



**Ministry of Agriculture Forestry and Fisheries
Climate-Friendly Agribusiness Value Chains Sector Project (CFAVC)**

**ADB Loan No. 3661-CAM (COL), 8346-CAM (EF) and Grant No. 0579 (EF)
Contract No. SER 003: Feasibility Studies and Detailed Engineering Design
Consulting Firm (Package – CS5)**

Inception Report

December 2019



**Prepared and Submitted by
Resources Development Consultants (Pvt) Ltd., Sri Lanka
In association with
CAM-CSTR Co., Ltd., Cambodia**

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Description
AC	Agricultural Cooperative
ADB	Asian Development Bank
BDS	Bid Data Sheet
BOQ	Bill of Quantities
BME	Benefit Monitoring and Evaluation
CAD	Computer Aided Design
CAP	Country Assistance Plan
CARM	ADB Cambodia Resident Mission
CFAVC	Climate-Friendly Agribusiness Value Chains Sector Project
CS	Consultancy Service
CSA	climate smart agriculture
CWR	Crop Water Requirement
DDR	Due Diligence Report
DED	Detailed Engineering Design
DMF	Design and Monitoring Framework
EARF	Environment Assessment and Review Framework
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
FGD	Focused Group Discussion
FIRR	Financial Internal Rate of Return
FSDD	Feasibility Study and Detailed Engineering Design
FWUC	Farmer Water User Community
FWUG	Farmer Water User Group
GCC	General Conditions of Contract
GCF	Green Climate Fund
GHG	Green-house Gas
GMS	Greater Mekong Sub-region
Ha	Hectare
ICB	International Competitive Bidding
ICT	Information and Communications Technology
IEE	Initial Environmental Examination
IEER	Initial Environmental Examination Report
IFB	Invitation for Bids
Km	Kilometer
KOC	Kingdom of Cambodia
LARP	Land Acquisition and Resettlement Plan
MAFF	Ministry of Agriculture, Forestry and Fisheries
MOWRAM	Ministry of Water Resources and Meteorology
MRD	Ministry of Rural Development
NCB	National Technical Department
NTD	National Competitive Bidding
O&M	Operation and Maintenance
PAM	Plain Cement Concrete
PCC	Project Administration Manual
PIC	Project Implementation Consultant
PMU	Project Management Unit
PPIUs	Provincial Project Implementation Units
PPP	Public Private Partnership
PPTA	Project Preparatory Technical Assistance
PSC	Project Steering Committee
RCC	Reinforced Cement Concrete
RDC	Resources Development Consultants (Pvt) Ltd.
RP	Resettlement Plan
SCC	Special Condition of Contract

Acronym / Abbreviation	Description
SIA	Social Impact Assessment
SPRSS	Summary Poverty Reduction and Social Strategy
TL	Team Leader
TTL	Task Team Leader
TOC	Table of Content
TOR	Terms of Reference
USD	United States Dollar

ACKNOWLEDGEMENT

The Climate-Friendly Agribusiness Value Chains Sector Project (CFAVC) has been one of auspicious project of RDC in South East Asia. CFAVC has been the outcome of the Government's plan to tackle with the low performance of agriculture sector due to a) climate vulnerable and poor agriculture production and service infrastructure; b) underdeveloped agricultural value chains, and c) unsustainable natural resources exacerbated by climate change. The CFAVC aims to support the implementation of the government's Agriculture Sector Strategic Development Plan, 2014–2018 and the Industrial Development Policy, 2015–2025 aimed at improving the competitiveness of agricultural value chains.

CFAVC covers four provinces of Cambodia and they are Kampong Cham, Tboung Khmum, Takeo and Kompat. The RDC deals with the FSDD CS5 Contract of CFAVC Project.

This has been great experience so far to work with Project Management Unit, Ministry of Agriculture, Forestry and Fisheries, Ministry of Water Resources and Meteorology, Ministry of Rural Development and the Asian Development Bank.

Particularly, we are thankful to Dr. Sam Chhom Sangha, the CFAVC Project Director, Deputy Secretary General, MAFF, for guiding and suggesting us from the beginning of project. We appreciate and thank to HE Chann Sinath, PMU Director, MOWRAM, and all his team in Phnom Penh and provinces for his continued effort to support and facilitate us during the field visits and subproject identification and familiarization.

We are grateful to the Dr. Srinivasan Ancha, Task Team Leader, Asian Development Bank for providing us the project background, scope of works and project status, and pertinent suggestions to start the project with mindset to make up the almost one-year delay in CFAVC start up.

Last but not least, we thank to Willem Jan VAN DIEST, TL of CS1 and his team, Pollard Martin Blackeley, TL of CS2 and his team and all RDC staff and CAM-CSTR Co. Staff who contributed their best to implement and complete the inception phase.

Team Leader and RDC Management

RDC (Pvt.) Ltd. Sri Lanka

1. INTRODUCTION

1.1. Project Background

1 Agriculture plays a dominant role in Cambodian economy, and low value addition, low productivity and extensive use of natural resources are key characteristics of the Cambodian agriculture sector. The root causes for low performance of the agriculture sector include; i. climate vulnerable and poor agriculture production and service infrastructure; ii. Underdeveloped agricultural value chains, and iii. Unsustainable natural resources exacerbated by climate change.

2 The Cambodian Ministry of Agriculture, Forestry and Fisheries (MAFF) in coordination with Ministry of Water Resources and Meteorology (MOWRAM) and Ministry of Rural Development (MRD) has implemented the Asian Development Bank funded, “The Climate-Friendly Agribusiness Value Chains Sector Project” aimed at addressing the above issues by improving the competitiveness of agricultural value chains in Kampong Cham and Tboung Khmum province along the Greater Mekong Sub-region (GMS) southern economic corridor, and Kampot and Takeo provinces along the south coastal economic corridor. The project is focused on enhancing the climate resilience of critical agriculture infrastructure and facilitating commercialization of rice, maize, cassava, and mango production¹.

3 The project aims to increase crop productivity and diversification; improve the capacity for storage, processing, and quality and safety testing; and promote the use of solar and bioenergy. It also plans to strengthen the technical and institutional capacity for climate smart agriculture (CSA) and create an enabling policy environment for climate-friendly agribusinesses. The above interventions will make a significant contribution to promote long-term environmental sustainability and enhance the profitability for farmers and agribusinesses. The project interventions are expected to address key constraints in the Cambodian agriculture sector and make a significant contribution to improve agricultural productivity, climate resilience, quality and safety, value addition and rural household incomes. The expected outcome of the project should result in development of productive and resource efficient agribusiness value chains in the project areas.

4 The project is financed in part by the Asian Development Bank (ADB), Green Climate Fund (GCF), and in part directly by the Kingdom of Cambodia (KOC) and beneficiary farmers of CFAVC area. It responds to the government’s strategy to support the implementation of the government’s Agriculture Sector Strategic Development Plan, 2014–2018 and the Industrial Development Policy, 2015–2025 aimed at improving the competitiveness of agricultural value chains in in Kampong Cham and Tboung Khmum province along the Greater Mekong Subregion (GMS) southern economic corridor, and Kampot and Takeo provinces along the south coastal economic corridor of Cambodia. The project foresees to have impact reflected in enhanced productivity, climate resilience, quality and safety, value addition and rural household incomes.

1.2. Objectives of the Assignment and Expected Outcome

5 The objective of the feasibility studies and detailed engineering design (FSDD) assignment is to assist the project management unit (PMU), and the provincial project implementation units (PPIUs) in the preparation of feasibility study and detailed engineering design of each subproject.

¹ Project Administration Manual, CFAVC, June 2018, ADB

6 Expected project outcome is the development of productive and resource-efficient agribusiness value chains in the Project area².

1.3. Scope of Works of CS5 Consultancy Assignment

7 Resources Development Consultants (Pvt) Ltd. (RDC), Sri Lanka in association with CAM-CSTR Co., Ltd., Cambodia has been engaged to undertake the Consultancy Services for package 5 Time Based Contract related to feasibility studies and detailed engineering design Works for the CFAVC by the Ministry of Agriculture, Forestry, and Fisheries, Kingdom of Cambodia. The terms of reference (TOR) of the Consultant's services is presented in **Appendix A**.

8 The feasibility study and detailed engineering design of irrigation and market & farm roads subprojects in Kampong Cham and Tboung Khmum province along the Greater Mekong Sub-region (GMS) southern economic corridor, and Kampot and Takeo provinces along the south coastal economic corridor has to be carried out under this consultancy assignment, which is aimed at achieving the project output 1: **Critical Agribusiness Value Chain Infrastructure Improved and made Climate Resilient**.

9 Key activities involve:

- (i) Rehabilitation of minimum 27 irrigation and water management infrastructure (off-farm irrigation systems), about 800 on-farm water rainwater harvesting ponds, and 15 drip irrigation demonstration unit to climate-resilient condition;
- (ii) Upgrading agricultural cooperatives' value chain infrastructure (drying, processing and storage facilities);
- (iii) Improving the connectivity of farms to cooperatives and markets through climate-resilient farm road networks of 250 km;

10 It is apparent that the objective of the consultancy assignment is to assist the project management unit (PMU) established in the Ministry of Agriculture, Forestry and Fisheries, and the Provincial Project Implementation Units (PPIUs), in the preparation of feasibility study and detailed engineering design of a number of irrigation subprojects and farm and market road subprojects, which will improve critical agribusiness value chain infrastructure and climate resilience of agribusiness value chains in four selected provinces.

11 As expected in Project Administration Manual (PAM) of CFAVC Project, the FSDD CS5 firm will ensure that the subprojects are designed in a logical and efficient manner and start feasibility study and design work on a package by package basis and will allocate resources as required for these subprojects to be completed. Given the time needed to undertake feasibility studies and detailed engineering design for each package, as well as preparing tender documents (approximately six months), packages will likely have to be undertaken one after the other. However, there may be some overlap depending on the speed and resources available with the FSDD CS5 firm. The terms of reference of FSDD recommends that grouping of packages will be done based on location (with subprojects grouped according to province to the extent possible), as well as total estimated works contract size. Viable subprojects will then be approved by the Project Steering Committee (PSC) after submission and following recommendations from PMU.

² The design and monitoring framework (DMF) of PAM

Table 1.1: List of Pre-screened Irrigation Subprojects from ADB Website

Sr. No.	Subproject Name	Address			Command area Ha	ESTIMATED COST USD \$	Coordinate WGS84 48P	
		Village	Commune	District			X_UTM	Y_UTM
I Location of Sub Project in KAMPOT Province								
1	TRAPEANG RUN	TRAPEANG RUN	TANI	ANGKOR CHEY	100	526,000	460642	1193057
2	TAKOCH (Prey Takoch-Prawoek Pong)		SRAE KNOUNG	CHUM KIRI	360	643,000	444381	1212158
3	MLECH		CHRES	CHUM KIRI	1600	1,150,000	445367	1206609
4	TEOK LA'AK		ANGKOR CHEY	ANGKOR CHEY	100	600,000	458854	1196606
5	TRAPEANG BEUNG		Sathpong/ TROMENG/ Baniev	CHHOUK	1400	1,610,000	442052	1197647
6	KANDORL		KANDORL	TEUK CHHOU	650	650,000	419597	1180074
7	BROVEK PONG RESERVOIR		TRAPEANG PRING	TEUK CHHOU	310	410,000	421180	1174794
II Location of Sub Project in Kampong Cham Province								
8	O Chrey Dam	Song kerb	Sambo	Batheay	750	1,000,000	491814	1317700
9	Kor Aet Reservoir	Tang Klerng	Me Prin	Batheay	450	600,000	491013	1330883
10	Teuk Cha Irrigation System	O Chrer	Beung Nay & Krouch	Prey Chhor	4900	600,000	521112	1347610
11	Pram Kumpheak Reservoir	Knol beak kert	Svay Teap	Chamkaler	638	1,076,000	531218	1361210
12	O Kamprok Reservoir	Preach Andong Ti Mouy	Preach Andong	Stoeng Trong	455	760,000	575700	1361004
III Location of Sub Project in TBOUNG KHMUM Province								
13	TA KHEM RESERVOIR TUMNUB KBAAL TEUK	KBAL TOUEK	PREASH THEAT	Ou Raing Ov	445	378,000	554814	1310518
14	TOUL PRING RESERVOIR	STUNG PENH	CHIKOR	TBOUNG KHMUM	250	100,000	563804	1313173
15	TRAPAING TROS RESERVOIR	THMAR PICH 2	THMAR PICH	TBOUNG KHMUM	600	456,800	563270	1329108
16	K' ETH RESERVOIR	PREK PDAO	PEAM CHEALAING	KROUCH CHHMAR	1120	475,000	561218	1336783
17	TBOUNG DAMREI COMMUNITY	BARRAY	CHHOUK	KROUCH CHHMAR	1000	300,000	586531	1345733
18	KAMPONG RAING COMMUNITY	KAMPONG RAING	SEDA	DAMBAE			602326	1348505
IV Location of Sub Project in TAKEO Province								
19	Prey Kdouch Reservoir	Prey Kdouch, Trapaing Robong, Trapaing Skea, Trapaing Kranhoung, Trapaing Chork	Trapaing Kra Nhoung	Tram Kak	550	1,041,000	436090	1227056
20	Kraing Empil Embankment		Trapaing Kra Nhoung	Tram Kak	300	243,900		
21	Sdok Sab Reservoir	Samraong, Pen Meas, Prey Tadok	Samraong	Tram Kak	560	402,000	451970	1214140
22	Trapaing Khorn Reservoir	Trapaing Thom Tboung	Samraong	Tram Kak	200	362,000		
23	O' Rumdoul Reservoir	Trpaing Kess, Trapaing Russey, Korl Korm, Kraing Kor, Yeay Lor	Tram Kak	Tram Kak	985	750,000		
Total					17,723	14,133,700		

1.5. Consultancy Contract Completion Period

1 The Time Based Contract No. SER 003: Feasibility Studies and Detailed Engineering Design (FSDD) Consulting Firm (Package – CS5) of Climate-Friendly Agribusiness Value Chains Sector Project (CFAVC) was signed on 26 September, 2019 between the Ministry of Agriculture, Forestry and Fisheries (MAFF), Kingdom of Cambodia and Resources Development Consultants (Pvt) Ltd., (RDC), Sri Lanka in association with CAM-CSTR Co., Ltd., Cambodia. The Contract No. SER 003: FSDD CS5 of CFAVC Project commenced with effect from 1 November 2019 for a contract period of 60 months. Estimating the effective date from 1 November 2019, the FSDD CS5 contract is physically planned to complete by 29 October 2024.

1.6. Expected Project Outputs

2 The CFAVC Project has three key outputs and particularly related with FSDD CS5 is the **Output 1**. All the Project outputs are discussed below:

3 **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.

4 Key activities involve:

- (i) Rehabilitation irrigation and water management infrastructure (off-farm irrigation systems, on-farm water rainwater harvesting ponds, and drip irrigation) to climate-resilient condition;
- (ii) Upgrading agricultural cooperatives' value chain infrastructure (drying, processing and storage facilities);
- (iii) Improving the connectivity of farms to cooperatives and markets through climate-resilient farm road networks;
- (iv) Strengthening the infrastructure for agricultural quality and safety testing; and
- (v) Promoting renewable energy (bio-digesters and use of solar energy in target cooperative areas).

5 **Output 2: Climate-smart agriculture and agribusiness promoted.** 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.

6 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. Key activities include:

- (i) Deploying climate-resilient varieties;
- (ii) Strengthening the capacity for climate-friendly production practices and technologies; and
- (iii) Promoting farm mechanization and extension.

7 **Output 3: Enabling environment for climate-friendly agribusiness enhanced.** The project will support the Ministry of Agriculture, Forestry, and Fisheries (MAFF) and the Ministry of Commerce in creating a favourable 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.

8 Activities include:

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

1.7. Purpose and Overview of This Inception Report

9 This Inception Report is prepared by RDC as the first deliverable in fulfilment of the key deliverables under this Contract. The report addresses the following:

- (i) Start-up activities
- (ii) Project Site Visits and Prioritization of Works
- (iii) Status of data collection
- (iv) Updated Approach and Methodology
- (v) Updated Work and Staff Schedule
- (vi) Conclusion: Issues and Concerns

10 In brief, the purpose of the Inception Report is:

- To document RDC's understanding of the project and to allow MAFF to review this and clarify any issues where necessary;
- To update and confirm the task methodology and work plan, especially for feasibility survey, design, and tender document preparation;
- To highlight any additional work that may be deemed to be necessary for the effective implementation of the Assignment;
- To confirm the deliverables of the Assignment;

2. INCEPTION PHASE

2.1. Mobilization and Kick off Meeting

11 After the receipt of notice to proceed on 16 October 2019, the national team of FSDD CS5 joined the CFAVC Project from 1 November 2019 and the Team Leader joined the Team from 4 November and had a kick off meeting on 5 November 2019 with the Project Director Dr. Sam Chhom Sangha, Deputy Secretary General, MAFF.

