAs, staff, consultants	not specified	as required

Task 1001: Inception Report (IR)
The preparation of the IR is a vital step in project implementation. In the IR PIC-CS1 will:

(i) confirm, elaborate on, and adjust as necessary the Consultant's approach, methodology and work plan based on information received during the inception phase;
(ii) provide a detailed plan of the consultant's activities and confirmation and adjustment to the tasks of each expert with further elaboration as required;
(iii) give details of how each task will be performed, identifying what resources will be required
(iv) provide a detailed implementation plan for the project's activities;
(v) discuss any issues identified during the inception phase;
(vi) Include an updated PPMS, Costab, Procurement and Disbursement Plan;
(vii) provide updated work and staffing schedule;
(viii) outline the planned implementation of the provisional items;
(ix) confirmation of the reports that will be prepared under the assignment.

The Inception Report will be presented at a Workshop to MAFF and ADB. All comments made will be incorporated into a final version. The IR will be submitted within three months of commencement

Task 1002: Quarterly Progress Reports (QPRs)
QPRs will summarize the project highlights each quarter, describing activities undertaken and a summary of disbursements; physical and financial progress of the project; achievement of targets for outputs and inputs defined in DMF. It will be submitted within 14 working days of the end of the quarter.

Task 1003: Project Performance Monitoring Reports (PPMS)
PPMS reports will be prepared in accordance with the updated format developed on the draft one given in PAM and highlight project performance based on the DMF targets. A PPMS report will be submitted every 6 months,

Task 1004: Borrower's Project Completion Report
A Borrower's Project Completion Report, in all probability following the ADB PCR template, will be submitted within 6 months from physical completion of the project, that is before 31 March 2025.

Task 1005: Safeguard Monitoring Reports
Safeguard Monitoring Reports will be prepared every six months as required in the project LARF's, EARF's and EMDF

Task 1006: Gender Action Plan
Gender Action Plan Reports will be prepared every six months as required in the Gender Action Plan.

Tasks 1007: Other Reports
As may be required as the project progresses.

Task 1008: Advice to Executing and Implementing Agencies, their staff and consultants
As will be required as the project progresses, advice in writing may be given in in the form of Notes which would be officially recorded.

Task 1009: Sub Contract for Gender Analysis in Agriculture Value Chains
The output from this sub-contract will be in four reports.

12 Work Program CS2 Capacity Building and Climate Smart Agribusiness

12.1 General

The CS2 consultancy has a wide range of activities which are grouped in 15 Main Tasks as is shown in Table 38. Due to the minimum input of the International Team Leader (ITL) and also the intermittent input of the National Deputy Team Leaders, many of these activities will have to be done more by the sector specialist on their own without supervision of a (deputy) Team Leader. Annex XX shows the workplan and assignment schedule of the CS2 consultancy. On all aspects of CS2 task delivery, the CS2 teams will work closely with the CS1 gender team to ensure gender issues are fully taken into consideration.

Table 38: CS2 Main ToR Tasks

0	**Inception**
1	**1.1.3: Establish Mango Orchard Drip Irrigation sites** 1.1.3.1: Select demonstration sites; 1.1.3.2: Specify procurement packages; 1.1.3.3: Prepare procurement packages / launch tenders; 1.1.3.4: Supervise installation of drip irrigation; 1.1.3.5: Monitor site maintenance;
2	**1.2.2: Install Solar roof units on drying, cleaning and storage units** 1.2.2.1 Specify solar roof units; 1.2.2.2 Assist with procurement process; 1.2.2.3: Monitor installation and maintenance
3	**Deliverable 1.4.1: Ensure NAL achieves ISO17025 accreditation** 1.4.1.1: Develop a strategy and work plan to get the PBL ready for ISO17025 accreditation; 1.4.1.2: Review of PBL Spatial Organization; 1.4.1.3: Undertake Market Assessment; 1.4.1.4: Prepare procurement package and supervise physical works; 1.4.1.5: Establish genetically modified organism (GMO), plant toxins, bio-fertilizer and organic fertilizer testing capacity; 1.4.1.6: Develop tissue culture protocols for banana and cassava; 1.4.1.7: Support ISO 17025 accreditation; 1.4.1.8: Assist the laboratory commercialization process to achieve partial cost recovery;
4	**1.5.1: Assist delivery of biodigester and compost hut program** 1.5.1.1: Establish national framework; 1.5.1.2: Install 12,000 biodigesters and 6,000 compost huts;
5	**1.5.2: Support 10 Agribusinesses to reduce energy use / costs** 1.5.2.1: Select 10 agribusinesses; 1.5.2.2: Specify appropriate solar PV system; 1.5.2.3: Link to Green Finance and Support Feasibility Studies;
6	**2.1.2: Support Partial Commercialization of CARDI** 2.1.2.1: Develop action plan; 2.1.2.2: Deliver training program and workshops; 2.1.2.3: Deliver procurement; 2.1.2.4: Enter commercial contracts
7	**2.2.1: Deliver training in CSA, SRP and CAMGAP** 2.2.1.1: Develop Capacity Building Plan and Training Curriculum; 2.2.1.2: Deliver training in CSA & other practices; 2.2.1.1: Deliver training to Cooperatives
8	**2.2.2: Support MOWRAM to deliver training in irrigation scheme O&M** 2.2.2.1: Develop Capacity Building Plan and Training Curriculum; 2.2.2.2: Support MOWRAM to deliver training;

9	**2.3.1: Deliver training to PADC and Engineering Workshop Staff** 2.3.1.1: Deliver training in Management and operation of provincial agricultural development centers and mechanization workshops for government staff
10	**3.1.1: Make Recommendations on an Agribusiness Steering Committee** 3.1.1.1: Support MAFF to lead an inter-ministerial and development partner coordination mechanism; 3.1.1.2: Prepare Budget for Study Tours, Retreats, Technical Committees and Working Groups; 3.1.1.3: Support Steering Committee and Working Groups
11	**3.1.2: Develop a Draft Agribusiness Policy** 3.1.2.1: Review existing policies and strategies; 3.1.2.2: Develop Action Plan; 3.1.2.3: Develop Clear Draft of Agribusiness Policy;
12	**3.1.3: Develop CSA Standards** 3.1.3.1: Review Progress of Work on Standards; 3.1.3.2: Draft and Promote CAMGAP for tropical fruit; 3.1.3.3: Draft a CSA Policy; 3.1.3.4: Prepare Guidance Manuals; 3.1.3.5: Measures to Further Climate-friendly SRP; 3.1.3.6: Develop climate-friendly Industrial Development Policies;
13	**3.2.1: Develop feasibility studies for 8 agribusinesses / PPP** 3.2.1.1: Develop Action Plan; 3.2.1.2: Convene an Inter-Ministerial Committee (IMC); 3.2.1.3: Organize Crop Centric Forums; 3.2.1.4: Organize Feasibility Studies for PPP Projects; 3.2.1.5: Organize Study Tours;
14	**3.2.2: Extend Application of Risk Sharing Mechanisms / Green Finance** 3.2.2.1: Undertake Comprehensive Landscape and Key Stakeholder Analysis; 3.2.2.2: Organize Workshop on Climate Friendly Investments in Cambodia; 3.2.2.3: Provide Policy Support; 3.2.2.4: Explore Opportunities for First-loss Guarantees and Warehouse Receipt Financing; 3.2.2.5: Develop Climate Safe Screening Criteria; 3.2.2.6: Finalize Design of the Credit Guarantee Program; 3.2.2.7: Design and Implement Guarantee Training Program; 3.2.2.8: Design and Implement Crop Insurance Scheme in Kampong Cham; 3.2.2.9: Field Visits to Green Investments; 3.2.2.10: Establish Accreditation Scheme for FIs;
15	**Reporting**

12.2 Task 0: Inception

Under this Task 0: Project Start-up a total of 11 activities have been done in the period September to December 2019 as follows:

Task 001: Mobilization

The team started to mobilize on 23 September 2019 and the International Team leader mobilized on 23 September 2019. MAFF has provided the Consultants' with minimum serviced office space in Phnom Penh awaiting planned improvements and implementation of procurement.

Task 002: Preparation for Inception Workshop

The PMU requested the CS2 consultants to proceed to an early inception workshop without waiting for CS1 and CS5 because of project delays and an urgent need to commence with disbursement. On mobilization of CS1 and CS5 in early November, the CS2 team were asked to participate in a joint inception workshop in January and all activities had to be re-adjusted and re-planned to fit in with CS1 and CS2 activities.

Task 003: Collect and review all relevant reports and data

While many reports, designs and drawings have been collected during the course of proposal preparation it was important to visit all related MAFF/PPIU offices and the offices of their consultants engaged on similar ongoing projects to collect relevant materials. Many of the PPTA reports and referenced reports were not available and some time was taken to identify sources for this material.

The ongoing projects include: CAVAC, IFAD Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE), IFAD Credit and Financial Services: Accelerating Inclusive Markets for Smallholders (AIMS), Rice Commercialization Sector Development Program and the Agriculture Value Chain Investment Project. Reports from relevant completed projects were also collected. The findings and lessons learnt from these on-going and previous projects were reviewed and summarized and circulated amongst the specialists. It is intended that that synergies will be developed with many on-going projects.

As the assignment progresses it will be important to create a Project Archive containing all material, hopefully mainly in electronic format but also in hard copy. Consultant staff would be encouraged to contribute to the archive and not create their own personal libraries.

Task 004: Hold preliminary discussions, establish lines of communication and maintain good coordination between ADB, PMU, MAFF, GDA, GDAHP, CARDI and other stakeholders.

After mobilization of the International Team Leader on November 2, 2020 official introductory meetings were conducted with MAFF (September 23, 2019), ADB (November 4, 2019), GDA (October 30, 2019) GDAHP (October 30, 2019) and CARDI (November 1, 2019). The meeting at ADB was a video-conference with the ADB project officer in Manila. A number of follow up meetings and meetings with other donors were also undertaken.

Task 005: Establish and maintain close working relationships with consultants engaged under Packages CS1 and CS5.

It will be vital for all the consultants working on the Project to work as closely together as possible. To this end regular meetings will be held, probably at weekly intervals to exchange information and keep each other abreast of progress and plans.

Task 006: Undertake a round of Joint CS1/CS2/CS5 Introduction Visits to the Participating Provinces.

The CS2 team made preliminary visits to the PPIUs in October and then in the period 14 - 29 November a joint CS1, CS2, CS5 team visited all 4 participating provinces and inspected the fast-action schemes of Trapiang Run and the Mango drip – irrigation farm and met with all Project Provinces the key stakeholders PDAFF, PDWRAM and PDRD. These field visit teams included both Consultants and PMU staff.

Task 007: Update and complete the PPMS framework

The PAM includes only a draft PPMs framework and a more detailed version has been developed.

Task 008: Prepare Inception Report including Detailed Workplan

The TOR require the Consultants to prepare the Inception Report (IR) within three months of mobilization and every effort would be made achieve this. An important element in the IR is the Update of the CS2 Consultants' Workplan. Administrative matters of the CS2 package are either dealt with in a separate annex.

Task 009: Provide necessary technical and management support to the executing and implementing agencies for effective project implementation

The International Team Leader (ITL) and in his absence the National Deputy Team Leader (DTL) will retain overall responsibility for the provision of the necessary support to the PMU, and the executing and implementing agencies. This support would cover all disciplines, engineering, safeguards and economics. The ITL/DTL will be responsible for bringing together the various disciplines and ensuring that all required aspects were reported upon in a coherent manner. All experts' outputs will be submitted in the first instance to the ITL/DTL who will review them for compliance with their TOR and for their overall quality. Another important task for ITL/DTL will be to ensure timely mobilization and inputs for the experts in accordance with agreed plans and as required by the project.

Task 010: Actively participate in field visits and in project supervision at project sites as required

It will be vital for the ITL/DTL to make regular field visits both to implementation agency offices and subproject sites to learn at first hand precisely what is going on and to appreciate where any different resources might be required.

Task 011: Update the Project Implementation Schedule (PIS)

This Inception Report includes an updated Project Implementation Schedule to be used to monitor progress against the targets set in the PIS. While monthly reports are not required as Deliverables, at least in the first year of the project, individual experts world be required to prepare such reports which would then be discussed at the proposed Monthly Meetings.

12.3 Task 1: Establish Mango Orchard Drip Irrigation sites

Task 1.1.3.1: Select demonstration sites;

The International GAP, CSA and SRP Training Specialist mobilized on 13th November and is working with the National Training and Capacity Building Specialist (NTC) and the PPIUs to identify appropriate sites. They have made visits to Takeo and Kampot provinces to identify mango farms that meet the selection criteria in the PAM. An initial effort has been made to identify farmers where drip irrigation can be installed on new planting and existing planting used for training.

Task 1.1.3.2: Specify procurement packages;

Procurement packages are expected to be specified in February / March 2020 although there are several factors that could delay this: including disagreement between MAFF and MOWRAM over overall responsibility and the fact that design of the drip irrigation sites is not included in the ToR of any specialists in packages 1, 2 and 5. The International and National Photo-voltaic Specialists (IPV and NPV) will mobilize as soon as these issues have been clarified.

Task 1.1.3.3: Prepare procurement packages / launch tenders;

Assuming design can be completed to schedule, the IGAP, IPV, and NPV will assist the PMU and CS1 to specify procurement packages and assist in developing evaluation criteria. This task can be completed March, April, May 2020.

Task 1.1.3.4: Supervise installation of drip irrigation;

Supervision of installation is a further activity not included in any ToR but should begin in October 2020 at the start of the dry season. The IGAP, NTC and NPV will assist with visits to ensure the quality of installation. Capacity building and field-based farmer training will be able to commence as soon as equipment is installed and new orchards planted.

Task 1.1.3.5: Monitor site maintenance;

It is proposed that five-year guarantees, farmer training in drip irrigation management and five-year maintenance support are included in the tenders. Responsibility for ensuring this is delivered will lie with the farmers themselves and the PPIUs.

12.4 Task 2: Install Solar roof units on drying, cleaning and storage units

Task 1.2.2.1 Specify solar roof units;

Responsibility for specifying solar PV installations for the storage, cleaning and drying units lies with the IPV and NPV. There are several issues that need to be clarified before this can commence. Firstly, the 80 cooperatives provisionally selected during the inception phase need to be assessed to ensure that they meet criteria in the PAM and to ensure that sufficient cassava and maize producing cooperatives are included in the list. Secondly, clarification is required as to who will design the storage, cleaning and drying units; as this is not included in the ToR of any specialists within packages CS1, CS2 and CS5. The IPV and NPV will mobilize to develop recommendations on appropriate solar PV units as soon as the timing of the design process is known. At this stage, it is estimated that this work is likely to commence in July / August 2020.

1. Assist with procurement process;

The IPV and NPV need to know the design load requirement to operate the cleaning, drying and storage units and the physical sites to check that solar PV will be cost effective to deliver

electrical power. The IPV will prepare a set of standard specifications to be adapted to each site by the NPV. This task is expected to be completed in August / September 2020. The IPV will prepare evaluation criteria for the solar PV units and is expected to specify that five-year guarantees, farmer training in solar PV O&M and five-year maintenance support are included in the tenders

Task 1.2.2.3: Monitor installation and maintenance;

The IPV and NPV will train CS1 staff and staff in the PPIUs to monitor installation and maintenance.