12 Following the kick-off meeting in Phnom Penh, mobilisation of other experts has been carried out. The International Agriculture Economist arrived to Phnom Penh on 7 November 2019. Mobilisation of the rest of the staff is being undertaken in accordance with the work schedule and needs of the project.



13 A number of meetings was attended by the FSDD CS5 Consultant team, especially a CFAVC Project Briefing Meeting in ADB Cambodia Resident Mission (CARM) was attended on 5 November 2019 in presence of CS1, CS2, CS5 plus representatives from MAFF, MOWRAM and MRD. ADB Task Team Leader (TTL) Dr. Srinivasan Ancha described about the project background, challenges and situation and highlighted the delay in project start up by almost a year. A similar meeting was attended on 6 November in MOWRAM in the chairmanship of HE Chann Sinath, Secretary, MOWRAM.

14 The Consultant has discussed with the PMU and procurement expert to engage some National Survey Firms in order to accelerate the field survey and investigation required for feasibility and design works. The intention has been that the project works are carried out simultaneously in a number of subprojects. As the project area is spread over four provinces Kampot, Takeo, Kampong Cham and TBOUNG KHMUM. This approach of engaging a number of survey firms from different provinces is considered as the most rational approach to expedite the progress.



15 The site visits have been commenced in order to familiarise with the Sub-project areas and to get to know the views and expectations of the PPIUs, local authorities and local community /farmers. This will facilitate need assessment and identification of problems in the process of preparing the respective feasibility studies and detailed engineering design to solicit comprehensive input from the local community regarding the subprojects.

2.2. Start-up Activities

16 The Consultant has been collecting and reviewing relevant documents of CFAVC Project from PPTA stage till now. The Consultant has been visiting the different subproject areas in four provinces with representatives from CS1, MAFF, MOWRAM and MRD in order to get pre-feasibility idea about the pre-screened subprojects under irrigation and listed subprojects of roads. The Consultant has a plan to send survey and investigation team to field to collect more specific data / information during the reconnaissance and feasibility study period. The Consultant intends that the participation of the target groups is ensured at all stages of development of planning and design. The consultant, keeping in mind the above principle, will hold a number of pre-arranged discussion meetings with the beneficiaries in the presence of public representative(s), PPIUs and local officials. The Consultant will discuss and obtain necessary inputs from beneficiaries and local officials regarding the proposals of subprojects, and verify that the social and environmental needs and problems have been identified and addressed appropriately. The Consultant will record the participatory discussions in detail and prepare a well-structured participatory report in connection with each subproject. In the event that changes in the proposed subproject proposals are necessary, the consultant will review the proposed development plan on the basis of the outcomes of participatory discussions, technical viability, observation, etc. and adjust or modify the development plan acknowledging the local people's opinion for further analytical study. This modified plan will be finalized in consultation with the PMU.

2.3. Project Site Visits and Familiarizing with the Project

17 The Consultant's experts have visited 4 provinces (Kampong Chom, Tboum Khmum, Kampot and Takeo) with representatives from MAFF, MOWRAM, MRD, PPIUs, CS1 and CS2 in orientation phase in November and December 2019 having interaction with local community and then conducted screening and pre-feasibility phase field visits in more than 15 irrigation subprojects and concerning farm roads related with agriculture cooperatives. Mainly visited irrigation subprojects are: Trapeang Run, Teuk La'ak, Trapeang Boeung, Mlech, Takouch in Kampot province. Prey Kdouch, Sdok Sab reservoir, Prajeajun Prey Rumdeng and Rolous Meas irrigation subprojects in Takeo province. Tomnob Boeung Ka Et and Tomnob Trapeang Tros, Tumnuh Kbal Teuk, Toul Pring, O Kamprok, Pram Kompheak, Touek Char, PoTa Tress, Ko et and O Chrey, Brovek Pong Reservoir, Kandorl Reservoir irrigation subprojects.



18 The response received about CFAVC is encouraging, which shows indication that the project is notably important for the area. The PPIUs and other officials have expressed full cooperation in providing necessary support for all aspects of project implementation such as providing data, information and relevant available documents as well as for carrying out survey, investigation, design and subsequently for project implementation.

19 The Consultants have explained the objectives of the project and the various activities included under CFAVC and explained that the entire CFAVC program will be implemented in a participatory approach involving the concerned local Government Officials as well as the farmers/local community and stakeholders.

20 The Consultants travelled through the project areas extensively and visited reservoirs, canals, structures and agricultural fields in order to get an idea about the current condition of the irrigation and drainage system. Generally, the condition of the I&D systems is poor. Most of the canals are silted up or unattended and sections are irregular. The condition of the water management structures is also very poor. The Consultants have also discussed with the accompanying members (Officials and farmers) regarding their view about rehabilitation / modernization needs of the systems. Preliminary Field Visit Reports have been prepared for some visited irrigation subprojects and they are shown in **Appendix B**.



21 Based on the initial field visits and irrigation and drainage structural condition surveys, meeting with farmers and PPIU officials, and review of the available documents, the Consultants have prepared prioritization of irrigation for the survey, design and tender document preparation. This is discussed in **section 2.4.2** below.

2.4. Field Visit Findings

2.4.1. General Findings

22 The orientation phase served to make contacts, to present the project objective and scope and to provide insights in data requirements. It seems that most counterparts, including PPIUs did not have much information about the CFAVC Project.

23 It was also observed that there was no coordinated set-up; some experts knew about the visited irrigation scheme, others about the situation of the farmers and so on; no one had a good overview.

24 It might be useful to prepare short leaflets in local language to inform stakeholders about the project, opportunities and threats, including eligibility criteria such as average farm size of 0.6 ha within the future irrigated area, profitability of the investment (EIRR, etc).



25 Fact-sheets might be a useful tool too where all CS-teams could enter and access data. It needs from CS side a more holistic approach, looking for the big picture and not only for details of interest to the specific experts.

26 A joint databank, eventually on a local server, might help to spread the information about the CFAVC project and to get quicker insight into already available data; this might be of interest to Ministry and other authorities' staff as well.

27 Information obtained from agricultural cooperatives (ACs) was very poor; two of three visited coops could provide after some discussion figures about turnover and profit; it turned out that one coop, with an impressive building, redistributed USD 58 to each member last year, whereas the other one only USD 5; both cannot be considered as commercially successful. In general, it appears that the agricultural cooperatives have been set up top-down, to get a structure among farmers for dissemination of information, for scheduling some support measures and so on.



28 Interpreter; as most meetings take place in Khmer language, the international consultant does not get the full picture as the local counterpart is often himself involved in the discussions and has not enough capacity to act also as an interpreter. Having an interpreter available on daily basis would improve the communication.

2.4.2. Identified List of Subprojects

29 As the pre-screed list of subprojects shown in **Table 1.1** shows 23 irrigation subprojects only, and they are short of 4 subprojects, in such a number of subprojects were suggested by MOWRAM during and after the field visits, they have been also included for further consideration during feasibility stage of the project. In consideration of current situation, the identified list of irrigation subprojects is shown in **Table 2.1**.

30 The location maps of identified irrigation subprojects in four provinces are shown in **Figure 2.1** to **Figure 2.4**.

31 In similar way, a list of farm and market road linking Agriculture Cooperatives have been received from MRD for Kampot, Takeo and Tboung Khmum Provinces and they are shown in **Table 2.2**, **Table 2.3** and **Table 2.4** respectively. The list of farm roads for Kampong Cham province is yet to be received from MRD.

2.4.3. Prioritization of Subprojects (Irrigation and Road) and their Packaging

32 Taking into account the field visits carried out in four provinces in irrigation subprojects mainly and some farm roads, mutual interaction and discussions held with PPIUs of provinces and some local communities, prioritization of the irrigation subprojects have been assessed into packages. While prioritizing, the following criteria was adopted:

- The subprojects having more clarity in irrigation source and command area during the screening and pre-feasibility phase in terms of technical, social and economic criteria for instance EIRR > 12% was given more priority;
- Also farm road projects have to reach an EIRR of 12% according to PAM p 71. The benefits to be quantified are time for transport, reduced transport costs as transporter will charge less if roads are better, less repair costs on trucks and trailers, reduced damage of transported agricultural goods to markets, etc. Internal discussions came to the

conclusion that the 12% EIRR must be achieved through the additionally transported agricultural output only. In other words, the calculation will not take into consideration that village inhabitants will travel faster and cheaper to work, to the hospital or to the cinema; only the agricultural in the calculation will be done purely in an “agricultural” sense. Eventually this will not allow any rehabilitation of the road network as the little increase in agricultural production might not justify the road construction costs.

- The concerns and suggestions from local community and PPIUs were taken into account while prioritizing the subprojects and their packaging;
- The suggestion provided in PAM to include the subprojects within a province while forming a package was considered;
- Trapaing Run Reservoir subproject was studied in PPTA, and thus it was kept in first package;
- Subprojects were grouped in a package based on the vicinity of their location, size of the subprojects in terms of technical issues and financial size to accommodate in a package;
- The subprojects proposed by MOWRAM during field visit and after has also been included in the packages.

33 The prioritization of irrigation subprojects and their packaging has been done in due consideration of above criteria and formed 14 packages slightly more than 12 as anticipated in PAM. The prioritized packages in irrigation subprojects are shown in **Table 2.5**.

34 In similar manner, the list of farm and market roads received from the MRD has been prioritized considering the following criteria:

- Grouping the package size between 10 to 25 km;
- Targeting the concerning AC to main market if it is same from different ACs;
- Giving preference to single type of road as much as possible, however if site conditions dominates, combination of different types have been considered;
- Location in close vicinity or in same district as far as possible;
-

35 The prioritization of farm and market roads subprojects and their packaging has been done considering the above criteria and formed 14 packages with available list with target to form 16 packages as anticipated in PAM. The prioritized packages in farm and market roads subprojects are shown in **Table 2.6**.

Table 2.1: List of Identified Irrigation Subprojects

Sr. No.	Sr. No. from MOWARM	Subproject Name	Address			Command area Ha	ESTIMATED COST USD \$	Coordinate WGS84 48P		Remarks
			Village	Commune	District			X_UTM	Y_UTM	
I Location of Sub Project in KAMPOT Province										
1	1	TRAPEANG RUN	TRAPEANG RUN	TANI	ANGKOR CHEY	100	526,000	460642	1193057	ADB Website
2	3	TAKOCH (Prey Takoch-Prawoek Pong)		SRAE KNOUNG	CHUM KIRI	360	643,000	444381	1212158	ADB Website
3	4	MLECH		CHRES	CHUM KIRI	1600	1,150,000	445367	1206609	ADB Website
4	2	TEOK LA'AK		ANGKOR CHEY	ANGKOR CHEY	100	600,000	458854	1196606	ADB Website
5	5	TRAPEANG BEUNG		Sathpong/TROMENG/Baniev	CHHOUK	1400	1,610,000	442052	1197647	ADB Website
6	6	KANDORL		KANDORL	TEUK CHHOU	650	650,000	419597	1180074	ADB Website
7	7	BROVEK PONG RESERVOIR		TRAPEANG PRING	TEUK CHHOU	310	410,000	421180	1174794	ADB Website
II Location of Sub Project in Kampong Cham Province										
8	1	O Chrey Dam	Song kerb	Sambo	Batheay	750	1,000,000	491814	1317700	ADB Website
9	4	Kor Aet Reservoir	Tang Klerng	Me Prin	Batheay	450	600,000	491013	1330883	ADB Website
10	2	Teuk Cha Irrigation System	O Cherk	Beung Nay & Krouch	Prey Chhor	4900	600,000	521112	1347610	ADB Website
11	3	Pram Kumpheak Reservoir	Knol beak kert	Svay Teap	Chamkaler	638	1,076,000	531218	1361210	ADB Website
12	5	O Kamprok Reservoir	Preach Andong Ti Mouy	Preach Andong	Stoeng Trong	455	760,000	575700	1361004	ADB Website
13		Pou Tatress		Taing Krasaing, Trorp	Batheay	2050		491103	1336779	PDOWRAM 29 Nov 19
III Location of Sub Project in TBOUNG KHMUM Province										
14	1	TA KHEM RESERVOIR TUMNUB KBAAL TEUK	KBAL TOUEK	PREASH THEAT	Ou Raing Ov	445	378,000	554814	1310518	ADB Website
15	4	TOUL PRING RESERVOIR	STUNG PENH	CHIKOR	TBOUNG KHMUM	250	100,000	563804	1313173	ADB Website
16	3	TRAPAING TROS RESERVOIR	THMAR PICH 2	THMAR PICH	TBOUNG KHMUM	600	456,800	563270	1329108	ADB Website
17	2	K' ETH RESERVOIR	PREK PDAO	PEAM CHEALAIING	KROUCH CHHMAR	1120	475,000	561218	1336783	ADB Website
18	5	TBOUNG DAMREI COMMUNITY	BARRAY	CHHOUK	KROUCH CHHMAR	1000	300,000	586531	1345733	ADB Website
19	6	KAMPONG RAING COMMUNITY	KAMPONG RAING	SEDA	DAMBAE			602326	1348505	ADB Website
20		Choam Taheung			DAMBAE	5000		602958	1316815	PDOWRAM 26 Nov 19
IV Location of Sub Project in TAKEO Province										
21	1	Prey Kdouch Reservoir	Prey Kdouch, Trapaing Robong, Trapaing Skea, Trapaing Kranhoung, Trapaing Chork	Tropaing Kra Nhoung	Tram Kak	550	1,041,000	436090	1227056	ADB Website
22	2	Kraing Empil Embankment		Tropaing Kra Nhoung	Tram Kak	300	243,900			ADB Website
23	3	Sdok Sab Reservoir	Samraong, Pen Meas, Prey Tadok	Samraong	Tram Kak	560	402,000	451970	1214140	ADB Website
24	4	Tropaing Khorn Reservoir	Tropaing Thom Tboung	Samraong	Tram Kak	200	362,000			ADB Website
25	5	O' Rumdoul Reservoir	Trpaing Kess, Trapaing Russey, Korl Korm, Kraing Kor, Yeay Lor	Tram Kak	Tram Kak	985	750,000			ADB Website
26	6	Reussey Tmey Rong Reung	REUSSEY THMEY	CHAMPA	PREY KABASS			490126	1234198	from MOWRAM
27	7	Jerngkoun Jokjey	JERNGKOUN	JERNGKOUN	SAMRONG			481320	1229802	from MOWRAM
28	8	Sromok Sok Senjey	SROR MOK	PUNLEY	ANGKOR BOREY			489345	1222745	from MOWRAM
29	9	Kampeng Sok Sen Sambo	CHI MARAEK	KAMPENG	KIRIVONG			467969	1175175	from MOWRAM
30	10	Projeajun Prey Romdeng	DEI KRAHAM	PREY RUMDAENG	KIRIVONG			474260	1173919	from MOWRAM
31	11	Rolous Meas	ROLOUS	THLEA PROJUM	KOH ANDAET			486516	1193087	from MOWRAM
32	12	Arng Toeuk Sarmky	ROVEANG	THLORK	TRAIING			485326	1205277	from MOWRAM
33	13	Baksey Rikreay	ANG BAKSEY	CHEANG TONG	TRAMKAK			459988	1221913	from MOWRAM