12.5 Task 3: Ensure NAL achieves ISO17025 accreditation

Task 1.4.1.1: Develop a strategy and work plan to get the PBL ready for ISO17025 accreditation;

As described earlier in the report (chapter 4.5) it is proving very hard to recruit the specialists required to undertake the tasks related to achieving ISO accreditation for the PBL at the NAL. As currently specified, it is uncertain when a specialist team can be mobilized. The first task of the team will be to agree an action plan with the NAL and GDA. At this stage it is assumed that specialists can be mobilized in the first quarter of 2021.

Task 1.4.1.2: Review of PBL Spatial Organization;

The National Laboratory Coordinator (NCO) will lead the team, comprising of the National Laboratory Commercialization Specialist (NLC), the National Biofertilizer and Organic Fertilizer Testing Specialist (NBO), the National GMO and Phytotoxin Analysis Specialist (NGM), the National ISO17025 Accreditation Compliance Specialist (NIS) and the National Tissue Culture Development Specialist (NTI). This team will review the spatial organization of the proposed PBL and are likely to recommend that the flow of rooms and doors is re-constructed to ensure that a range of tests can be undertaken in a flow of samples with minimum contamination risk (as described in chapter 4.5). This will involve certain physical works being procured and undertaken before training can begin.

Task 1.4.1.3: Undertake Market Assessment;

As soon as the review of spatial organization is complete, the team will undertake a market assessment to determine the best strategy for developing tests to ISO17025 standard and to inform the proposed cost recovery strategy. The market assessment will take four months to design and implement and is likely to require an element of sub-contracting of basic survey work. The team will prepare ToR and supervise the study.

Task 1.4.1.4: Prepare procurement package and supervise physical works;

During the market assessment, the team will review the equipment list proposed in the Costab and re-cost and re-specify the equipment requirements to ensure that tests proposed for ISO17025 accreditation can be undertake. It is suggested that any strategy for partial commercialization will be a step by step process. The PBL should not try to run before it can walk. Procurement is likely to take 6 months.

Task 1.4.1.5: Establish genetically modified organism (GMO), plant toxins, bio-fertilizer and organic fertilizer testing capacity;

The NBO and NGM will make second visits to train staff in the agreed range of tests, prepare guidance manuals and protocols and work with the NIS on ISO17025 accreditation.

Task 1.4.1.6: Develop tissue culture protocols for banana and cassava;

At the same time the NTI will return to work with PBL staff on tissue culture protocols, in cooperation and discussion with both CARDI and GDA.

Task 1.4.1.7: Support ISO 17025 accreditation;

The NIS will work with the NBO, NCO and NGM to ensure that the NAL is supported to follow the agreed strategy.

Task 1.4.1.8: Assist the laboratory commercialization process to achieve partial cost recovery;

The NLC and NCO will work with the NAL to ensure that the NAL is supported to follow the agreed strategy. For both processes, training and support will be given but a long-term link with a commercial laboratory in ASEAN would be a great advantage from the point of view of sustainability.

12.6 Task 4: Assist delivery of biodigester and compost hut program

Task 1.5.1.1: Establish national framework;

The International Biodigester Standards Specialist (IBM) mobilized on November 27th and has prepared a draft briefing note. The briefing note will be submitted in January 2020. The next step will require establishment of a technical committee and working group to liaise with the IBM on standards for biodigesters and to agree a draft standard on bio-slurry. The National Bio-slurry Specialist (NBS) will mobilize in April or May 2020 to support the technical committee and working group and the IBM will return for a second input in May or June 2020.

Task 1.5.1.2: Install 12,000 biodigesters and 6,000 compost huts;

The biodigester and compost hut disbursement program requires two key decisions: a) how will the $9.28 million procurement envisaged in the PAM operate when $2.85 million comes from the green climate fund (GCF) grant (for the subsidy element), $2.76 million from the government, and $3.66 from beneficiaries, given that beneficiaries are meant to pay for the balance of each biodigester procured. It is not clear that the government has an allocated budget line for biodigester subsidies and even if additional subsidy is envisaged; b) are all stakeholders prepared to use the budget to support not only the farmer's friend biodigester model propagated by the NBP but also other models from the private sector.

Once these matters are agreed, the International Bio-slurry Specialist (IBS) will mobilize to work with GDAHP and NBP on the details of procurement and implementation. This mission is envisaged for June / July 2020. The first biodigesters are expected to be financed soon after this.

12.7 Task 5: Support 10 Agribusinesses to reduce energy use / costs

Task 1.5.2.1: Select 10 agribusinesses;

The gender analysis of value chains the crop forums and other field work by CS2 will identify a range of agribusinesses and all of these opportunities will be used to promote the opportunity of a feasibility study being financed on conversion to green energy. The IPV and NPV will undertake preliminary pre-feasibility for perhaps 20 agribusinesses and review green energy options to identify in principle opportunities for conversion. The IPVs first and second visits are planned for March and August 2020 (assuming that other solar PV initiatives are ready for the IPVs inputs) and this work would be undertaken at these times.

Task 1.5.2.2: Specify appropriate solar PV system;

After the initial pre-feasibility, the IPV and NPV will specify and cost appropriate solar PV systems (possibly in combination with biodigesters in some cooperatives with large scale processing) for interested agribusinesses.

Task 1.5.2.3: Link to Green Finance and Support Feasibility Studies;

After the IPV's second visit, for those agribusinesses showing a genuine interest in financing energy conversion, detailed feasibility studies will be commissioned.

12.8 Task 6: Support Partial Commercialization of CARDI

Task 2.1.2.1: Develop action plan;

The International Seed Commercialization and Intellectual Property Specialist (ISC) will mobilize in March 2020 and work with CARDI and IRRI to develop an action plan for the partial commercialization of CARDI. The plan will specify varieties to be distributed and potential partners to be approached. It will delineate any training and equipment required and examine the legal status of breeder's rights and commercial contracts.

Task 2.1.2.2: Deliver training program and workshops;

In order to ensure wide support for partial commercialization within CARDI and in order to prepare concerned staff for meeting commitments to private partners, a number of orientation workshops will be undertaken and a series of short training courses. These will be undertaken under the management of the ISC in December 2020 and January 2021 after necessary equipment has been procured.

Task 2.1.2.3: Deliver procurement;

Procurement of any equipment necessary and of any studies required will be specified during the ISC's first visit and undertaken during the period April 2020 to December 2020.

Task 2.1.2.4: Enter commercial contracts

Draft contracts will be prepared during the ISC's second visit and the ISC will support negotiations during his third visit. This is currently envisaged for the third or fourth quarter of 2021 in order that distribution of planting materials can start in 2022.

12.9 Task 7: Deliver training in CSA, SRP and CAMGAP

Task 2.2.1.1: Develop Capacity Building Plan and Training Curriculum;

The National Training and Capacity Building Specialist (NTC) mobilized on November 1st 2019. He has coordinated consultations with GDA and worked with the IGAP and the National Public Private Partnership Sp. (NPP) in the process of developing an overall Capacity Building Plan. Considerable research has been undertaken on existing training materials, both with other donor and NGO projects and within MAFF. The CS2 Capacity Building Team is awaiting the identification and mobilization of the National Farmer Demonstration Specialist (NFD) and the National GAP for Tropical Fruit Specialist (NGAP), so as to prepare a capacity building plan covering training for:

(i) 40,000 farmers (at least 16,000 women) trained in CSA with productivity increases of at least 15%;
(ii) 20,000 farmers (at least 8,000 women) trained and compliant with SRP, which leads to direct paddy marketing links with SRP affiliated millers and traders;
(iii) 500 farmers (at least 200 women) trained and compliant with CAMGAP in tropical fruit;
(iv) 50 provincial input (agrochemical, fertilizer, etc.) suppliers have received training in CSA and capable to pass on that training to farmers;

The majority of this part of the training is expected to be undertaken by GDA trainers and PADC staff (supplemented by private training organizations if necessary), and therefore

- 15 certified trainers on CSA from the GDA Department of Industrial Crops and Extension; (IGAP, NGAP)
- At least 15 training workshops for government staff and farmers' groups held on project management, and agronomic resource efficiency, climate resilience in value chains and agribusiness. (NTC) need training-of-trainers.