Figure 2.1: Location map of Irrigation Subprojects in Kampot Province

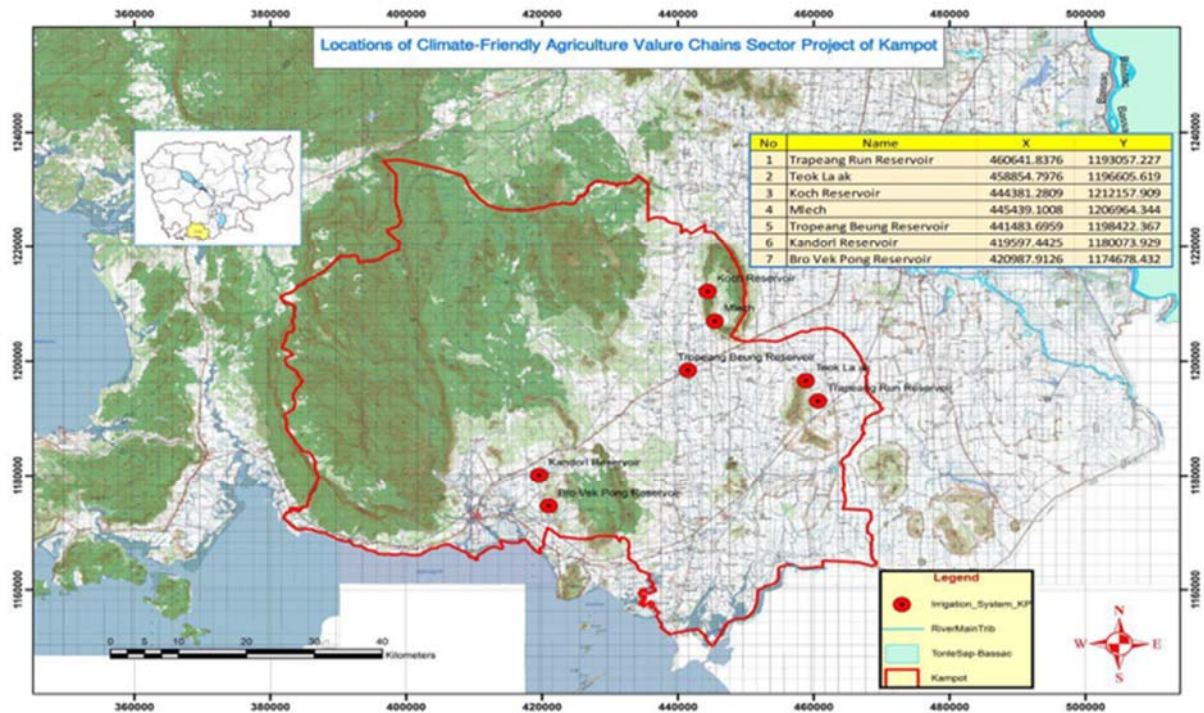


Figure 2.2: Location map of Irrigation Subprojects in Takeo Province

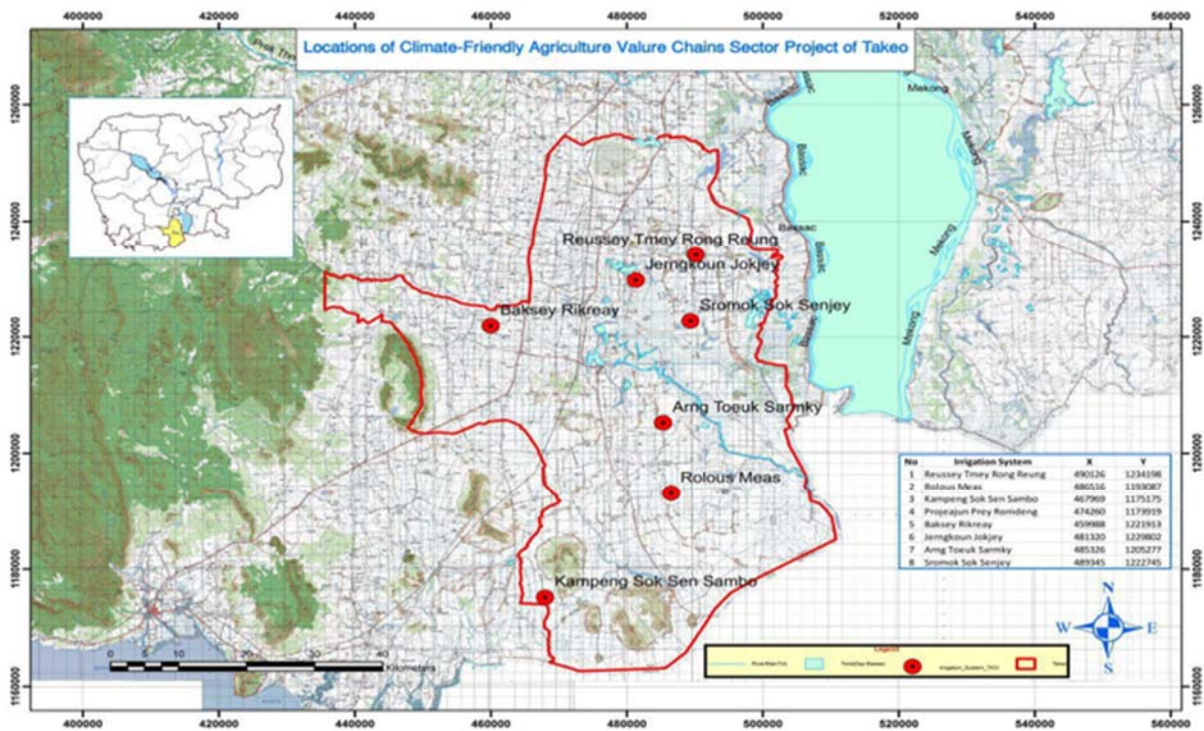


Figure 2.3: Location map of Irrigation Subprojects in Tboung Khmum Province

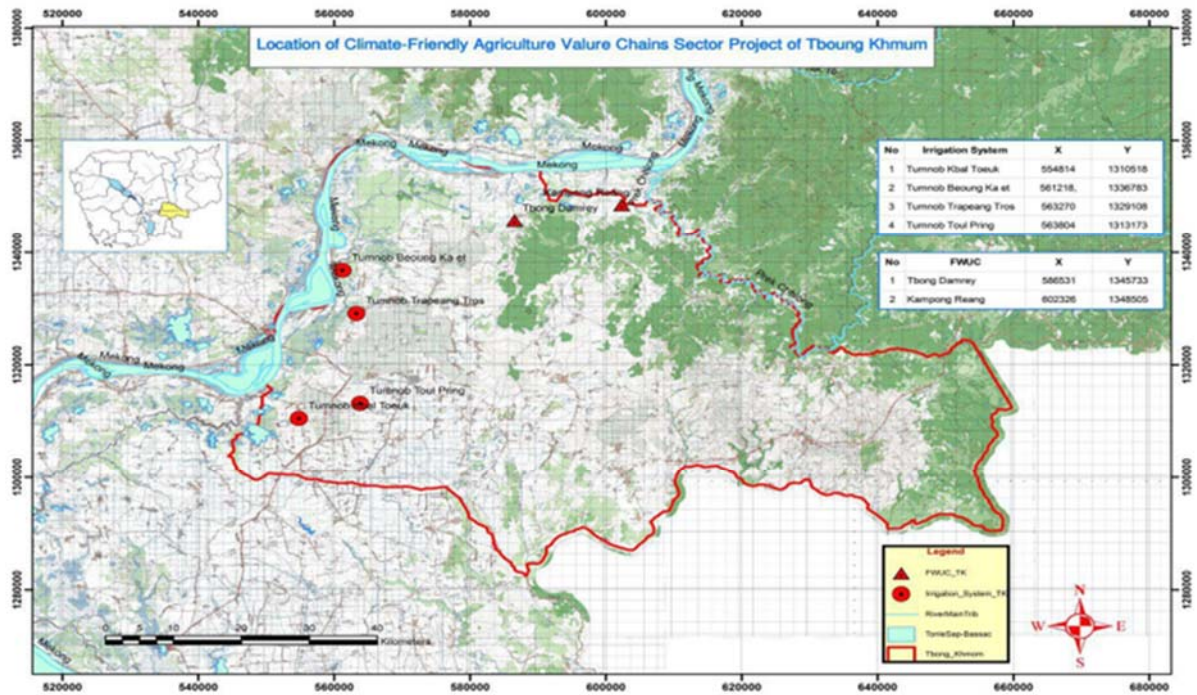


Figure 2.4: Location map of Irrigation Subprojects in Kampong Cham Province

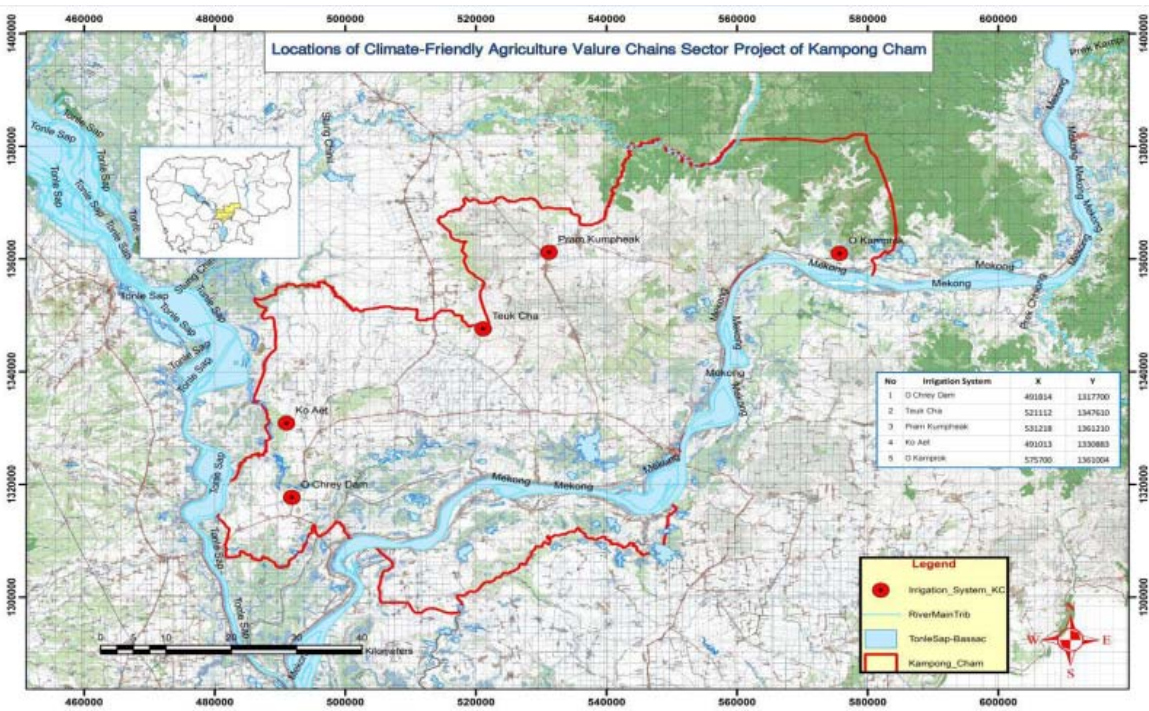


Table 2.2: List of Farm and Market Roads in Kampot Provinces

N.o	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	Raksmeay 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 52 94 452	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 47 00 606	Road N.o 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 Angchorik-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 N.o 41-Sahakom	1.340	Laterite	6.00	0443180	1221827	0441889	1221548	Code 436
10	Kasekor Rongroueng	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 2.3: List of Farm and Market Roads in Takeo Provinces

No.	Name of AC	Village	Commune	District	Phon No	Name of Road	Length (k.m)	Type	Exiting Width(m)	Start , NE point	End , NE point	Code /Inv			
1	Samaki Trapang Kralagn AC	Trapang Kralagn	Ou saray	Tram Kok	092977984	Trapng 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 Tekthia AC	Tekthia	Trapang Krasang	Bati	012823703	Vat Angron- Slarom+	4.900	Laterite	5.00	0475915	1242506	476223	1238580	Code112	
						Trapang Krasang-Kodoul	2.700	Laterite	4.00	0475568	1240834	0473014	1241274	Code129	
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	Kloungvar Vattotar -plov Tonlebatl	9.700	Laterite	5.00	0473930	1246137	0473367	1254972	Code105	
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	Code101	
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	Code522	
7	Kampoeng Soksen Sombo AC	Chi Marak	Kompeng	Kiri Vong	0979831393	Kampoeng -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	Code180	
						Pum Donghet	1.500	Natural Gravel	4.00						
9	Phombey Meanchey AC	Chroy Sleng	Kiri Chong Koh	Kiri Vong	0719720927	RN2-Croy Sleng	1.400	Natural Gravel	5.00	0486549	1174131	0487256	1174885	Code115	
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	Code534	
11	Rolous Meas AC	Roleas	Thlea Prachom	Koh Andet	0975504243	Thla Prachom -klong Tvar Vatralach	4.500	Natural Gravel	5.00	486798	1193571	485060	1196825	Code121	
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	Code099	
						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 Thout	Prey Kabas	012323400	Klong Tvarvat An Andet-Klong Tva Asrom Donam	2.700	Ston Mix	5.00	484160	1238703	483132	1240760	Code134
			Keo Chamreang	Tang Yab	Prey Kabas		KlongTvarvat phnom Chorchock-Pumpey	5.200	Natural Gravel	5.00	485830	1234489	486242	1239549	Code338
			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	0886848567	Deum beng	9.400	Laterite	6.00	493374	1183408	487087	1186802	Code95+250	
			Krapom Chouk	Koh Andet		Plov Sahakom Deum Beng	0.447	Chalk Road	4.00	490999	1183570	491360	1183657		
Total length							87.951								

Table 2.4: List of Farm and Market Roads in Tboung Khmum Provinces

N°	Name of AC	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	Dom Bae Rong Reng	Chrey Pleuk	Dam Bae	Dam Bae	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	Kok	Pongakreak	086591890	Wat AngKeng-SamRoery	5	Laterite road	5.00	587143	1294800	587364	1299136	587050	1294828	
9		Sam Rerouy														
10		Tropang Sontey														
11	Kaksekor Dombae	Sro Mtr	Teuk Jrav	Dam Bae	0882708811	PhomSromor-TalMeak (KnongTomnub-Phleu Proleay)	9.300	Laterite road	5.00	602963	1315996	595510	1317734	600937	1316099	On Dam and Canal dike
12						Plov Knong Phum Sromor	0.670	Laterite road	5.00	602409	1316149	602958	1316462			
13	Kdey SongKhem Kaksekor	Bei Mert	Toul Chnol	Krouch Chma	0975808292	Plov Tapov -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 Berg Ka Aet	PrekPdav-Ta Pang	PemChilang	Tabong Kmom		Preak Pdov-Wat Tapang	3.89	Laterite road	7.00	559846	1337256	563205	133592			On Dam
16	Tomnub Steng Penh	Steng Penh	ChiKor-PreahTheat	Tabong Kmom-OReangOuv		Plov Knong Phum Steng Penh	1.00	Laterite road	5.00	563500	1312637	563636	1312628			
17	Tomnub Trapang Kros	Tmor Pich Ti Bei	Tmor Pich	Tabong Kmom		Wat 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							89.46									

Table 2.5: List of Prioritized Irrigation Packages

Package Number	Province	Subproject Name	Command area, ha	Allocated Package Budget in US\$ Million	Remarks
1	Kampot	TRAPEANG RUN	100	0.526	ADB List
2	Kampot	TAKOCH (Prey Takoch-Prawoek Pong)	1,960	1.793	ADB List
		MLECH			ADB List
3	Takeo	Prey Kdouch Reservoir	850	1.285	ADB List
		Kraing Empil Embankment			ADB List
4	Tboung Khmum	TA KHEM RESERVOIR TUMNUB KBAAL TEUK	1,295	0.935	ADB List
		TOUL PRING RESERVOIR			ADB List
		TRAPAING TROS RESERVOIR			ADB List
5	Kampong Cham	Teuk Cha	5,993	2.436	ADB List
		Pram Kumpheak			ADB List
		O Kamprok			ADB List
6	Kampot	TRAPEANG BEUNG KANDORL	2,050	2.260	ADB List
					ADB List
7	Takeo	Sdok Sab	1,485	1.514	ADB List
		Trapaing Khorn Reservoir			ADB List
		O' Rumdoul Reservoir			ADB List
8	Tboung Khmum	TBOUNG DAMREI COMMUNITY	2,120	0.775	ADB List
		KAMPONG RAING COMMUNITY			ADB List
		K' ETH RESERVOIR			ADB List
9	Kampong Cham	O Chrey Dam	3,250	1.600	ADB List
		Ko Aet			ADB List
		Pou Tatress			PDOWRAM 29 Nov 19
10	Takeo	Reussey Tmey Rong Reung			MOWRAM List
		Jerngkoun Jokjey			MOWRAM List
		Sromok Sok Senjey			MOWRAM List
11	Tboung Khmum	Choam Taheung	5,000		PDOWRAM 26 Nov 19
12	Takeo	Rolous Meas			MOWRAM List
		Arng Toeuk Sarmky			MOWRAM List
		Baksey Rikreay			MOWRAM List
13	Takeo	Kampeng Sok Sen Sambo			MOWRAM List
		Projeajun Prey Romdeng			MOWRAM List
14	Kampot	BROVEK PONG RESERVOIR	410	1.010	ADB List
		TEOK LA'AK			ADB List
		33 subprojects	24,513	14.1337	