A key decision that is still required is whether to focus on training 20,000 farmers in SRP (given that there are no commercial premiums and no organizations to ensure compliance) or whether to mix the target between GAP and SRP training.

The 40,000 farmers are expected to be drawn from the 10-12,000 households within the 80 cooperatives and the total households on the rehabilitated irrigation schemes. Training will not start until the end of the dry season in 2021. 2020 will be spent on developing and refining curriculum and training manuals, training trainers and selecting sites on which to establish farmer demonstrations that will be used for field-based training.

Specific curriculum need to be developed for rice, maize, cassava and mango, as well as for specific training delivered to cooperatives.

Task 2.2.1.2: Deliver training in CSA & other practices;

Training will be field based and delivered in three tranches to reflect construction of irrigation schemes and installation of drying, storage and cleaning equipment on cooperatives. Each tranche will cover two cropping years.

Task 2.2.1.1: Deliver training to Cooperatives;

Cooperative training will also be delivered by GDA trainers and PADC staff supplemented by private training suppliers. Training will cover:

(i) 150 agricultural cooperative management and board members can fulfil their management and accounting obligations as specified within the law of agricultural cooperatives; (NTC / ICA)
(ii) 50 cooperatives have successfully entered into a profitable agribusiness venture (this does not include establishing a saving and loan scheme); (NTC / ICA)
(iii) 4,000 ha of laser land levelling (~1000 ha in each province) demonstrated to improve water use efficiency; (NFD)

The International Cooperative Agribusiness Training Specialist (ICA) will mobilize in the third quarter of 2020 to work with the NTC and NPP to design training materials and train trainers. Training will start in late 2020 or early 2021 on the first tranche of cooperatives where storage, cleaning and drying equipment has been installed.

12.10 Task 8: Support MOWRAM to deliver training in irrigation scheme O&M

Task 2.2.2.1: Develop Capacity Building Plan and Training Curriculum;

The National Farmer Water User Community Training Specialist (NFW) is expected to mobilize in May 2020 to work with MOWRAM and CS1 on adapting training curriculum and manuals for training water user groups. Training needs to cover O&M, water fee collection, bookkeeping, membership, byelaws, water management as well as climate change.

Training will be procured from private providers and delivered in three batches. The first batch of training is expected to commence as soon as the first group of feasibility studies is complete, when MOWRAM is expected to establish the FWUCs / FWUGs.

Task 2.2.2.2: Support MOWRAM to deliver training;

Training will be procured from private providers and delivered in three batches. The first batch of training is expected to commence as soon as the first group of feasibility studies is complete, when MOWRAM is expected to establish the FWUCs / FWUGs. At this stage it is expected training will start in October 2020.

12.11 Task 9: Deliver training to PADC and Engineering Workshop Staff

Task 2.3.1.1: Deliver training in Management and operation of provincial agricultural development centers (PADCs) and mechanization workshops for government staff

Training for PADC staff is included under section 12.8 and PADC staff will be closely involved in all aspects of training in CSA, SRP and CAMGAP. They will receive a number of training-of-trainer workshops and short courses and will then participate in field training, learning by doing. Training-of-trainers is expected to start in quarter 2 or 3 in 2020.

The National Agricultural Machinery Operations and Maintenance Training Specialist (NAM) will mobilize in April 2020 and start to undertake a training needs assessment with staff at the mechanization workshops so that courses can be developed in the theory of agricultural machinery and equipment repair, operation and maintenance. The NAM will deliver training-of-trainers and then these staff will start to train local repair workshop staff and potential workers in the mechanization industry. Training-of-trainers is expected to start in quarter 2, 2021 after construction of the mechanization workshops.

12.12 Task 10: Make Recommendations on an Agribusiness Steering Committee

Task 3.1.1.1: Support MAFF to lead an inter-ministerial and development partner coordination mechanism;

The TL and DTL and CS2 Policy Team will work closely with the PMU and MAFF to ensure all aspects of policy work are coordinated with other projects and donors, to avoid duplication and ensure all issues are covered. Policy work will require wide consultation and ownership by the relevant technical committees and working groups to ensure that the CS2 Policy Team do not produce reports that are never actioned and approved. This work can begin as soon as the PMU introduces the CS2 Policy Team to the relevant technical committees and working groups. Introductions are expected soon after the inception workshop.

Task 3.1.1.2: Prepare Budget for Study Tours, Retreats, Technical Committees and Working Groups;

The CS2 Policy Team will work with the relevant technical committees and working groups to identify relevant study tours, retreats and committee meetings and prepare appropriate budgets.

Task 3.1.1.3: Support Steering Committee and Working Groups;

Policy work will focus on:

1. Assistance in the development of a draft agribusiness policy within the framework of the Cambodian Industrial Development Policy (IDP) 2015-2025, for endorsement by the Minister of MAFF,
2. Assistance in the elaboration of standards that relate to CSA, in particular climate-conscious standards for agribusiness operations aimed at climate neutrality and effective adaptation. It is intended that standards developed accord with ISO 14080 (currently under development) and standards endorsed by ASEAN. The objective will be to develop CSA standards for the eventual endorsement by the National Standard Council (NSC), in order that the standards can be national standard with the Cambodia Standard mark,
3. Assistance in further development of a Public Private Partnership (PPP) framework for agribusiness investment, that works within the parameters of the Cambodian national PPP framework.
4. Assistance in the development of Green Finance facilities in Cambodia with banks and other financial institutions with the objective of designing and proposing management structures for a bank “climate friendly” financing accreditation process, and
5. Assistance in extending trading in carbon credits (as in the Cambodian REDD+ scheme) to farming activities undertaken by cooperatives.
6. Assistance in developing technical standards for biodigesters and bio-slurry.

It is planned that the PMU will effect introductions to key technical working groups or focus persons soon after the inception workshop and is intended to establish an agribusiness steering committee with private sector representation to coordinate all the above policy aspects.

12.13 Task 11: Develop a Draft Agribusiness Policy

Task 3.1.2.1: Review existing policies and strategies;

The TL and DTL have undertaken an initial review of existing policies and strategies during the inception period. The Cambodian Industrial Development Policy (IDP) 2015-2025 already outlines relevant tasks for MAFF and associated ministries on agribusiness. These need to be delineated into a comprehensive strategy informed by Cambodian comparative and competitive advantage. It is expected that deliberations with the relevant technical committee can begin in quarter 1 2020 and will continue for the next two years to ensure wide consultation and ownership.

Task 3.1.2.2: Develop Action Plan;

In quarter 1, 2020 the CS2 Policy Team will work with the relevant technical committee to develop and action plan and schedule committee meetings, studies, retreats and working groups.

Task 3.1.2.3: Develop Clear Draft of Agribusiness Policy;

It is planned that a first draft agribusiness policy will be developed by quarter 1, 2023.