Note: The cost allocation shown is applicable to ADB list only

Table 2.6: List of Prioritized Farm and Market Roads Packages

Package Number	Province	Road Name	Package Length Km	Remarks
1	Kampot	Wat Sovann Cholsa-Sahakom	14.30	From MRD
		Span Domnaksokrom-Sahakom		From MRD
		Phum Boeng-Sahakom		From MRD
2	Tboung Khmum	Chrey Plok-Seda Senchey	13.80	From MRD
		WatTmey-Khje		From MRD
				From MRD
				From MRD
3	Takeo	Trapng Kralagn-Tomnop Khpob Trabek	13.5	From MRD
		Mongmean Lak-Trapang Kralagn		From MRD
		Vat Angron- Slarom+		From MRD
4	Kampot	Phsar Chhouk-Sahakom	22.63	From MRD
		Wat Borivas-Sahakom		From MRD
5	Tboung Khmum	Wat AngKeng-SamRoery	14.97	From MRD
		PhomSromor-TaMeak (KnongTomnub-Phleu Proleay)		From MRD
				Plov Knong Phum Sromor
6	Takeo	Trapang Krasang-Kodoul	17.3	From MRD
		RN3-Ang Baksey		From MRD
		Klountvar Vattotar -plov Tonlehati		From MRD
7	Kampot	Wat Domnak Trayeng-Sahakom	16.03	From MRD
		Wat Stoeng Thmea-Sahaom		From MRD
		Chhouk Chomkiri-Sahakom		From MRD
8	Tboung Khmum	Plov Tapoav -Songkom	20	From MRD
		Meanchey-Romving		From MRD
9	Takeo	Vat Damrey Yoktek-Sretasok	14	From MRD
		Pum Kvav		From MRD
		RN2 -Pum Kvav		From MRD
		Kamoeng -Chi Marak		From MRD
10	Kampot	Wat Mony One-Sahakom	11.601	From MRD
		Road N.o 41-Sahakom		From MRD
		Wat Angchork-Sahakom		From MRD
		Road N.o 41-Sahakom		From MRD
		Toul Phchoek-Sahakom		From MRD
11	Tboung Khmum	Plov N73(PhumSreKhsach-Kilo 18-SenMonoRot)	15.290	From MRD
		Preak Pdov-Wat Tapang		From MRD
12	Takeo	Dong Het-Vatchampa	15.900	From MRD
		Pum Donghet		From MRD
		RN2-Croy Sleng		From MRD
		Salakhum Cheung Koun-PumCheung Koun		From MRD
		Pum Cheung kon-Tomnop Ang Changa		From MRD
		Thla Prachom -klong Tvar Vattralach		From MRD
13	Tboung Khmum	Plov Knong Phum Steng Penh	23.5	From MRD
		Wat Perk-Tmor Pich Ti Bei		From MRD
		Plov Ba Ray-Prey Jor		From MRD
14	Takeo	klong Tvarvat Angroka-Sretasok	15.504	From MRD
		Plov Sahakhom Ponleu Kaseko		From MRD
		Plov Sahakhom Sdok Som		From MRD
		Klong Tvarvat An Andet-Klong Tva Asrom Donam		From MRD
		KlongTvarvat phnom Chorchok-Pumpey		From MRD
Total			228.33	

2.5. Agriculture/Social /Environmental Questionnaire

36 Two versions of Questionnaire have been developed, and later have been merged into one questionnaire. In pre-feasibility stage, the local agriculturist will go into the fields and interview 5 farmers and/or extensionists from the area; like that 1 irrigation schemes per day can be elaborated and therefore around 5 per week; in 1 province there will be 5 – 8 schemes.

37 For the next and more detailed round of agricultural data collection, 3% of the farmers of the future irrigated area and within the present reservoir will be interviewed; the average scheme will have 555 ha and 925 farmers / owners; 3% of them would result into around 30 interviews per scheme.



2.6. Acquisition of Data, Relevant Studies and Reports

38 During the kick-off meeting, RDC, TL requested Dr. Sam Chhom Sangha, PMU Project Director to provide available documents required for the assignment. Dr. Sangha suggested to search in ADB web site for PPTA documents of CFAVC Project. Meanwhile, Dr. Sangha provided Costab of CFAVC Project and other following documents from ADB website were collected with support from Dr. Sangha and Dr. Srinivasan Ancha, TTL, ADB :

1. Technical Assistance Report, Project Number 50264-001, June 2018
2. The Project Administration Manual (PAM) of CFAVC Project
3. Loan Agreement (Ordinary Operations) Loan Number 3661-CAM(COL)
4. Loan Agreement (ADB Green Climate Fund) Loan Number 8346-CAM(EF)
5. Grant Agreement (ADB Green Climate Fund) Grant Number 0579-CAM(EF)
6. Feasibility Study Report for Trapaing Run Irrigation Subproject
7. Initial Environmental Examination – Trapaing Run Irrigation Subproject
8. List of Pre-Screened Subprojects
9. Due Diligence Report on Land Acquisition and Resettlement for Trapaing Run Irrigation Subproject
10. Feasibility Study Report for Tram Kak On-farm water Management Subproject
11. Feasibility Study Report for Agricultural Cassava Drying, Processing and Storage Facility Subproject
12. Land Acquisition and Resettlement Framework
13. Environmental Assessment and Review Framework
14. Climate Change Assessment
15. Detailed Economic and Financial Analysis
16. Gender Action Plan
17. Detailed Poverty and Social Impact Analysis
18. Detailed Gender Analysis

19. Financial Management Assessment
20. Stakeholder Consultation and Participation Plan
21. Stakeholder Communication Strategy
22. Institutional Capacity and Training Plan

39 TTL, ADB. Dr. Ancha was requested to provide further PPTA reports on economic analysis and other details. On his approval, Mr. Simon Foxwell, The Regional Director of Landell Mills Limited (UK), the ADB PPTA 8897-REG Consultant provided a number of documents. Out of them, key reports are as follows:

1. Design and Monitoring Framework (DMF), CFAVC-CAM
2. Supplementary Appendix No.4 - Seda Senchey Cooperative Cassava Chip Drying and Storage Unit, Feasibility Study, Tboung Khmum Royal Kingdom of Cambodia
3. Supplementary Appendix No 3, Mango Drip Irrigation Demonstration Subproject, Feasibility Study –Tram Kak, Takeo, Royal Kingdom of Cambodia
4. Procurement Risk Assessment
5. Bidding Documents Civil Works NCB for Trapaing Run Reservoir, Cooperative Storage, and Goods NCB for drip irrigation Equipment V2
6. A number of Economic Analysis documents and files used in CFAVC Project

40 Key abovementioned reports have been studied and they will be utilised during the FSDD activities.

3. FSDD APPROACH AND METHODOLOGY

3.1. Understanding of the Project Areas

41 The Project has to improve the competitiveness of agricultural value chains in Kampong Cham and Tboung Khmum province along the Greater Mekong Sub-region (GMS) southern economic corridor, and Kampot and Takeo provinces along the south coastal economic corridor. It is very important to understand the location, size, population, type of crops and extent of cultivation in each province, and issues and challenges faced by the farming community in the proposed project areas. The Consultants with the support of provincial PPIUs of MAFF, MOWRAM and MRD, have done a preliminary study on the four provinces project areas. These have been explained in **section 2.4**.

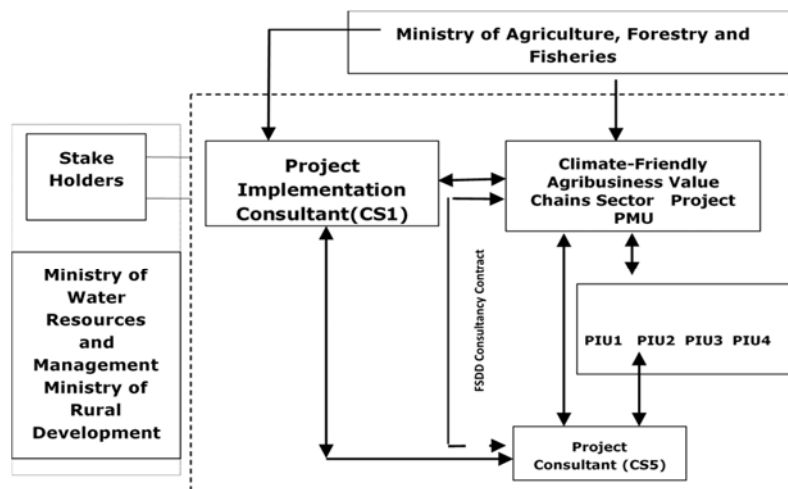
3.2. Understanding of the FSDD Scope and Responsibilities

42 The main responsibility of the Consultant is to assist the PMU and PPIUs in the preparation of feasibility study and detailed engineering design of each subproject. Therefore, the Consultant will take necessary steps for the planning and implementation of project activities, close supervision of overall FSDD works, preparation and submission of required reports and documents in a timely manner and assist in preparation of tender documents in cooperation and consultation with the Client.

43 The Consultant will adopt a consultative approach in liaising with many relevant participatory Government Agencies. The close interaction and dialogue with the key stakeholders of the project will help identify expectations of the relevant stakeholders, limitations and constraints as well as identifying acceptable solutions to the identified problem areas. The Consultant's approach will also be results based in order to speed up the project outcome and to optimize expert time inputs and resources. The prioritized assessment criteria will be agreed upon initially prior to the commencement of the design studies. The agreed criteria could be applied at each subproject location and the selection process thereby could be expedited and finalized with minimum time and effort.

44 The basic Institutional arrangement is depicted in the **Figure 3.1** below.

Figure 3.1: Institutional Arrangement in CFAVC



45 The Consultant fully understand the safeguard policies applied to ADB projects and recognize that the safeguards are the key cross-cutting issues for all necessary background data. Thus, the Consultant will take necessary steps to comply with ADB's safeguard policies.

46 While the objective of the consultancy assignment is to assist in the preparation of feasibility study and detailed engineering design of each subproject, the main goal of the Climate-Friendly Agribusiness Value Chains Sector Project is improving the competitiveness of agricultural value chains in Kampong Cham, Tboung Khmum Kampot and Takeo provinces of Cambodia.

47 The Consultant will adopt a three phased approach for execution of this assignment i.e. Selection Phase, Assessment Phase (Feasibility) Phase and Design Phase. The methodology to be adopted is described in detail in the following sections.

3.3. Selection Criteria for Subprojects in CFAVC

48 The PAM has mentioned selection criteria to be adopted for the surface Irrigation, drip and pond irrigation subprojects. The criteria proposed in PAM will be adopted as far as possible in the site conditions. The selection criteria are mentioned below for clarity and understanding:

3.3.1. Selection Criteria for Irrigation Subprojects

49 The selection criteria applied will be, the subproject:

- (i) Is an existing small to medium scale irrigation system with good balance between water demand and raw water availability;
- (ii) 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.
- (iii) 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);
- (iv) Is not supported by other ongoing or proposed development projects financed by ADB or other development partners;
- (v) Has existing farmer water user group (FWUG) or farmer water user community (FWUC) or is ready for registration;
- (vi) 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;
- (vii) Has low irrigation efficiency and low water productivity, and scope for improvement, with sufficient water resources;
- (vii) Should have viable economic returns (a minimum economic internal rate of return of 12%) and a realistic and technically viable O&M plan;
- (viii) Should be category B or C for involuntary resettlement, environmental impact and ethnic minority;
- (ix) Should have high potential for cluster (cooperative) development and include vulnerable communities, poor and women farmers as beneficiaries.
- (x) 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.

3.3.2. Selection Criteria for Farm Surface Water Catchment Ponds

50 At least 800 on farm surface water catchment ponds will be dug and commissioned. 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.

3.3.3. Selection Criteria for Drip Irrigation Demonstration Sites

51 The project will support establishment of drip irrigation demonstration units on mango farmers’ land mainly in Kampot and Takeo provinces. The demonstrations will be used for training of not only the recipient farmer but also for surrounding mango farmers and MAFF nominated training of trainers. So far, there are no mango producers and marketing associations in the target provinces. It is hoped that through meetings at the demonstrations and field days, a producers’ association can be created. 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 selection criteria for drip irrigation demonstration sites include the following, the recipient:

- (i) Must be a smallholder⁴ and not an absentee farmer;
- (ii) Must have a land title, or equivalent;
- (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) Is willing to work with the project and accepts the technical innovation of drip irrigation and solar pumping;
- (vii) 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) Has no objection for his or her farm to be used as a training and demonstration location for the duration of the project.

⁴ During field visit, we visited a mango farmer right in the beginning and it was rather an investor; smallholders are financially not capable to invest in 5 - 50 ha of mango.

3.5. Feasibility Study of Selected Subprojects

- 53 Feasibility studies will cover the following:
- a) Conduct of technical and engineering studies and preparation of conceptual designs of the subproject components;
 - b) Preparation of preliminary cost estimates and conduct of economic and financial analysis of the subproject;
 - c) Identification of contract packages, procurement methods, procedures and preparation of the procurement plan;
 - d) Preparation of an implementation plan for the proposed subproject, including the proposed project organization, implementation schedules, institutional arrangements, and benefit monitoring and evaluation (BME) plan;
 - e) Conduct of an Initial Environmental Examination (IEE) of the subproject, and
 - f) Conduct of a social dimension analysis of the proposed subproject, including gender analysis and resettlement planning, if necessary.

3.5.1. Collection of Data on Irrigation Subprojects

Step 1 - Reconnaissance and Feasibility

3.5.1.1. Conducting Field Visits / Surveys

54 FSDD Firm will undertake detailed field visits, meetings /surveys and analysis 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%).



55 One of the key activities under output 1 is “rehabilitation of irrigation and water management infrastructure including; off-farm irrigation systems, on-farm rainwater harvesting ponds and drip irrigation systems”. Accordingly, it is very important to understand the status of existing irrigation infrastructure in the four provinces. As the first step, the Consultants will collect existing data/information on irrigation infrastructure in the four project areas, reports of the design details on status of existing irrigation infrastructure. In addition to the size and the current status of existing irrigation infrastructure, the survey will also focus on the number of families dependent on the respective irrigation facilities, type of crops and extent of cultivated lands supported by the irrigation infrastructure and demand for irrigated water as well as water availability during different periods of the year.

3.5.1.2. Community Consultations

56 The rehabilitated or newly built irrigation subprojects will largely depend on commitment of local government authorities and the usefulness and relevance of these irrigation subprojects to

the water users as well as the commitment of cooperatives and water users to operate and maintain irrigation structures to ensure distribution of water resources in an equitable manner. In order to ensure serious attention on the social and institutional sustainability of the irrigation sub projects, the Consultants will hold close consultations with commune leaders, Farmer Water User Cooperatives (FWUC) and water users to understand issues, expectations and drawbacks in the present irrigation systems with their views on most appropriate irrigation infrastructure required to guarantee adequate water supply to improve productivity of their crops. The extent of consultations will be decided based on the size of each irrigation subproject, number of water users dependent on the project and the severity of socio-economic issues associated with each sub project.

3.5.1.3. Socio-economic Data Analysis

57 Understanding the socio-economic status of the proposed project areas and communities living in those areas is of paramount importance to assess the relevance and feasibility of suitable irrigation infrastructure. The Consultants will make a concerted effort to collect accurate socio-economic data, if available through relevant sources, or if available data is insufficient, socio-economic surveys will be conducted to gather data required to assess the socio-economic feasibility of irrigation sub projects. As described above, if required, Socio economic 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 also be prepared. The Consultants will prepare above plans strictly following the project's land acquisition and resettlement framework (LARF) and environment assessment and review framework (EARF).

58 As the due diligence report (DDR) and IEE for the representative subprojects has already been prepared in PPTA stage, the Consultant will carefully follow them in assessing the socio economic and environmental feasibility of the respective irrigation subprojects. Ultimate objective of CFAVC Project being the promotion of long-term environmental sustainability and the profitability of farmers and agribusinesses, which will contribute to poverty reduction, due consideration will also be given to the Summary Poverty Reduction and Social Strategy (SPRSS) during the feasibility assessment.

Step 2. Surveys

59 The Consultant envisages that the following technical surveys will be required for the feasibility study and the designing phase.

3.5.1.4. Preparation of TORs for Surveys

60 The need for additional surveys will be identified by comparing the data requirements with the data availability for the feasibility study and for the designing phase.

61 For each of these surveys, topographic, hydrological, geotechnical, preparing structural designs, socio economic/ agro-economic surveys, a TOR will be drafted to guide the implementation of these surveys. Each TOR will contain the technical Specifications for one specific survey. All the TORs will be discussed with PMU and PPIU Staff and once agreed, the surveys will be tendered and implemented by subcontracted national private firms using the provisional sum allocated in FSDD CS5 Contract. The Consultants will use the services of well reputed local private firms, which has extensive experience in conducting similar surveys. Here the FSDD Consultant's main task will be to ensure proper monitoring and quality control of these activities' outputs made by each subcontracted Firm.

3.5.1.1. *Establishment of Control Points or Bench Marks*

62 Prior to carrying out the topographical surveys, permanent control points for both horizontal and vertical control along the full length of the irrigation subproject will be established by the subcontracted firm and the FSDD Consultants may supervise and monitor the work.

3.5.1.2. *Conducting the Topographic Survey*

63 Conducting of topographic survey being the first step of assessing the technical feasibility of the irrigation subprojects, and it will help to locate and map each surface feature of the proposed subproject areas. The survey will assist in identifying the contours, vegetation and physical attributes, any manmade utilities in the respective area as well as its elevations. The outcomes of these surveys will be used as input for the detailed designs.

3.5.1.3. *Conducting Hydrological Surveys*

64 The TOR clearly indicates the need to conduct field surveys to ascertain the water availability in sufficient quantity and quality to ensure the intended benefits of the project can be achieved. The Consultant will explore the possibility of obtaining existing secondary data through relevant Government Agencies. If the required data is not available, hydrological surveys on each irrigation subprojects areas will be conducted using the services of reputed hydrological survey firms with necessary experience and resources to gather important hydrological data such as annual and seasonal precipitation, streamflow, groundwater levels, water lost through evaporation and other relevant data, which will be key to assess the long term sustainability of intended irrigation subprojects.

3.5.1.4. *Conducting Geotechnical Surveys and Soil Testing*

65 The Geo- technical field surveys and laboratory testing of the subsoil along and nearby the proposed and existing alignment of the structures will be required (index properties, grain size distribution, compaction testing, shear strength, compressibility, permeability etc) and the services of reputed geotechnical survey firms with necessary experience and resources will be utilized.

3.5.1.5. *Prepare the Survey Drawings and Maps in CAD format.*

66 After completion of topographic surveys, hydrological surveys and geotechnical surveys, the Consultants will get the survey drawings, maps in CAD format and excel and survey reports from the relevant Firms, as specified in the TOR and submit them to PMU for their approval.

3.5.2. Collection of Data on Farm and Market Road Subprojects

67 Road connectivity being a key factor affecting competitiveness of agricultural value chains, one of the key outputs of the project is improving the connectivity of farms to agriculture cooperatives and 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.

Step 1 - Reconnaissance and Feasibility.

3.5.2.1. Conducting Field Visits

68 Prior to determining the suitable farm and market road subprojects, it is very important to understand the extent and the status of existing road network connected with each irrigation subproject and agriculture cooperative and market. Thus, the Consultant will first undertake an exploration visit to the proposed road subprojects and thoroughly investigate the existing condition of the roads and structures, its history, present maintenance arrangements and funding mechanisms.

3.5.2.2. Community Consultations

69 Farming community living in the project areas being the main beneficiaries of farm and market road networks, they are the most important stakeholder with regard to road subprojects. In order to ensure that the proposed road subprojects meet the expectations of local communities, the Consultants will hold close consultations with a representative sample of commune leaders, potential agriculture cooperatives and other road users to understand issues, expectations and their views on suitability of the proposed/upgrading of road subprojects. The extent of consultations will be decided based on the size of each road subproject, population living in the respective localities, extent of cropping, ease of access to farms and markets, extent of use of vehicles and the severity of socio-economic issues associated with each road sub project.

3.5.2.3. Assessment of Contribution of Road Subprojects to the Project Outputs

70 Contribution of proposed road subprojects to achievement of the overall project outputs, i.e. improving connectivity to farms, agriculture cooperatives and roads thereby improving competitiveness of agricultural value chains, will largely depend on intensity of road usage by intended beneficiaries and in this case the farming communities. The Consultant will carry out traffic count surveys to estimate the type and quantities of goods that may be transported along the road after the road has been rehabilitated. During this assessment, main attention will be paid to the type of crops, the extent of cultivation and the distance to agriculture cooperatives and markets, which will be crucial factors in assessing the relevance of road subprojects to the local people.



3.5.2.4. Investigating the Local Geology and Soils

71 Local geology and soils along the full length of the road will be crucial factor in determining the feasibility of road subprojects as well as in the preparation of detailed engineering designs.

The Consultant will carry out necessary geological surveys and soil investigations to assess both economic and environmental feasibility of the proposed road subprojects. These investigations will also be used to identify possible sources of construction materials such as local quarry sites, borrow pit areas etc. The geological surveys and soil testing will be carried out using reputed local firms with extensive experience in undertaking similar assignments as explained in the irrigation subprojects.

3.5.2.5. *Collection of Information on Issues*

72 Factors such as possibilities of flooding, traffic, resettlement needs, environmental concerns, and particular problems such as use of roads by heavy vehicles will have serious impact on the feasibility and in turn on detailed engineering design of the road subprojects. Information pertaining to these issues will be collected to the extent possible through available secondary data and if sufficient data is not available, these information will be collected through the support of relevant government agencies or own surveys and studies. As resettlement needs and environmental concerns too have a direct impact on the feasibility and detailed design of road subprojects, the Consultant will give due consideration to social and environmental issues in assessing the feasibility of road subprojects.

Step 2. Topographic Survey

3.5.2.6. *Establishment of Control Points or Benchmarks*

73 Prior to carrying out the topographical surveys, permanent control points for both horizontal and vertical control along the full length of the road will be established by the subcontracted firm and the FSDD Consultants may supervise and monitor the work.

3.5.2.7. *Conducting the Topographic Survey*

74 The services of a well reputed local private firm with extensive experience in conducting similar surveys will be selected to undertake this topographic survey.

75 Through this topographic survey, all topographic details such as existing roads, tracks, drainage structures, buildings, walls, existing road furniture and services/utilities including electric, telephone and water lines will be surveyed. A wider area at the location of the bridges will be checked with the subcontracted firm and accurately supervise the record of position of all features.

3.5.2.8. *Prepare the Survey Drawings and Maps in CAD Format.*

76 Once the topographic surveys are completed, the prepared survey drawings and maps in CAD format, and excel format and report as specified in the TOR will be obtained from the subcontracted firm and submit them to PMU for their approval.

3.5.3. Assessment of Feasibility of Infrastructure Subprojects

77 Prior to commencement of the design phase, feasibility studies will be carried out to check the acceptability of the sub-project.

78 The identification of existing subproject status, community consultations, collection of data and information, topographical survey and preparation of maps and drawings of the subproject areas are done as explained in **section 3.5.1** and **3.5.2** above in key two steps as recapitulated below:

Step 1 - Reconnaissance and Feasibility.

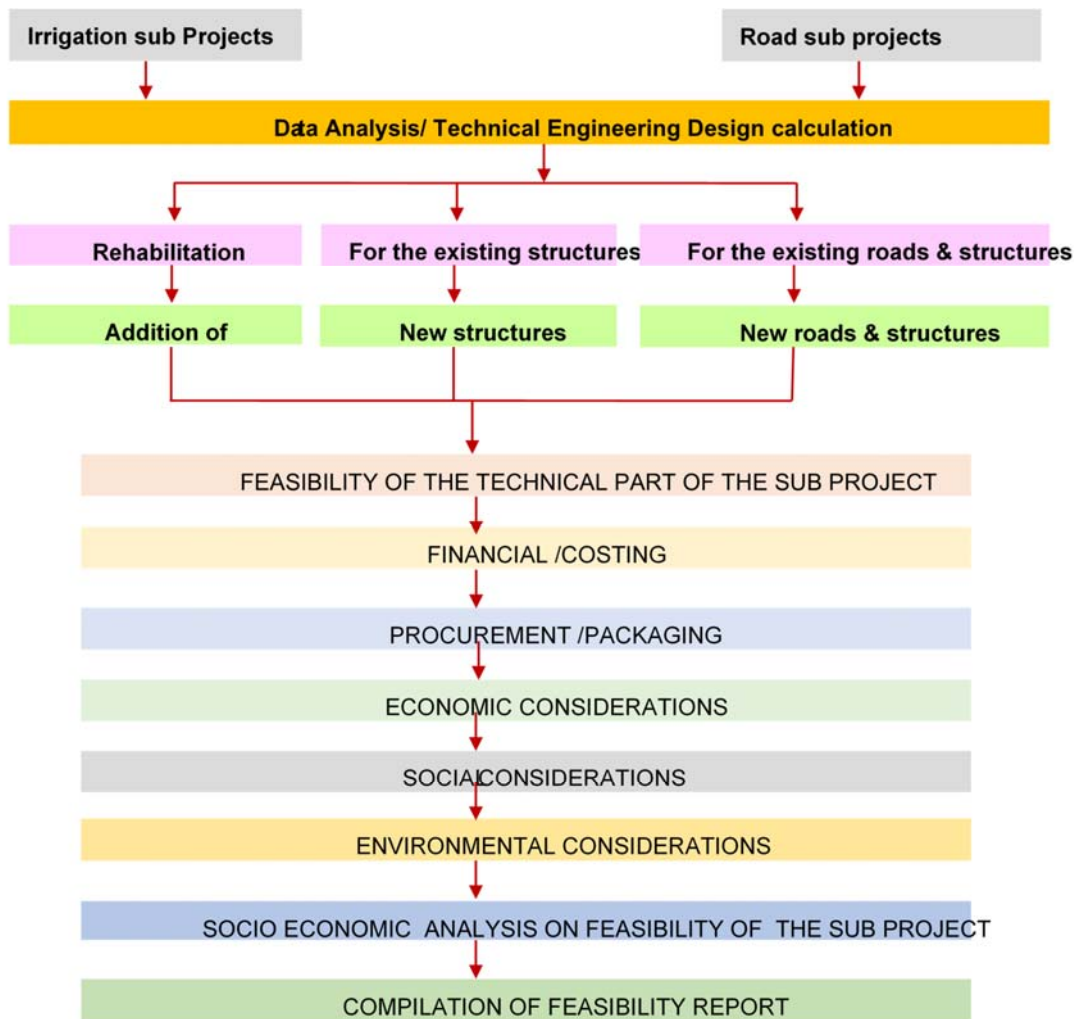
Step 2. Topographic Survey

79 The above collected data and information, and prepared survey maps & drawings are used in the order of below mentioned activities to assess the feasibility of the subprojects:

- i. Analysis of collected data to achieve project objectives
- ii. Concept formulation for subproject feasibility
- iii. Feasibility Analysis
- iv. Preparation of Feasibility Reports

80 The concept formulation approach is further described in **Figure 3.3** below:

Figure 3.3: Concept Formulation Approach



3.5.4. Criteria for Eligibility for Financing under the Project

81 The purpose of the feasibility studies is to ascertain the acceptability of proposed subprojects as a rational intervention. Therefore, the Consultants will ascertain whether the candidate subprojects should be eligible for financing under the Project, based on the following eligibility criteria:

- A subproject should be technically feasible and economically viable. If the estimated economic rate of return is below 12%, the subproject must be dropped;
- For the calculation of the EIRR, it is essential to have a true picture of the existing situation i.e. how much are the farmers harvesting now? The consultant will get this information through the questionnaire and interviews with involved farmers. More difficult might be the estimation of the increased production with the project, assuming that more water means more yield. To do the calculations right, the support of local authorities, especially the PPIUs is needed, to operate with realistic figures and not to make too optimistic increases in yields.
- Procurement package(s), method(s) of procurement and cost estimates are prepared;

- Public hearings on a sub-project proposal have been held in concerned communes and villages, and beneficiary representatives have been included in consultations to ensure continued public consultation and supervision;
- The sub-project does not have significant negative environmental or social impacts, and mitigation measures are identified for minor impacts;
- The sub-project does not have significant resettlement impacts, and if such sub-project is categorized as Category B, a Resettlement Plan (RP) must be prepared in accordance with the RF, the Borrower's laws and regulations and the Safeguard Policy Statement; and
- The sub-project does not have outstanding social safeguards issues. In case there are any such outstanding issues, the Consultant shall assist the PMU to prepare a corrective action plan in accordance with the Safeguard Policy Statement to address the same.
- In the event the sub-project meets above criteria, the Consultants will proceed with the feasibility assessment of identified subprojects

82 In case a candidate sub-project does not meet the criteria listed above, it shall not be considered for Intervention & Development and will be replaced by the next priority candidate sub-project under the List of Candidate Sub-projects recommended by PMU

3.5.5. Environmental & Socio-Economic Analysis

3.5.5.1. Environmental Aspects

83 Location of the site and the environmental sensibility of the area with a detail environmental and socio-economic analysis may have to be undertaken to determine the feasibility of the sub-projects. Once structures have been identified by the Technical Team, environmental screening will be undertaken to determine any environmental impacts. The type of assessment that should be carried out will be determined by the environmental authority on application by the Client.

84 These assessments will be done under separates categories. In order to determine the category under which the development has to be assessed, an Initial Environmental Examination (IEE) will have to be carried out depending on requirements. The requirement of the Initial Environmental Examination Report (IEER) is to describe the environmental implications of the Asian Development Bank's investment operation of the proposed facilities.

85 The study is undertaken along with the feasibility study to increase the information base and assessing the environmental impacts to incorporate mitigation of significant negative impacts at the design phase. The IEER will scrutinize the potential beneficial and adverse environmental impacts for incorporation of cost-effective mitigation measures for enhancement of the environment. This IEER will examine the conceptual design to ensure that it complies with the environmental requirements of the Asian Development Bank and the Environmental Authority of Cambodia. It will assess the significant environmental impacts resulting from the environmental analysis, recommend mitigation for the adverse impacts and formulate an environmental monitoring program.

86 The Consultant will carry out the environmental assessment according to Environmental Assessment Requirements of the Asian Development Bank. ADB has categorized projects listed in the Country Assistance Plan (CAP) according to their anticipated environmental impact. Each project has to be scrutinized as to its type, location, sensitivity and scale, nature and magnitude of its potential environmental impacts, and also availability of cost-effective mitigation measures.

87 Projects thus screened on their environmental assessments fall into one of the following categories:

- Category A: Projects expected to have significant adverse environmental impacts. An Environmental Impact Assessment (EIA) is required to address significant impacts.
- Category B: Projects expected to have some adverse environmental impacts, but of lesser degree and/or significance than those for Category A projects. An initial environmental examination (IEE) is required to determine whether or not significant environmental impacts warranting and EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- Category C: Projects unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are still reviewed.

88 Public disclosure meetings with the assistance of PMU, will be held to the stakeholders, to present the project and to obtain their concerns.

3.5.5.2. Socio-Economic Aspects

89 The Social Impact Assessment (SIA) will cover the sociological aspects such as re-location of families (if any), willingness of communities to be re-located, possible locations for re-location and other possible negative and positive social consequences of the development.

90 For the socio-economic impact assessment, all the data for all sub projects, will be collected during feasibility stage, through interviews, Focused Group Discussion (FGD) and participant observations. Interviews and FGD will be conducted with dwellers, farmer organisations, small boutiques, and others.

91 Once technical Team identified sites for new structures involuntary resettlement screening will be done to determine if there are any resettlement impacts. The SIA activity will suggest the suitable mitigating measures for negative social impacts and re-location plans for the present users of the premises identified for the development of the sub-project.

Financial Analysis:

92 The basic costing of each subproject for the identified scope of work will be formulated, and packaging of subprojects too will be determined with the computed basic cost estimates. In order to test the overall financial viability of the subproject, the Financial Internal Rate of Return (FIRR) will be calculated. The financial analysis at the subproject level will be carried out to determine the financing requirements to implement and run the project.

3.6. Detailed Engineering Design of Subprojects

93 Critical design 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 m³ 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.

94 The climate resilient design will be targeted, inter alia, adopting following approach:

- Augmentation of capacity of reservoir, extension of canal system to feed additional land etc. can be considered under rehabilitation projects if operation studies indicate that such augmentation is essential for optimising the use of the available resources and;
- such augmentation could be achieved with relatively low additional cost.

95 Reservoir dams breached recently (due to exceptional floods) do qualify to be included, if the farmers have not abandoned the scheme and land holdings have not been altered.

96 Newly conceived and recently planned schemes cannot be classified as rehabilitation projects. Restoration of ancient and abandoned works also cannot be considered for rehabilitation if new land settlement is involved, they should be regarded as new schemes.

97 The designer should apply these criteria in considering different schemes for studying the feasibility proposals to rehabilitate them.

98 The designer should identify how and why a need has arisen for rehabilitation. It may be due to one or more of the following causes or circumstances:

- *deterioration due to action of the elements* i.e. rain, wind, vegetation etc. leading to scours, siltation, breaches, landslides and structural damage;
- *deterioration due to wear and tear* resulting from operations, hydraulic actions, corrosion, vehicular traffic etc;
- *damage by animals* such as elephants and cattle;
- *wanton damage by people*, vandalism, gemming operation etc.
- *fragmentation* of land holding;
- *structural defects* and shortcomings; and *structural failure* which could be due to faulty original planning and design such as inadequate spill length, steep side-slopes of embankments and lack of essential protective devices such as cut-off drop walls, stilling basins, rip-rap etc.
- improper construction and also due to poor maintenance practices etc.