12.14 Task 12: Develop CSA Standards

Task 3.1.3.1: Review Progress of Work on Standards;

The CS2 Policy Team have identified that a draft CAMGAP for mango exists and is expected to be approved in 2020. The team has prepared a draft list of possible climate conscious standards for discussion with the relevant technical committee once introductions are made. It would be useful and effective if one technical committee could work on both the agribusiness policy and the CSA standards, with separate working groups on the different subjects.

Task 3.1.3.2: Draft and Promote CAMGAP for tropical fruit;

The IGAP will work with GDA on adapting the CAMGAP for mango to selected tropical fruit with high potential for export. Initial agreement needs to be reached on perhaps three specific tropical fruit and the IGAP needs introductions to the relevant working groups on CAMGAP.

Task 3.1.3.3: Draft a CSA Policy;

The standards developed for CSA will be integrated into the agribusiness policy so that there is a clear strategy for promoting climate change adaptation and CSA.

Task 3.1.3.4: Prepare Guidance Manuals;

It is expected that standards can be agreed during 2021 and guidance manuals will be prepared in quarter 1 and 2 in 2022.

Task 3.1.3.5: Measures to Further Climate-friendly SRP;

The CS2 Policy Team will work with the Rice Federation to further climate-friendly SRP. Initial discussions with the Rice Federation have suggested that this process should start with training workshops on SRP for Rice Federation members.

Task 3.1.3.6: Develop climate-friendly Industrial Development Policies;

There is expected to be a feed-back link from work on standards, CAMGAP and SRP into the agribusiness policy so that the draft agribusiness policy prepared in quarter 1 2023 incorporates climate-friendly industrial policies.

12.15 Task 13: Develop Feasibility Studies for 8 Agribusinesses / PPP

Task 3.2.1.1: Develop Action Plan;

The NPP has studies the Cambodian PPP framework in depth and has prepared an action plan. This has been submitted to the PMU and awaits approval.

Task 3.2.1.2: Convene an Inter-Ministerial Committee (IMC);

The NPP is now awaiting the establishment of an inter-ministerial committee (IMC) to review the PPP framework.

Task 3.2.1.3: Organize Crop Centric Forums;

The first crop-forum, focusing on rice, is being organized and is expected to occur in February 2020.

Task 3.2.1.4: Organize Feasibility Studies for PPP Projects;

Feasibility studies for PPP projects are expected to be undertaken in 2021. Work in 2020 will focus on identifying potential partners and potential PPP projects.

Task 3.2.1.5: Organize Study Tours;

The NPP will work with the PMU and the IMC to identify appropriate study tours and training. Study tours are expected to focus on visits to successful agricultural PPP projects in ASEAN and will be undertaken in 2021 and 2022.

12.16 Task 14: Extend Application of Risk Sharing Mechanisms / Green Finance

Task 3.2.2.1: Undertake Comprehensive Landscape and Key Stakeholder Analysis;

The International Green Financing Specialist (IGF) and National Green Financing Sp. (NGF) will mobilize in May 2020. Their first task will be to undertake a comprehensive landscape review of green finance initiatives in Cambodia and to identify key stakeholders. This will be undertaken in May / June 2020.

Task 3.2.2.2: Organize Workshop on Climate Friendly Investments in Cambodia;

On completion of the landscape review a workshop will be organized on green finance in Cambodia to familiarize stakeholders with the CFAVC intentions and resources.

Task 3.2.2.3: Provide Policy Support;

Policy support will be provided to the Cambodian Sustainable Finance Initiative (CSFI), launched by the Association of Banks in Cambodia (ABC). This will build on the Mekong Sustainable Finance Working Group and the Micro-Finance Institutions (MFI) Client Protection Principle to help Cambodian financial institutions develop environmental and climate screening criteria and tools to guide their lending activities. Policy support will be provided throughout the IGF and NGF inputs.

Task 3.2.2.4: Explore Opportunities for First-loss Guarantees and Warehouse Receipt Financing;

As part of the policy support the IGF and NGF will explore opportunities for First-loss Guarantees and Warehouse Receipt Financing, building on work already undertaken by the Rice Commercialization project.

Task 3.2.2.5: Develop Climate Safe Screening Criteria;

The IGF and NGF will develop climate safe screening criteria (or adapt criteria developed by the CSFI. The criteria should be prepared by the end of 2020.

Task 3.2.2.6: Finalize Design of the Credit Guarantee Program;

During 2021 the IGF and NGF will develop and finalize the design of a credit guarantee program, and develop training programs for staff of interested financial institutions.

Task 3.2.2.7: Design and Implement Guarantee Training Program;

Training will be delivered to 50 staff from financial institutions and to 30 agribusinesses on green finance and green finance opportunities in Cambodia. Training curriculum and manuals will be prepared in early 2021 and training delivered in late 2021.

Task 3.2.2.8: Design and Implement Crop Insurance Scheme in Kampong Cham;

Because penetration of crop insurance and other risk sharing instruments is extremely low, the IGF and NGF will first provide policy support by examining financial and regulatory constraints specific to target provinces and identify mechanisms to overcome such barriers. They will build on the experiences of the Climate Resilient Rice Commercialization project which focuses on Battambang, Kampong Thom, and Prey Veng provinces and the work of the Cambodian Center for Study and Development in Agriculture (CEDAC) in five provinces, including Kampot and Takeo. The IGF and NGF will examine opportunities to expand such services to Kampong Cham and Tboung Khmum and consider including cassava and maize to rice as the portfolio of insurable crops.

A major publicity campaign will be undertaken during 2021 to provide with information on climate risk sharing instruments, including crop insurance, to 20,000 households.

Task 3.2.2.9: Field Visits to Green Investments;

The IGF and NGF will join participating financial institutions for field visits to potential green investments to familiarize themselves with lending policies and constraints throughout their inputs.

Task 3.2.2.10: Establish Accreditation Scheme for FIs;

Towards the end of their inputs the IGF and NGF will seek to work with the CSFI to formalize a financial institution (FI) accreditation scheme so that participating FIs that meet green-financing criteria can be registered and carry an accreditation logo allowing for easy customer recognition.

12.17 Task 1: Reporting

Project reporting is covered in detail under Task 10 of the CS1 workplan. The CS2 specialist will contribute to all project reporting and ensure that the PPMS indicators collect data relevant to CS2 disbursement and performance.

13 FINANCES

13.1 Costs and Financing

The total project cost is estimated at $141.04 million. For the implementation RCG has received (i) concessional loan Nr 3661/CAM of $90 million from ADB's ordinary capital resources, and (ii) loan Nr. 8346-CAM (EF) of $10 million and (iii) Grant No 0579-CAM (EF) of $30 million from the Green Climate Fund (GCF), while the remainder are financed by the RGF ($ 7,36 million) and the Beneficiaries $ 3,66 million.

The ADB loan will have a 32-year term, including a grace period of 8 years; an interest rate of 1.0% per year during the grace period and 1.5% per year thereafter; and such other terms and conditions set forth in the draft loan agreement. GCF loan will have a 32-year term, including a grace period of 8 years; a service charge of 0.25% per year; and such other terms and conditions set forth in the draft GCF loan agreement.

The ADB loan and ADB-administered loan and grant proceeds will finance (i) civil works; (ii) equipment and materials; (iii) studies, surveys and design; (iv) training and demonstration; (v) policies and standards; (vi) monitoring and evaluation; (vii) consulting services; (viii) information and communication technology; and (ix) incremental operating costs. The government will also borrow for financing charges during implementation. ADB and GCF will finance taxes and duties for civil works, trainings and portion of incremental operating cost.

The government will provide the equivalent of $7.38 million to (i) finance biogas plants and composts huts; (i) pay salaries of government staff working for the project; (iii) cover cost of land acquisition and resettlement; (iv) monitor (including external monitoring for safeguards and external audit), and (v) pay taxes and duties for goods, equipment, materials, surveys and services through exemption. Contribution from the beneficiaries of $3.66 million equivalent can be in-kind or in cash for the biogas plant, and compost huts.