99 During the Clarification sought for the RFP document, it was informed by the Client that a total of 15 drip irrigation pilot kits in mango orchards are to be designed and installed. The identification of the requirements will have to be carried out with the farmer communities living in the subproject area.

100 The farm and market roads subprojects are the connecting road networks with the agricultural markets, cooperative offices and the farms. The upgrading and rehabilitation and forming of new roads including the infrastructure, will be studied in detail with the analysis of data.

101 All subproject roads will have to be climate/disaster resilient.

102 During feasibility study, following features will be considered for the roads to be climate resilient.

- increasing wherever, embankment heights
- providing cross drainage
- selecting suitable embankment materials
- providing hard top surface to resist heavy rainfalls

3.6.1. Consolidated Design Methodology

- 103 The consolidated design approach and methodology will be in stepwise as follows:
1. Reconnaissance Survey and Topographical Survey
 2. Agriculture Survey of command area
 3. Hydrological Study of Rivers/Reservoirs/Main Canal feeding subproject
 4. Crop Water Requirement (CWR) Assessment and Water Balance
 5. Main Canal/Secondary Canal Design
 - a. Profile design of existing main canal will focus on checking the canal capacity for design discharge obtained from CWR Assessment
 - b. Fixing of Canal Design Parameters (Manning's n, free board, limiting velocity in canal soil condition, Froude Number etc.)
 - c. The side slopes of the existing Main Canal will be designed based on soil type for earthen canal. For lining section, it will be decided on side slope as 1V:ZH on both banks, where Z will be decided based local Design Guidelines or international best engineering practice will be applied.
 6. Headworks Reservoir including Intake and associated structures
 7. Design of Cross Regulator & Head Regulator/ Offtakes
 - a. The methodology adopted for the design of main structures such as the cross-regulators and gated off-takes is based on the local design practice or Best Engineering Practice and Standard Manual for the Design of a Cross-Regulator and Off-Take Structures on Permeable Foundations.
 - b. The PCC and RCC is used for the floor upstream and cistern floor downstream in the structures from the consideration of long life, durability and ease in operation & maintenance of the structures.
 8. Spillway
 9. Design of Drops
 10. Canal Lining
 11. Flood Protection works
 - a. Type of protection (Concrete Block, gabion with geomembrane etc.). The Protection works is designed on the consideration of material availability, works durability and river flow characteristics.
 - b. Scour depth calculation using hydrological data for river and main canal using Lacey's regime scour depth formula. Factor of safety will be followed as recommended in the Standard Code.
 12. Drainage Structures are designed considering the drain flow and other necessary activities suitable to the particular drain structure.
 13. Others if necessary, like Aqueduct, Syphon, etc.

3.6.1.1. Specific DED Process for Irrigation Subprojects

- 104 The Consultants will adopt the following process for successful and timely completion of detailed engineering designs for approved irrigation subprojects:

- Consult PPIUs, local district officials, communes, existing or potential cooperatives and water users;
- Take due account of projected climate change impacts and incorporating design features that enhance resilience;
- Use existing design procedures practice under national standards. However, as the improvement of climate resilient of agricultural value chains is the main goal of CAVAC Project, the Consultants will make every effort to incorporate innovative climate resilient improvements in the design providing sufficient justification for such additional costs, structures or practices. Some examples have been discussed for canal lining and control structure in above sections.
- Use PPTA spreadsheets for calculation of EIRR and FIRR. Not all the final excel sheets have been yet submitted to the consultant; Landell Mills submitted whatever they had in their files, but the final, final calculations and tables later on published in the various reports, e.g. 18 Feasibility Study Report for Trapaing Run Irrigation, have been done by ADB and the consultant does not have the final, final calculations sheets. That can be seen e.g. on the ADB website where draft versions have been published with comments. - When looking at the same report, also different figures are shown which might be contradicting: on the first page and in Annex 5 detailed investment costs are provided, summing up in USD 914,304 plus USD 9,710 for FWUC establishment. In Annex 9 (last page) all Project Costs would result in USD 547,892, including investment costs, FWUC costs, trainings and O&M.
- To get a better understanding of the underlying assumptions, it would be helpful if ADB could provide all tables from e.g. this Feasibility Study Report for Trapaing Run Irrigation in excel format with underlying calculations and formulas.
- Update LARP, DDR, IEE, EMP and environmental code of conduct as necessary upon finalization of design.
- Submit the detailed engineering designs to PIC for review with relevant line agencies to ensure compliance with standards and regulations of the Government
- Submit the designs to PMU for approval,

3.6.1.2. Specific DED Process for Farm and Market Road Subprojects

105 The Consultants will adopt a similar process for successful and timely completion of detailed engineering designs for approved farm and market road subprojects for the climate/disaster resilient, as well:

- 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 the increased embankment heights, an average 0.2m preliminary design height above the conventional road design height will be adopted. However, this will be reconfirmed during the detailed design stage based on detailed hydrological data.
- iii. For cross drainage, the preliminary design will be considered as the adequacy of existing structures (culverts, small bridges, spillways etc) and readjustments will be included with additional structures for strengthening cross drainage. During detailed design stage, will be reconfirmed on refurbishing the existing structures for their optimal use.
- iv. Identify sources of suitable materials for road construction and their costs.

- v. Provide hard top surfaces with double bitumen surface treatment pavement to be resistant to heavy rainfalls during wet season. Special attention will be made for road sections that are exposed to higher risk of damage due to flooding.
- vi. Prepare the detailed engineering designs, drawings and costs of the main road / rural roads and road structures. Assistance and checking of subcontracted design firm's engineering design will include 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, will include longitudinal sections and cross sections of proposed road and structures, indicating the high flood marks. Though the standard road surface width will be considered as 5.0 meters, wherever necessary, due consideration will be given to reduce the widths of some road sections and provide passing places. Additional activities such as green planting for strengthening embankment road sections that are exposed to high risk of damage will be designed.
 - f) All the detailed designs will be consistent with the Ministry of Rural Development's (MRD) priorities for rural development and decentralization.
- vii. 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. It is expected that PIC will forward copies to the PMU and ADB.

106 The Consultant will ensure that the design of the road and structures will conform to the Commune/ Sangkat Fund Technical Manual (2009), Volume II: Specification for Construction Materials and Works and any other relevant guidelines and specifications. The design will also be conformed to ADB's safeguards on environmental impact, land acquisition and DRR. During the design phase, due consideration will also be given to the practicalities of public access and safety.

107 The following steps will be strictly followed during the Detailed Design Development Process:

- The Team Leader/ Design Engineer will certify that the information contained in the sub-soil investigations were reviewed and evaluated, the preliminary plans have been appropriately addressed and the foundation/ road paving systems decided upon accordingly;
- The Design Team will ensure that an appropriate level of social and environmental review and evaluation has been completed to minimize impacts.
- The preparation of appropriate code analysis and structural systems by the Design Team, includes Life Time and Safety Plan;

108 Finalize construction techniques and material specifications; Choose materials for finishing work; complete outline specifications, a written list of criteria for materials and building methods; revised cost estimates considering probable labor and material requirements.

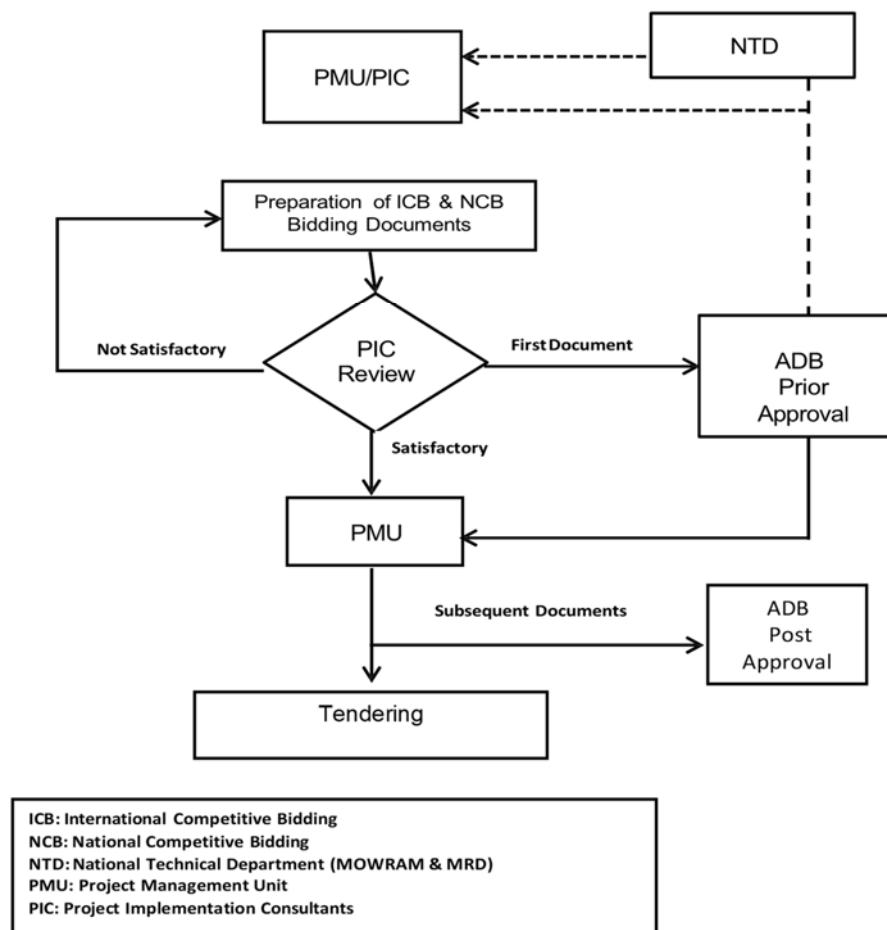
3.7. Preparation of Tender Documents

109 Following approval of the detailed engineering design from PMU, the Consultants will assist the National Technical Department (NTD) of MOWRAM, MRD and MAFF 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.

110 Procedures to be followed for national competitive bidding (NCB) will be those set forth for NCB method in the government's procurement Manual issued under Sub-Decree Number 74 ANKR.BK, updated version dated 22 May 2012 with the classification and modification described, which are required for compliance with the provision of procurement guidelines.

111 The bidding document preparation will be executed following the procedure as set out in PAM and shown in **Figure 3.4** below:

Figure 3.4: Bidding Document Preparation



112 The finalized tender documents will then be submitted to project implementation consulting firm for necessary action.

113 A construction contract package could consist of several subprojects in contiguous areas for an aggregate contract cost limit that is suitable to the contracting capacity and capability of local contractors. The Bidding document will comprise of following:

Part 1

- Section I Invitation for Bids
- Section II Eligibility Documents
- Section III Eligibility Data Sheet

Part 2

- Section I Invitation to Bidders
- Section II Bid Data Sheet
- Section III General Conditions of Contract
- Section IV Special Conditions of Contract
- Section V Specifications
- Section VI Drawings
- Section VII Bill of Quantities
- Section VIII Forms and Qualifications Information

114 All the documents listed above are required for the tendering of the subprojects and should be adapted, as necessary, to the requirements of the particular subproject. The technical specifications, engineering drawings, and BOQ will be prepared under the DED phase of the subproject. The Invitation for Bids (IFB), Bid Data Sheet (BDS), and Specific Conditions of Contract (SCC) will be prepared to complement the specific requirements of the subproject in the tender documents in accordance with provisions contained in the Procurement Plan. The SCC will specify that the Contractor should comply with national environment laws, implement the EMP and other conditions for environmental compliance, and other requirements like resettlement (if required). Modifications of the pro-forma tender documents to meet the specific subproject or contract needs will be provided in the BDS to complement, supplement, or amend the IFB. The SCC will also supplement or amend the General Conditions of Contract (GCC).

4. WORK SCHEDULE, STAFFING SCHEDULE AND REPORTING

4.1. Work Schedule

115 The work schedule is the reflection of Consultant's understanding of the project objectives, the scope of work defined in the Terms of Reference (TOR), PAM and in the Consultant's approach and methodology. The Consultant has carefully drawn up the Work Schedule that takes into consideration the nature and objectives of the Project. The Work Schedule has been prepared as per the Consultant's best judgments and is based on the Consultant's understanding of the Project from the Terms of Reference (TOR), PAM, initial discussions with the Project Director, MAFF, MOWRAM PMU Director, MRD Project Manager, its country experience, and its vast experience in undertaking similar projects under similar conditions in Cambodia and elsewhere. This program, however, is likely to be modified after the feasibility and detailed design works begin.

116 The Consultant's Work Schedule is based on several significant points:

- A clear understanding of the TOR and PAM, and appreciation of the Project objectives;
- A comprehensive response to the requirements of the Project;
- Action plan proposed in FSDD TOR and PAM that feasibility study and design work will be carried out on a package by package basis and will allocate resources as required for these to be completed⁵.
- Given the time needed to undertake feasibility studies and detailed engineering design for each package, as well as preparing tender documents (approximately six months), packages will likely have to be undertaken one after the other. However, there may be some overlap depending on the speed and resources of the FSDD firm.
- Simple, effective Work Plan, which can be readily understood to ensure that an integrated team approach from the various Components and Phases will achieve the objectives of the Project; and
- An appropriate and efficient Project organization with clear lines of communication, established protocols for liaison with all involved people and organizations and strong Project Management.

117 The Work Schedule has five key components:

- A. Inception
- B. Reconnaissance and Feasibility (subproject assessment)
- C. Detailed Engineering Design
- D. Tender Document
- E. Submission of Delivery and Reports

118 Detailed Work Schedule for Output 1 covering reconnaissance survey and feasibility, topographical survey, detailed engineering design and tender documentation for 14 packages of irrigation subprojects and 16 packages of farm roads subproject over the period of January 2020 to October 2024 within the Contract period, and the targeted completion period by end of December 2022 as requested during the Video Conference meeting in CARM, ADB held on 5 November 2019 is presented **Figure 4.1**.

⁵ Annex 2 TOR for Consulting Services, E. Package CS5: FSDD, para 116. PAM

4.2. Project Milestones and Deliverables

119 The scope of works of the Project has been distributed into Milestones and Deliverables. The list of the Milestones and Deliverables are summarized in **Table 4.1** below:

Table 4.1: List of Milestones and Deliverables

Sr.No.	Milestones	Deliverables
1	Inception Phase : Milestone 1	D1- Inception Report
2	Assessment Phase: Milestone 2	D2- Feasibility Report D3-Social Safeguard Report (LARP) D4-Environmental Report (IEE)
3	Design Phase: Milestone 3	D5- Design Report
4	Tender Document Support: Milestone 4	D6- Tender Document (Bid Documents, Drawings, BOQ, Technical Specification)

120 The Consultant is fully committed to this assignment on schedule and appreciates Client's support and cooperation in achieving this goal.