13.2 Disbursements

At 31 December 2019 a total of $ 2,722,218 had been disbursed, equivalent to 2.38 % of the combined loan and grant amount of $ 130,000,000. The $ 2,722,218 comprised of $ 1,248,000 initial deposit (to the 2 loans) and $ 1,474,218.77 actual disbursements, all from the 3661-loan. There have been no payments yet from the grant. For more details reference is made to Tables 39-41, which also provide the details of the composition of these 3 funds source.

Table 39: ADB Loan No 3661-CAM

No.	Activity	Amount ($)	Already Disbursed			
			MAFF	MOWRAM	MRD	TOTAL
1	Civil Works					
1A	Irrigation and Roads	60,537,190	0	0	0	0
1B	Warehouses and Laboratory	5,762,800	0	0	0	0
1C	Other Infrastructure	1,330,600	0	0	0	0
2	Equipment, Materials, Goods, and Project Implementation Services	16,757,700	1,463,737.8	0	0	1,463,737.8
3	Incremental operating cost	4,187,100	0	0	0	0
4	Interest Charges	1,424,610	0	0	0	0
Initial Deposit			360,000	448,000	100,000	908,000
Total		**90,000,000**	**1,834,218.77**	**448,999**	**100,000**	**2,382,218.77**

Table 40: GCF Loan No. 8346-CAM (EF)

No.	Activity	Amount ($)	Already Disbursed			
			MAFF	MOWRAM	MRD	TOTAL
1	Civil Works	9,963,900	0	0	0	0
1A	Irrigation and Roads	36,100	0	0	0	0
Initial Deposit			0	0	0	0
Total		**10,000,000**	**0**	**0**	**0**	**0**

Table 41: GCF Grant No. 0579-CAM (EF)

No.	Activity	Amount ($)	Already Disbursed			
			MAFF	MOWRAM	MRD	TOTAL
1	Civil Works					
1A	Irrigation and Roads	8,295,660	0	0	0	0
1B	Warehouses and Laboratory	114,950	0	0	0	0
1C	Bio gas and Compost Huts	2,854,150	0	0	0	0
2	Equipment, Materials, Goods, and Project Implementation Services	10,785,430	0	0	0	0
3	Incremental operating cost	7,456,780	0	0	0	0
4	Interest Charges	493,930	0	0	0	0
Initial Deposit			340,000	0	0	340,000
Total		**30,000,000**	**340,000**	**0**	**0**	**340,000**

13.3 Details per Log-frame Item

Table 42 shows the estimated budgets split out per DMF Performance Target.

Table 42: Estimated Costs Per Performance Target

Log frame	Output	TOTAL	Funding Percentages				
			Loan		GCF grant	RCB	Beneficiaries
			ADB	GCF			
1	Gravity Irrigation Infrastructure	32.835,000	76.8	12.7	10.5	0	0
	Drip Irrigation and associated training	975,000	76.8	12.7	10.5	0	0
	Ponds	9,460,000	76.8	12.7	10.5	0	0
	Rural Roads	37,350,000	76.8	12.7	10.5	0	0
	Cooperatives	9,953,900					
	Laboratory Equipment	3,5440,000	81.7	0	0	18.3	0
	Renewable Energy	13,379,000	0	0	30.8	29.7	39.5
	Sub-total	98,389,910					
2	Rice Varieties	3,616,610					
	40,000 farmers trained in CSA and Agribusiness						
	FWUCs developed and established	258,000					
	Agricultural Development centers and Engineering Workshops	1,512,580					
	Sub-total						
3	Policies	793,240					
	Good Agricultural Practices						
	50 staff trained in CSA and Green Finance	6,902,00					
	20,000 households trained in climate risk sharing						
	ICT plat form						
	PMU	3,023,000					
	PTC	8,178,000					
	TOTAL	129,060,000					

14 Updated PROCUREMENT PLAN

14.1 General

The PAM includes a procurement plan which in line with ADB policies includes only activities procured as Works, Goods and Consulting Services. Workplan activities implemented in Force Account are not included in the Procurement Plan. In this Updated Procurement all procurement planned for the upcoming 18 months up to mid-2021 are detailed out, while procurement for the remainder of the project are still clustered.

14.2 Procurement Types

14.2.1 Procurement of Irrigation, Ponds and Roads

Procurement of the Irrigation Works, Ponds and the Roads are typical civil-work packages for which standard NB procedures will be applied. It is planned that these works will be procured in a total of 36 packages, viz. for the years 2020 - 2022 in each participating provinces 3 packages for the irrigation works, the ponds and the road construction.

14.2.2 Procurement of Renewable Energy

The procurement of the renewable energy providers (bio-digesters and compost huts) is non-standard as a contribution from the beneficiaries is required. In the original Procurement Plan of the CFAVC project this feature was overlooked and procurement in 16 standard equipment packages is foreseen. This is excluding the provisions for training, marketing and monitoring. The total budget for these bio-digesters is $3.36 million. The main issues with regards to the procurement of these bio-digesters are the following:

14.2.2.1 Limitation of Qualified Bidders

In Cambodia there is only 1 provider (NBP) which has experience with the farmer's friend biodigester design. The NBP works through local masons who are normally contracted to construct or install a small number of biodigesters. Many masons trained by NBP have left to join the construction industry because work is more consistent and often better paid. NBP may have to train new masons and such training is included in the support budget. Unless additional budget is included in the procurement packages for training and marketing it is unlikely that any private providers can implement the farmer's friend biodigester model. It is likely that a number of sole provider packages will need to be let to NBP to ensure continued implementation of the farmer's friend, which is recognized as a technically sound biodigester.

There are two private companies providing alternative models but they have installed less than 2,000 biodigesters nationwide. In order to ensure diverse provision of biodigesters and future expansion of the biodigester market it is suggested that a number of the packages are let under NCB conditions. It is suggested that NBP remains in charge of providing post-purchase subsidies through the ACLEDA bank for all packages and this would require NBP checking the quality of all installations. It would, however, complicate the design and budget for each of the packages, see below.

14.2.2.2 Beneficiary Contribution

A further complication is that of the total budget of $9.28 million for biodigesters and compost huts (the part of the budget in the PAM procurement plan) comes from 3 sources:

- $2.85 million comes from the green climate fund (GCF) grant,
- $2.76 million from the government, and
- $3.66 from beneficiaries.

Each biodigester is budgeted at $667 and farmers are expected to pay up front unless they can obtain credit or buy on the pay as you go scheme devised by one of the private companies. It is not clear how beneficiary contribution, with farmers paying up front, can be included in procurement packages.

It is clear that the GCF grant is designed to cover the subsidies and, as suggested above, it seems the most appropriate that this is managed through the NBP scheme with ACLEDA bank rather than have a separate subsidy scheme attached to each of 16 procurement packages. It is not clear what the government contribution, of $2.76 million will cover? If this is a further subsidy to the cost of the biodigester this is substantially different from the PAM description that indicates subsidy will continue at the level currently applied by the NBP, i.e. US$150 per biodigester. If the government contribution will also be a subsidy to the cost of the biodigester, the level of subsidy will be US$468 per biodigester, equivalent to a 70% subsidy for each biodigester, This level of subsidy would be likely to have a negative impact on the development of private sector provision of biodigesters and the private sector already complains about the subsidy level of US$150-200 applied to the Farmer's Friend model.