4.3. Project Staffing Schedule

121 The staffing requirements of international and national team members for the project have been prepared on the basis of the work program and the scope of works described in the ToR and PAM and is shown in **Figure 4.2**. The composition of the team comprising the professionals (International and National) component wise is presented below:

Table 4.2: Feasibility and Detailed Engineering Design Consultant (CS5)

Experts	International	National
Team Leader/Irrigation Design Engineer	20	20
Hydrologist	2	4
Agricultural Economist	5	6
Social Safeguards Specialist	2	0
Environment Safeguards Specialist	2	10
Agriculturist	0	6
Road Design Engineer	0	20
AutoCAD Specialist (4 individuals)	0	42
Social Development and Gender Safeguard Specialist	0	4
Resettlement Specialist	0	6
Procurement Specialist	0	4
Total	31	122

122 The staff mobilized during Inception Phase are as follows:

International Experts:

1. Mr. Dinesh Kumar Shrestha, Team Leader/ Irrigation Design Engineer
2. Dr. Martin Mautner Markhof, Agriculture Economist

National Staffs:

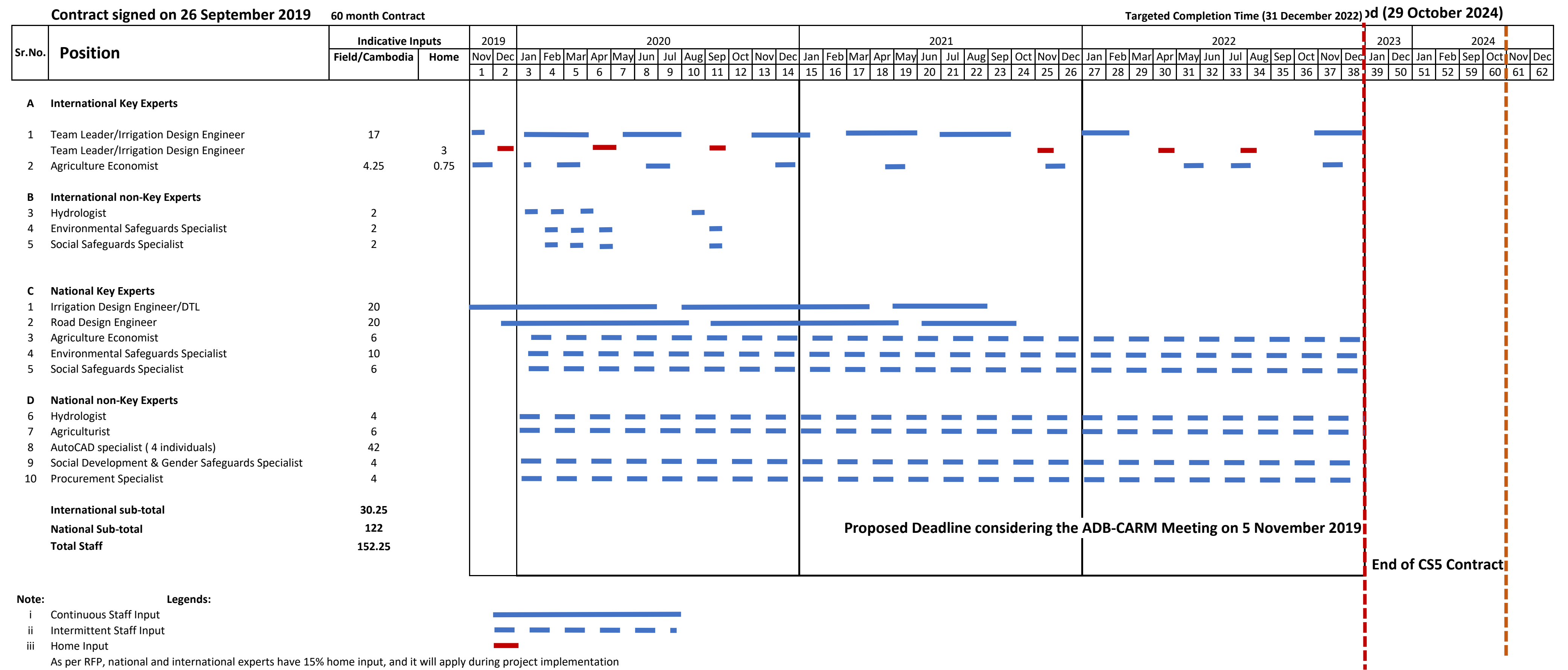
1. Mr. Khin Toda, Deputy Team Leader/ Irrigation Design Engineer
2. Mr. Kley Kimsot, Agriculture Economist
3. Ms. Sao Sambathmorakath, Environmental Safeguard Specialist
4. Mr. Chhit Kimhor, Hydrologist
5. Mr. HY Sopheap, Agriculturist
6. Mr. Sam Sothearo, Road Design Engineer
7. Mr. Phouv Narin, Resettlement Specialist
8. Mr. Chhoun Sovannara, AutoCAD Specialist - 1
9. Mr. MAO Phearun, AutoCAD Specialist - 2
10. Ms. Tuon Sangvapich, Secretary/Admin

123 Staffing allocations and inputs will be provided in accordance with the linkages to work activities and schedule as shown in **Figure 4.1**. Specific staff allocation schedule based on **Figure 4.1** has been provided in **Figure 4.2**. It is apparent from the **Figure 4.2** that the staff allocated in TOR is inadequate to meet the targeted deadline and additional staff are required as shown in **Figure 4.1** work schedule.

Figure 4.1: Work Schedule for CS5 Activities and Deliverables

Sr.No.	Activities	PAM	2019		2020												2021												2022												2023												2024																																																	
			11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12																																																		
I Inception Phase			Targetted Completion Period in order to make up the delay in CFAVC Project Implementation (31 December 2022)																																																																																																			
D-1	Work Plan and Staff Schedule																																																																																																					
	1 Mobilisation, staff integration and Kick off Meeting																																																																																																					
	2 Data / Information collection																																																																																																					
	3 Meeting with Line Agencies and Site Visits																																																																																																					
	4 Preparation of Work Plan and Staff Schedule																																																																																																					
	5 Inception Workshop																																																																																																					
II Assessment, DED and Tender Document Phase																																																																																																						
A	Irrigation Subprojects																																																																																																					
	1 Preparation of TORs for Surveys/ Studies																																																																																																					
	2 Selection of Survey Subconsultants																																																																																																					
D-2	Feasibility Report of 1st Irrigation Subproject																																																																																																					
	1 Reviews of Design Reports of Trapaing Run Subproject																																																																																																					
	2 Discussion with Communities																																																																																																					
	3 Review of Existing Situation / Technical aspects of Irrigation subprojects																																																																																																					
	4 Surveys / Studies/structural Designs																																																																																																					
	5 Economic & Financial Analysis & Identification of feasibilities of Irrigation Subprojects																																																																																																					
	6 Environmental and Social Safeguards Study and report submission																																																																																																					
	7 Identification of Pilot drip irrigation																																																																																																					
	8 Compliation of feasibility report for 1st irrigation sub project																																																																																																					
	9 Submission of Feasibility Report to PMU/PIC for approval																																																																																																					
B	Farm and Market Roads Subprojects																																																																																																					
	1 Preparation of TORs for Surveys/ Studies																																																																																																					
	2 Selection of Survey Subconsultants																																																																																																					
D-3	Feasibility Report of 1st Farm & Market Road Subproject																																																																																																					
	1 Selection of a Sub Project																																																																																																					
	2 Reviews of Design Reports of road subproject																																																																																																					
	3 Discussion with Communities																																																																																																					
	4 Review of Existing Situation / Technical aspects of Farm and Market road Subproject																																																																																																					
	5 Surveys / Studies/structural Designs																																																																																																					
	6 Economic & Financial Analysis & Identification of feasibilities of Irrigation Subprojects																																																																																																					
	7 Environmental and Social Safeguards Study and report submission																																																																																																					
	8 Compilation of feasibility report for 1st road subproject																																																																																																					
	9 Submission of Feasibility Report to PMU/PIC for approval																																																																																																					
D-4	Tender Document with Detailed Designs for 1st Irrigation Subproject & Farm & Market Road Subproject																																																																																																					
	1 Detailed Design of drip irrigation for the sub projects																																																																																																					
	2 Detailed Design of the identified 1st irrigation Trapaing Run subproject																																																																																																					
	3 Detailed Design of the identified 1st farm and market roads subproject																																																																																																					
	4 Preparation of Specifications/ Drawings																																																																																																					
	5 Preparation of BOQ of the identified projects in Irrigation sub projects																																																																																																					
	6 Preparation of BOQ of the identified projects in farm and market roads sub projects																																																																																																					
	7 Submission of detail design reports to the client for the client's approval																																																																																																					
	8 Revision of Environmental and Social Safeguards reports and submission																																																																																																					
	9 Preparation of bid document including TOR/ Contract Conditions/ Specifications/ BOQ/ Detail Designs for the particular package																																																																																																					
D-5	Feasibility Reports of the respective Irrigation Subprojects Packages																																																																																																					
	Package Type in terms of months required to complete																																																																																																					
	1 Reconnaissance Surveys																																																																																																					
	2 Discussions with Communities																																																																																																					
	3 Review of Existing Situation / Technical aspects of Irrigation subprojects																																																																																																					
	4 Surveys / Studies/structural Designs																																																																																																					

Figure 4.2: Staff Schedule of FSDD CS5



4.4. Reports

124 The Consultant will submit Reports as indicated in the Terms of Reference following the set out time frame. The Consultant has submitted the Inception Report with work and staff schedule however a little delayed from original target. The delay in submission was due to the irrigation subprojects and farm and road subprojects during the Inception Phase was found inadequate and unclear from the PAM. It was essential to visit the sites together with line agencies MOWRAM, MRD and MAFF to identify the actual situation. The field visit and identification of the subprojects took some time and delayed the submission of Inception Report.

125 The Consultant will also submit monthly progress report. The format for Monthly progress is shown in **Appendix C**.

- Monthly Progress Report – A brief statement outlining the current status of the subproject;

126 The other Reports mandated in the TOR is Feasibility Report – A draft TOC is shown in **Appendix D**.

127 The above stated reports in English will be submitted in electronic copy and three hard copies to PMU Project Manager.

5. CONCLUSIONS: ISSUES AND CONCERNS

5.1. Activities Out of the Scope of TOR and PAM

128 The terms of reference of FSDD CS5 elaborated in FSDD Contract and PAM mentions about the irrigation subprojects and farm and roads subprojects. Both TORs in FSDD Contract and PAM does not mention about the farm rainwater harvesting ponds, establishing of drip irrigation demonstration units and providing design support to establish post-harvest unit for drying and storage facility within the Agriculture Cooperatives. The foregoing activities were only discussed during the pre-bid meeting and stated in reply to bidders' queries. In such, the required concerning experts to address the survey, design and technical specification requirements are missing in the scope of manpower of FSDD Contract. The concerning experts required are as follows:

- Micro Irrigation Engineer for the design of drip irrigation demonstration unit and ponds;
- There is no consideration of man-power requirement for the design and technical specification of post-harvest unit in agricultural cooperatives.

129 In the absence of above stated experts, FSDD CS5 team will have hardship to provide services in above stated additional activities.

130 Meanwhile, it is understood from the TOR and PAM that, PMU will provide support to FSDD CS5 in overall FSDD activities, and PIC will provide support and guidance to feasibility study and detailed engineering design CS5 Consultants in the area of preparation of social and environmental safeguards studies, economic analysis to ensure compliance with borrower's and ADB requirement, and climate change resilience and adaptation options⁶.

5.2. Inadequate Staff in meeting the Targeted Deadline

131 It is apparent from the Work Schedule shown in **Figure 4.1** that in general approach each of 14 packages in irrigation subprojects requires 6.5 months to complete the feasibility, detailed design and tender document preparation, and similarly each of the 16 packages of farm road subprojects will require 5.5 months to complete feasibility to tender document preparation. In the planned schedule, it is hard to achieve the completion target with the proposed action plan of preparing feasibility studies and detailed engineering design (FSDD) work on package by package basis as stated in the TOR of PAM and FSDD CS5 Contract. In compared to preparation of tender documents for each package within 6 months as stated in TOR of PAM, the Work Schedule as shown in **Figure 4.1** considers only 6.5 months for feasibility, design and tender document preparation for a package. Despite the compacted and shortened time period, the FSDD Completion time cannot be achieved by the contract period and off course by the targeted completion period by end of December 2022. For the design works, current TOR has one irrigation design engineer and two AutoCAD Specialist as one design team for irrigation subproject and similarly, one road engineer and two AutoCAD Specialists as one team for road subprojects. Apparently three design teams are necessary to complete the design works of irrigation and road subprojects separately. In other word, two design teams for irrigation subprojects and two design team road subprojects are short.

132 In similar manner, the input of international and national agriculture economist, Hydrologist, Environmental Safeguards Specialist, Social Safeguards Specialist and national procurement Specialist are short.

⁶ D. Consultant's TOR, para 63 in page 40 of PAM.

Appendix A

Terms of Reference of FSDD CS5 Consultants

IV. Appendices

APPENDIX A – TERMS OF REFERENCE

A. Background

1. The Climate-Friendly Agribusiness Value Chains Sector Project is aimed at improving the competitiveness of agricultural value chains in Kampong Cham and Tboung Khmum province along the Greater Mekong Subregion (GMS) southern economic corridor, and Kampot and Takeo provinces along the south coastal economic corridor. The project will boost the climate resilience of critical agriculture infrastructure and help commercialize rice, maize, cassava, and mango production. It will help increase crop productivity and diversification; improve the capacity for storage, processing, and quality and safety testing; and promote the use of solar and bioenergy. It will strengthen the technical and institutional capacity for climate-smart agriculture (CSA) and create an enabling policy environment for climate-friendly agribusinesses. This will in turn promote long-term environmental sustainability and enhance the profitability for farmers and agribusinesses.

2. The project's impact is reflected in enhanced productivity, climate resilience, quality and safety, value addition and rural household incomes. The outcome is productive and resource efficient agribusiness value chains developed in the project areas.

3. The main outputs and key activities under each output include the following:

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 GHG emissions and increasing climate resilience. Key activities involve: (i) rehabilitation irrigation and water management infrastructure (off-farm irrigation systems, on-farm water rainwater harvesting ponds, and drip irrigation) to climate-resilient condition; (ii) upgrading agricultural cooperatives' value chain infrastructure (drying, processing and storage facilities); (iii) improving the connectivity of farms to cooperatives and markets through climate-resilient farm road networks; (iv) strengthening the infrastructure for agricultural quality and safety testing; and (v) promoting renewable energy (biogas and use of solar energy in target cooperative areas).

Output 2: Climate-smart agriculture and agribusiness promoted. Key activities include (i) deploying climate-resilient varieties; (ii) strengthening the capacity for climate-friendly production practices and technologies; and (iii) promoting farm mechanization and extension. 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.

Output 3: Enabling environment for climate-friendly agribusiness enhanced. The project will support the Ministry of Agriculture, Forestry, and Fisheries (MAFF) and the

Ministry of Commerce in creating a favorable policy environment for agribusiness to mobilize the private sector participation through PPPs and contract farming. Activities include: formulating climate-friendly agribusiness policies and standards; (ii) promoting green finance and risk-sharing mechanisms; and (iii) supporting climate risk management through ICT. 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 ICT, the project will provide weather, market, and agronomic information to create an environment for more effective climate risk management.

B. Objectives of the Assignment

4. The objective of the consultancy assignment is to assist the project management unit (PMU), and the provincial project implementation units (PPIUs) in the preparation of feasibility study and detailed engineering design of each subproject. The project implementation consultants (CS1-PIC) will review FSS in coordination with the Ministry of Water Resources and Meteorology (MOWRAM) and Ministry of Rural Development (MRD) prior to submission to ADB.

C. Scope of Services

5. To ensure that the subprojects are designed in a logical and efficient manner, these will be grouped and packaged. The feasibility studies and detailed engineering design (FSDD) firm will start feasibility study and design work on a package by package basis and will allocate resources as required for these to be completed. Given the time needed to undertake feasibility studies and detailed engineering design for each package, as well as preparing tender documents (approximately six months), packages will likely have to be undertaken one after the other. However, there may be some overlap depending on the speed and resources of the FSDD firm. It is recommended that grouping of packages will be done based on location (with subprojects grouped according to province to the extent possible), as well as total estimated works contract size. Viable subprojects will then be approved by the Project Steering Committee (PSC) after submission and following recommendations from PMU. Prioritizing of the subprojects within each province should be agreed upon in consultation with PPIU and local authorities.

I. for Irrigation subprojects

6. Activities shall include, but not be limited to the following:

Step 1. Reconnaissance and feasibility. The contractor needs to determine that the subproject is technically, environmentally, socially and economically feasible:

- (i) Detailed field surveys and analysis will be undertaken to determine that the subproject: (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. The methodology used during project preparation for the representative subproject can be used.
- (ii) Hold meetings and discussions with community groups, commune leaders and potential cooperatives and water users, to understand the issues and expectation of local people.
 - (iii) 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).
 - (iv) Submit documents to PIC.

Step 2. Topographic survey. Involve PMU and PPIU staff in the surveys for on the job capacity building:

- (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 FSDD 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.

Step 3. Detailed engineering design.

- (i) Consult PPIUs, local district officials, communes, existing or potential cooperatives and water users;
- (ii) Take due account of projected climate change impacts and incorporate design features that enhance resilience;
- (iii) Existing design procedures practice under national standards will be used. However, where innovative climate resilient improvements can be used, FSDD consultants will incorporate such innovations in the design providing sufficient justification for such additional costs, structures or practices can be proven.
- (iv) Update LARP, DDR, IEE, EMP and environmental code of conduct as necessary upon finalization of design.
- (v) Submit to PIC for review with relevant line agencies to ensure compliance with standards and regulations of the government.
- (vi) Submit to PMU for approval

Step 4. Tendering document.

- (i) Following approval of PMU of the detailed engineering design, FSDD 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.
- (ii) Tender documents should follow standard formats prepared during project preparation, unless modifications are required by PMU.

- (iii) Submit documents to project implementation consulting firm (CS1: PIC).

II. For Farm and Market Roads Subprojects

7. **Scope of work.** Activities required will include a detailed topographic survey of the full length of the road and preparation of a complete set of road design drawings with required supporting documents, calculations and specifications.