14.2.3 Procurement of Laboratory Equipment, ACs, Agricultural Development Centers and Engineering Workshops. 2

Procurement of the Improvement of the Laboratory Equipment, the Agricultural Cooperatives, Agricultural Development Centers and Engineering Workshop are also typical civil-work packages for which standard NB procedures will be applied. It is planned that these works will be procured in a yet to be determined number of packages, viz. for the years 2020 - 2024 in each participating province 3 packages for the irrigation works, the ponds and the road construction.

14.3 Already Completed and Ongoing Procurement

Reference is made to Annex 7.

14.4 Procurement During First 18 Months

All individual procurement expected for the first 18 months are detailed in the updated procurement plan shown in Annex 7.

14.5 Procurement During Remaining Contract Period

All remaining procurement is listed in the updated procurement plan shown in Annex 7.

15 UPDATED BUDGET and DISBURSEMENT PLAN

15.1 Introduction

In this calculation as applied for the update of the budget the expenditures are times in the year that the relevant disbursements have been made not when the actual contracts are signed.

15.1.1 MAFF Program

The updated work-plan of the MAFF program is shown in Table 43, with the associated budget.

Table 43: Updated Implementation Plan MAFF Program

Year	2019	2020	2021	2022	2023	2024	TOTAL
%							100
US$ 1,000							31,125.21

15.1.2 Irrigation Program (MOWRAM)

The updated work-plan of the irrigation program is shown in Table 44, with the associated budget.

Table 44: Updated Implementation Plan Irrigation Development

Year	2020	2021	2022	2023	2024	TOTAL
%	2.9	30.0	35.3	31.8	0	100
Ha	400	4,490	5,300	4,770	0	15,000
US$ 1,000	932.9	9,650.7	11,355.6	10,229.8	0	32,168.98

15.1.3 Road Development Program (MRD)

The updated work-plan of the road development program is shown in Table 45, with the associated budget.

Table 45: Updated Implementation Plan Road Development

Year	2020	2021	2022	2023	2024	TOTAL
%	2.9	30.0	35.3	31.8	0	100
Km	18.8	184.2	216.7	195.2	0	614
US$ 1,000	937.5	9,698.5	11,411.9	10,280.4	0	32,328.31

15.2 Updated Budget

Reference is made to Annex 8.

15.3 Updated Disbursement Plan

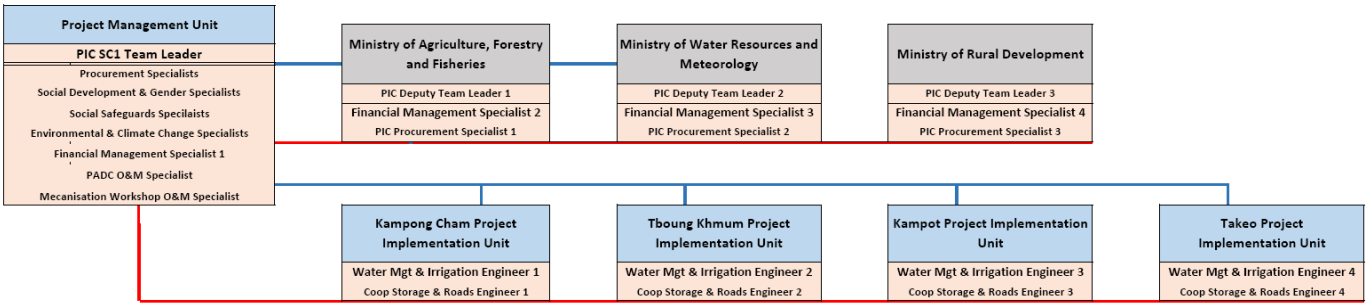
Reference is made to Annex 8.

16 CFAVC PIC Operation and Issues

16.1 Team Structure

The Consultants' organization for the assignment is shown in **Figure 15.** Annex 11 gives the names and tasks of all 28 experts and how their time will be used to complete the Project Deliverables.

Figure 15: Structure PIC Consultants



The main tasks of each individual expert are detailed in the Terms of Reference under each job description of the 28 positions. The Team Leader of the PIC will support the overall coordination, planning and implementation of the project activities in collaboration with the Project Director. He will be responsible to manage the work of the other PIC experts and delegating these coordination tasks to the Deputy Team Leaders when off project. A summary of the main tasks of each expert is given in the next paragraphs.

Team Leader, supported by 3 National Deputy Team Leaders, is primarily responsible for:
(i) overall technical support during implementation, including preparation, implementation of work plans and ensuring the project is completed on time.
(ii) maintaining good coordination among the Executing and Implementing agencies and other stakeholders and assure links with key institutions.
(iii) reviewing feasibility studies and detailed engineering designs.
(iv) working closely with other consultants to provide inputs, identify gaps, and provide timely recommendations.
The 3 Deputy Team Leader are 1 each for the 3 implementing Agencies.

International Environment and Climate Change Specialist, supported by the National Environment and Climate Change Specialist is primarily responsible for:
(i) ensuring that the EARF steps covering environmental screening and impact assessment are followed by PMU, PPIUs and the CS5: Feasibility Study and Detailed Engineering Design consultants and assisting in all aspects of the implementation of the project's EARF and subproject initial environment examinations (IEEs).
(ii) ensuring understanding and compliance with the Climate Risk Assessment and Management for the whole project including construction and operational (post construction) periods.
(iii) Assist PMU to establish and publicize the grievance redress mechanism (GRM) for sub-projects, including as a minimum, the disclosure of all contact persons with whom to lodge complaints.
(iv) prepare training materials and conduct training programs integrating (a) EARF and (IEEs; and (b) record-keeping and reporting (c) CC adaptation into subnational planning and development, gender issues and indicators into national, sectoral and project M&E systems.

The International Social Development and Gender Specialist supported by the National Social Development and Gender Specialist is primarily responsible for:
(i) providing technical leadership related to the proposed subprojects from social development and gender perspectives, based on the gender analysis of the four agricultural value chains.
(ii) reviewing the Summary Poverty Reduction and Social Strategy and Gender Action Plan and their application in the three representative subprojects and prepare reports on subproject poverty and social assessments, stakeholder communication strategy, and consultation and participation plans for local community engagement.
(iii) Ensure that social development and gender issues are accurately covered within all phases of the project; and assess and carefully track ID poor and women's livelihood needs.
(iv) coordinating with the project safeguard specialists regarding the livelihood and social development aspects, and advising the IAs on a training needs assessment of impacted households, including disaggregation of livelihoods by gender and ethnicity if relevant.

The International Social Safeguards Specialist, supported by the National Social Safeguards Specialist are r primarily for
(i) ensuring the project is implemented in accordance with ADB SPS (2009):
(ii) providing guidance in screening subprojects, conducting feasibility studies, preparing due diligence reports (DDRs) land acquisition and resettlement plans (LARP) and Indigenous Peoples/Ethnic Minority Development Plans, LARF and EMDF.
(iii) working in close cooperation with General Department of Resettlement in preparing LARPs for the subprojects with reference to the final detailed engineering design, and where relevant.
(iv) reviewing all subprojects to ensure that no land has been acquired through coercion, compensation paid, and that land purchased or acquired by cooperatives was done so under free private commercial transparent transactions.
(v) preparing training guidelines for preparation of LARP, and EMDP in accordance with Cambodian Laws and Regulations, LARF and EMDF and providing safeguard concept and monitoring training to executing and implementation agencies staff and provide inputs to the project performance monitoring system and other monitoring and evaluation reports on social safeguard indicators.

The International Procurement Specialist, supported by the 4 National Procurement Specialist are responsible for:
(i) preparing requests for proposals and bidding documents, evaluating of bids / proposal, preparing bid evaluation reports / submission for recruitment negotiations and finalizing contract agreements for works, goods and services.
(ii) preparing progress reports and quality control and inspection systems to be followed during execution of civil work contracts. (iii) review and update existing procurement manuals for the project.
(vi) developing, and organizing contract management capacity building and training.
The 4 procurement specialists are 1 each for the 3 implementing Agencies with a fourth one out posted at MEF.

The 4 National Financial Management Specialists are responsible for
(i) ensuring that project accounting practices follow ADB norms,
(ii) developing a financial planning system for project implementation and its subsequent operation and long, medium-term and annual operating plans and schedules as agreed between ADB, MEF and the executing agency (EA) for project implementation and subsequent administrative operation.
(iii) preparing manuals and standard procedures for accounting oversight, internal control, funds flow management, audit planning and management, acceptable to ADB, MEF and the EA.
(iii) assisting in review and preparation of withdrawal applications for submission to MEF and ADB.
(iv) being in charge of all the operations and administrative control, following the establishment of financial and accounting procedures.
The 3 National Financial Management Specialists are 1 each for the 3 implementing Agencies

International Provincial Agricultural Development Centers (PADC) Operations and Management Specialist is primarily responsible for:
(i) assisting in the development of a detailed work and management plan for PADC infrastructure development in consultation with the implementation agencies, this includes establishing an appropriate management and monitoring system.
(ii) reviewing the designs prepared by the PPTA and others by making recommendations for revision and updating the bill of quantities, if necessary.
(iii) providing necessary technical and management support to the executing agencies and IAs for effective project implementation relating to PADCs.
(iv) supervising and liaising with consultants and contractors contracted to conduct the infrastructure work and offer guidance to them when needed and monitoring on-site construction to ensure the work is compliant with the quality required and it will be handed over on-time.

The International Mechanization Workshop Operations and Management Specialist is responsible for:
(i) assisting in the development of a detailed work and management plan for provincial mechanization workshop infrastructure development in consultation with the implementation agencies, this includes establishing an appropriate management and monitoring system.
(ii) reviewing the designs prepared by the PPTA and others making recommendations for revision and updating the bill of quantities and reviewing the procurement list relating to tools and equipment and make revisions.
(iii) providing necessary technical and management support to the executing agencies for effective project implementation relating to provincial mechanization workshops.
(iv) supervising and liaising with the consultants and contractors that are contracted to conduct the infrastructure work and offer guidance to them when needed.

The 4 National Water Management and Irrigation Engineer Specialists are responsible for**:**
providing necessary technical and management support to the executing agencies for effective project implementation relating to off-farm and on-farm irrigation and water catchment.
(ii) assisting in the development of a detailed work plan for irrigation infrastructure activities with the implementation agencies, including establishing an appropriate management and monitoring system.
(iii) reviewing the designs prepared by others and make recommendations for revision and updating the bill of quantities, if necessary.
(iv) supervising and liaising with the consultants that are contracted to conduct the infrastructure work and offer guidance to them when needed and for each water management and irrigation site including assessing the compliance to climate resilience in the design and monitoring the onsite construction to ensure the work is compliant with the quality required and it will be handed over on-time.
(v) Proposing appropriate operation and maintenance regimes and options and collaborating with those responsible for FWUC capacity building to develop the training program and wherever possible make recommendations for improvement.

The 4 National Cooperative Storage & Rural Roads Engineer Specialists are responsible for**:**
(i) providing necessary technical and management support to the executing agencies for effective project implementation relating to cooperative storage units and rural roads.
(ii) assisting in the development of a detailed work plan for cooperative storage units and rural road infrastructure development in consultation with the implementation agencies, this includes establishing an appropriate management and monitoring system.
(iii) reviewing the designs prepared by others and making recommendations for revision and updating the bill of quantities.
(iv) supervising and liaising with the consultants that are contracted to conduct the infrastructure work and offer guidance to them when needed and for each water management and irrigation site including assessing the compliance to climate resilience in the design and monitoring the

onsite construction to ensure the work is compliant with the quality required and it will be handed over on-time.
(v) for each cooperative store that is approved, assessing the need to form climate-resilient rural roads and make recommendations as necessary.
The PIC Team is completed with Office Support Staff working at the MAFF office in Phnom Penh (Secretary/ office manager/accountant, office helper/cleaner and driver) and a Back-stopping Team based in AESA 's offices in Europe and SBK's in Phnom Penh.

16.2 Mobilization and Replacement of the Team Leader

Although the CFAVC CS1 contract was signed already early July 2019, was the Notice-to-Proceed only issued on 5 September 2019 as the ADB insisted on additional detailing of certain annexes of the contract. As this is some 13 months after the issuance of the RFP by MAFF on 20 August 2018 was the original Team Leader in the proposal at that time not available anymore. A replacement team leader was approved by ADB on 11 October 2019 and was mobilized on 03 November 2019. The first team members were mobilized on 23 October 2019.

16.3 Office Facilities

As the CS1, CS 2 and CS 5 teams mobilized more or less on the same time, currently office facilities are not sufficient to properly accommodate all members of the CS1, CS 2 and CS 5 teams, and unless additional office accommodation is made available this will become a burden.

Upon mobilization of the CS1 Consultants team on 23 October 2019 MAFF only one room available for the 3 CS teams, in which the CS2 team had been working since their mobilization mid September 2019. Some 2 weeks later 2 additional rooms became available and late December cupboard and desks arrived, while also the corridor was equipped with desks and air-conditioners.

MOWRAM had office facilities available for the CS 1 team which were occupied after the introduction meeting conducted on November 05. The MRD department could not make any office facilities available and had agreed with MAFF that the CS1 experts supporting the MRD-activities would be provided office facilities at MAFF.

16.4 Transport Facilities

The PIC contract does not foresee in any vehicle transportation as in had been agreed that these would be provided by the involved departments. From the beginning MAFF provided transport for the field visits and from early December MAFF has provided 2 rented cars for the 3 CS1 teams. If in case when the field activities really will have started, the CS1 consultancy is not provided with at least 4 vehicles, it will become difficult to implement the ToR in a decent manner.

For the 4 regional teams of 2 experts the CS1 contract foresees in purchase and operational costs for 8 motor bikes, one for each expert.

16.5 Updated Bar Charts

Due to a) the limited office facilities available and b) the intermittent nature of the input of nearly all experts (both international and national) has mobilization been slow. Annex 10 and 11 show the updated mobilization chart for CS1 and CS2. The CS1 DTL for MAFF resigned on 15 December because of health reasons, and the CS2 DTL on the 10th of January 2020.

17 SUGGESTIONS and PROPOSALS on TA Support

This chapters concerns a number of proposals and suggestions regarding the TA teams to smoothen the implementation of the project. Even though there seems to be many inputs from Consultants there seem to be a number of mis-matched as follows:

17.1 CS 1

The main issued with the staffing of CS1 are the fact that all 4 Team Leaders (both the International and the 3 national Deputy Team-leaders) have intermitted inputs at 18 PM for the International Team Leader and 30 each for the National Deputy Team Leaders out of a contract period of 60 months. These intermittent assignments like likely result in many replacements which will make smooth implementation difficult. For CS1 at present only the International and one National Deputy Team-leader (for MOWRAM) are mobilized and the International team leader is expected to finish his first input on 15 February 2020.

17.2 CS 2

The CS2 administrative issues are listed in Annex 14.

17.3 CS 5

The ToR of the CS 5 package requires the DED and Tender documents of the irrigation- and farm roads to be completed by October 2024, but as also raised during the videoconference with the ADB project officer on November 4, 2019, this will leave no time to actually implement these works within the original project period. In the Inception Report of the CS 5 consultants it is now proposed that all design works and preparation of tender documents are completed by the end of December 2022. As the design only covers 15,000 ha this should be a realistic target. It seems valid to limit the CS5 implementation period to December 2022.