8. Design of the road and structures should conform to the Commune/Sangkat Fund Technical Manual (2009), Volume II: Specification for Construction Materials and Works and any other relevant guidelines and specifications. ADB's safeguards on environmental impact, land acquisition and DRR must be considered. Also, the practicalities of public access and safety must be considered. Activities shall include, but not be limited to the following:

Step 1. Reconnaissance and feasibility

- (i) Undertake a reconnaissance visit to the proposed road to investigate the existing condition of the road and structures, its history, present maintenance arrangements and funding.
- (ii) Hold meetings and discussions with community groups 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) Submit documents to PIC for endorsement to PMU, PSC and ADB.

Step 2. Topographic survey. Following clearance of Step 1 documents by PSC:

- (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.

Step 3. Detailed Engineering Design

- (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 crosssections of proposed road and structures, indicating the high flood marks. Standard road surface width will be 5.0 meters, 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.

Step 4. Tendering of subproject construction

- (i) Following approval of the documents by PSC and ADB, the FSDD consultants will assist preparation of the tender documents and contracts for construction of the subproject.

D. Team Composition, Qualification Requirements and Tasks for Key Experts

Experts	Person-months (Inputs)	
	International	National
Key Experts		
Irrigation Design Engineer and Team (Deputy) Leader	20	20
Agriculture Economist	5	6
Environmental Safeguards Specialist		10
Road Design Engineer		20
Social Safeguards Specialist		6
<i>Subtotal</i>	25	62
Non-key Experts		
Hydrologist	2	4
Social Safeguards Specialist	2	
Environmental Safeguards Specialist	2	
Agriculturalist		6
AutoCAD Specialist (4 individuals)		42
Social Development & Gender Safeguards Specialist		4
Procurement Specialist		4
<i>Subtotal</i>	6	60

Total	31	122
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Note; At least 85% of international and national key experts inputs must be in field. All experts should be budgeted under the remuneration section of the financial proposal.

9. **Team Leader/Irrigation Design Engineer** (international, 20 person-months). The Team Leader will be responsible for overall team coordination, and delivery of quality and timely outputs. The candidate will preferably be a qualified engineer (preferably civil engineer) with adequate experience (10 years) in the design of irrigation rehabilitation and upgrading works. The tasks to undertake will be:

- (i) Responsible for overall direction of the consultant team, and coordination and management of inputs;
- (ii) Manage the FSDD team relationships with the government, PIC, ADB and other stakeholders;
- (iii) Identify tasks on the critical path, and ensure that implementation schedules are followed;
- (iv) Take the lead in the feasibility and detailed design of structures, and outsource specific studies as required (e.g. topographic studies); and
- (v) Take the lead in the preparation of the initial work plan and personnel schedule (including determining resource needs), monthly reports, feasibility study reports and technical sections of the tender documents.

10. **Deputy Team Leader/Irrigation Design Engineer** (national, 20 person-months). The deputy team leader/irrigation design engineer will preferably be a qualified civil engineer with adequate experience (five years) in the detailed design of irrigation rehabilitation and upgrading works. Proficiency in MS Excel and knowledge and experience in using AutoCAD is preferable. S/he will:

- (i) Prepare plans of the subprojects, showing where selected hydraulic structures are located, including reservoirs, main canals and the positioning of secondary and tertiary canals. The latter may require ground truthing using GPS.
- (ii) Assist the team leader in the feasibility and detailed design of structures (including the preparation of drawings and bill of quantities), including the supervision of any engineering surveys (e.g. topographic surveys). Undertake field visits as required to gather data and be involved in public disclosure meetings (with the environmental and social safeguards teams).
- (iii) In collaboration with the Agricultural Economist / Agriculturalist, assist in the assessment of the crop water requirement for design and scheme water distribution purposes.
- (vi) In collaboration with the Hydrologist, assist in the preparation of the rating curves at canal headwork levels.
- (iv) Assist in the preparation of the Water Requirements and Availability annex at irrigation scheme level (main canal) of the feasibility reports, including a proposal of water distribution from the main irrigation canal to branching or secondary canals.
- (v) Provide inputs to reports as required.

11. **Road Design Engineer** (national, 20 person-months). Preferably with a Bachelor's degree or higher in road engineering, civil engineering or equivalent qualifications from a recognized institution; 5 years' experience in designing rural roads and road structures; and

experience in alternative road surfaces. Knowledge in using CAD facilities in the preparation of designs and drawings would be an advantage. In coordination with MRD and PRD, s/he will report to the Team Leader and will be responsible for:

- (i) Assist in the identification, screening of subprojects.
- (ii) Undertake feasibility studies. Investigate existing road conditions and structures, its current maintenance arrangements and funding. Collect information on issues such as road traffic, flooding, resettlement needs and environmental concerns and be involved in public disclosure meetings with the social and safeguards teams.
- (iii) Supervise survey.
- (iv) Assist the team leader in the preparation of feasibility studies and detailed design of structures including the preparation of drawings and bill of quantities.
- (v) Ensure that designs are consistent with engineering standards and specifications for such works in Cambodia and incorporate measures to enhance climate change resilience and disaster risk reduction. Review the need for road safety measures and design road safety features appropriately.
- (vi) Ensures that resettlement and environmental issues are reviewed by relevant project staff, and if necessary, by the General Resettlement Department and that safeguard measures are incorporated.
- (vii) In coordination with the procurement specialist, assist the civil engineer from the national technical department of MRD in PMU and the provincial PRD staff, in preparing tender documents and construction contracts.
- (viii) Provide inputs to reports as required.

12. **AutoCAD Specialists** (national, 42 person-months, four individuals). The AutoCAD specialists will preferably be qualified civil engineers with over 3 years' experience in the use of AutoCAD, and with experience in the design of rural infrastructure, irrigation rehabilitation and upgrading works. They will:

- (i) Prepare detailed design drawings using AutoCAD, based on detailed designs prepared by the irrigation engineers; and
- (ii) Link the design drawings to the calculation of bill of quantities.

13. **Hydrologists** (international, 2 person-months) and (national, 4 person-months). The hydrologist will have a relevant educational background with at least ten years' experience in hydrology, including in rural infrastructure, irrigation rehabilitation and upgrading design. They should be highly proficient in MS Excel (including the use of pivot tables) and MS Access. They will report to the team leader and will be responsible for:

- (i) Assessing the watershed, ground water and or river hydrology in the area of the intake of selected schemes (using secondary or primary data); and
- (ii) Preparing the Water Requirements and Availability annex from the water sources into the irrigation schemes.

14. **Agricultural Economist** (international, 5 person-months) and (national, 6 person-months). The agricultural economist will preferably have a relevant educational background in economics, and with ten years' experience in undertaking economic analysis of agricultural projects, preferably irrigation rehabilitation projects. Experience of undertaking EIRRs according to ADB or World Bank guidelines will be an advantage. S/he will report to the team leader and will be responsible for:

- (i) Preparing farm budgets (with and without project) for the subprojects. This will include organizing a farm survey to determine farm size, current cropping type and patterns, crop yields, cropping intensities, and cropped areas.
- (ii) Prepare EIRRs for the subprojects and write the economic and financial analysis annex and economic analysis section of the feasibility reports. This will require undertaking sensitivity analysis and determining subproject benefit distribution, poverty impact and household financial returns. The economic and financial analysis reports and Excel files prepared at PPTA stage can be used as templates.

15. **Agriculturalist** (national, 6 person-months). Preferably will have a relevant educational background in irrigated agriculture or agronomy; five years' experience in agricultural development; and experience in undertaking agricultural surveys. S/he will report to the international agricultural economist, and in his/her absence the team leader and will be responsible for:

- (i) Under the guidance of the agricultural economist, undertake farm surveys to collect necessary information for the agricultural economist to prepare farm budgets (with and without project) for the subprojects. This will include collecting information to determine farm size, current cropping type and patterns, crop yields, cropping intensities, and cropped areas (preferably subdivided between head, middle and tail reaches).
- (ii) The potential to changing the cropping calendar on the basis of improved water availability and less impact damage to produce with rural road improvement should be determined.
- (iii) Collect market prices for agricultural products and for inputs, as required by the agricultural economist.

16. **Social Safeguards Specialist** (international, 2 person-months). The social safeguards specialist will preferably have a relevant educational background in a social science; and adequate experience in resettlement, social development and gender safeguard procedures for donor organizations such as the ADB or World Bank. S/he will report to the team leader and will:

- (i) Organize socioeconomic surveys in the subproject areas in order to prepare the socioeconomic survey and analysis annex of the feasibility reports.
- (ii) Take the lead in organizing public disclosure meetings in order to present the project and determine stakeholder concerns and ensure that the engineering team are aware of these.
- (iii) Once sites for structures have been identified, undertake an involuntary resettlement screening to determine if there are any resettlement impacts (see template in the Land Acquisition and Resettlement Framework (LARF)).
- (iv) If there are impacts, then organize a census of affected households and determine any impact.
- (v) Prepare a land acquisition and resettlement plan (LARP) (if Cat. B) including a public disclosure plan as an annex, and details on mitigation measures. The LARPs produced in the PPTA stage can be used as templates, and procedures outlined in the LARF should be followed.
- (vi) Once finalized and approved, assist the PMU to ensure that details of the LARP are disclosed to affected households and that the public disclosure plan is disseminated as required.

17. **Social Development and Gender Safeguard Specialist** (national, 4 person-months). The specialist will preferably have a relevant educational background in a social science, and with adequate experience in carrying out gender and social surveys. S/he will work with the international social safeguards specialist and will:

- (i) undertake socioeconomic surveys in the subproject areas in order to prepare the socio-economic survey and analysis annex of the feasibility reports; and
- (ii) undertake public disclosure meetings to present the project and determine stakeholder concerns – and ensure that the engineering team is aware of such concerns.

18. **Social Safeguards Specialist** (national, 6 person-months). The resettlement specialist will preferably have a relevant educational background in a social science, and with adequate experience in carrying out resettlement surveys for ADB or World Bank. S/he will work closely with the international social safeguards specialist and will:

- (i) Undertake public disclosure meetings in order to present the project and determine stakeholder concerns – and ensure that the engineering team is aware of such concerns;
- (ii) Once sites for structures have been identified, assist the social safeguards specialist (with field visits if necessary) to undertake an involuntary resettlement screening to determine if there are any resettlement impacts (see template in the LARF);
- (iii) If there are impacts then, with the international social safeguards specialist, undertake a census of affected households and determine any impact;
- (iv) Assist the international social safeguards specialist in the preparation of the due diligence report (DDR), land acquisition and resettlement plan (LARP) as required; and
- (v) Once finalized and approved, assist the PMU to ensure that details of the DDR or LARP are disclosed to affected households and that the public disclosure plan is disseminated as required. This may require field visits to disclose details.

19. **Environmental Safeguards Specialists** (international, 2 person-months) (national, 10 person-months). The environmental safeguards specialists will preferably have a relevant educational background, and with adequate experience in environmental safeguard procedures for donor organizations such as the ADB or World Bank. They will report to the team leader and will:

- (i) With the social safeguards team, jointly organize consultation meetings to present the project and determine stakeholder concerns – and ensure that the engineering team is aware of such concerns;
- (ii) Once sites for structures have been identified, undertake an environmental screening to determine if there are any environmental impacts, and thus determine the environmental category (see template in the Environmental Assessment and Review Framework (EARF));
- (iii) If the subproject is classified as category B (potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects) then prepare an initial environmental examination (IEE), including an environmental management plan (EMP). The procedures set-out in the EARF

should be followed, and the IEE prepared during project preparation stage can be used as a template; and

- (iv) If the subproject is classed as category C (a proposed project is likely to have minimal or no adverse environmental impacts) then review environmental implication and provide a writeup for insertion in the feasibility study report.

20. **Procurement Specialist** (national, 4 person-months). The procurement specialist will preferably have a relevant educational background, and with adequate experience in ADB procurement procedures, including the preparation of civil works tender documents. S/he will report to the team leader and will be responsible for:

- (i) The preparation of tender documents for civil works contracts for the subprojects in accordance with ADB guidelines taking into account the national procurement guidelines. A master bidding document prepared for the project should be used as a model;
- (ii) Prepare the subproject procurement section of the feasibility reports; and
- (iii) Coordinate with the procurement specialists/officers in PIC and in PMU.

E. Deliverables and Schedule

21. For each package, the following reports will be prepared:

- A work plan and personnel schedule should be submitted no later than two weeks after mobilization.
- Short monthly reports (no more than 1 page per sub-project in a format to be agreed with the PMU).
- A draft feasibility report (for each subproject) should be submitted no later than three months after mobilization. See **Annex 7 of Project Administration Manual** for a draft contents list. IEE, if required, should be translated into Khmer, as should the public disclosure plan (an annex to the LARP).
- Tender documents for work packages (including detailed engineering design drawings) should be submitted no later than six months after mobilization.

22. The reports will be submitted in electronic copy and hard copy (three copies) to the PMU Project Manager. The reports must be written in English. The PMU will provide comments to the reports within 30 days. The reports should then be updated by the FSDD firm. In the absence of comments or approval within the set deadline, the reports are deemed to be approved. The duration of services is about 60 months.

F. Client's Input and Counterpart Personnel

23. Services, facilities and property to be made available to the consultants by the client:

- (i) All available project reports and data including feasibility reports and detailed engineering design for the three representative subprojects;
- (ii) Office space with furniture and office equipment. Consultants will have an office provided by MAFF in Phnom Penh but are required to spend time in the provinces of Kampong Cham, Tboung Khmum, Kampot and Takeo in Cambodia;
- (iii) Vehicles;
- (iv) For social safeguards, development and gender, support in organizing field work related to (i) socioeconomic surveys; (ii) public disclosure meetings; and (iii) consultation meetings with stakeholders in the target areas; and

- (v) Counterpart staff in PMU, PPIU, MOWRAM, and MRD plus a Safeguard Officer (with Gender) from MAFF.

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Appendix B

Preliminary Field Visits Report some Irrigation Subprojects

Preliminary Field Report Prawoek Pong Reservoir Subproject

Kampot Province 05 to 07 December 2019

1. Introduction:

From 05 to 07 December 2019, the mission was done in Kampot Province. The mission was attempted to implementation of the preliminary of sub-projects section. The sub-projects selection was going to overview the subprojects which in the prescreening list in Kampot that had done by the PPTA during Project preparation. These projects were included Prawoek Pong Reservoir Scheme, Kandal Reservoir, and Trapeang Boeung Reservoir.

2. Aims of Preliminary Mission

The mission aims to classify the sub-projects for inception report in prior of feasibility study. The preliminary study will apply the selection criteria that had provided in PAM. Then, after applying selection criteria the sub-projects will be classified and categorized A, B, and C for feature study for designed phases.

3. Purpose of Preliminary Mission:

In order to confirm conditions of Pre-Selected Sub-Projects there were 8 crucial tasks to be done as following:

- (i) Site visit to verify pre-selection criteria of pre-selected projects
- (ii) Determine scheme-status (A, B or C) for involuntary resettlement and ethnic minority by walk through in the field
- (iii) Determine scheme-status (A, B or C) for environmental impact by walk through in the field
- (iv) Determine reliability or water availability for second irrigated dry season crop
- (v) Determine status/existence of primary, secondary and tertiary irrigation canals
- (vi) Conform likelihood of viable economic return (EIRR > 12 %)
- (vii) Draft sub-projects layout for rehabilitation by walk through in the field
- (viii) Identification of existing infrastructure rehabilitation requirement for Sub-Projects.

4. Mission Members:

The mission members were consisted of 6 people, (detail in the attached list). Every member was specialized on Designed Engineer from SC5, AutoCad Operator SC5, Agronomist SC5, Hydrologist SC5, Social Safeguards Specialist SC1 and DTL SC1 who was supporting to Designed Engineer to identify the scheme layout and hydraulic structures location (Table 1).

Table 1: List of Mission Members

No.	Name	Package	Position
1	Khin Toda	CS5	Mission Leader/ Deputy Team Leader/ Irrigation Design
2	Chhit Kimhor	CS5	Hydrologist Specialist
3	Hy Sopheap	CS5	Agriculturalist
4	Chhoun Sovannara	CS5	CAD Operator
5	Srey Heang	CS1	Deputy Team Leader (CS1, MOWARM)
6	Oum Sith (Tara)	CS1	Social safeguard specialist

5. Method of Preliminary Study:

The preliminary data collection will be applied as following methodologies:

- Reservoir infrastructure identification and conduct irrigation system layout inventory for further applying into the selection criteria excel spread sheet,
- Water source identification and pre assessment
- Pre-Agricultural data collection will be conducted on survey questionnaires
- Pre-Assessment on resettlement issued in order to overview of DDR, type, A, B and C.
- Preliminary rehabilitation/construction cost estimation

6. Expected Results:

After Preliminary study the number of sub-projects will be identified and type of sup-project will be finalized, and the final selected sub-projects will be presented in the conceptual workshop.

Results of [Prawoek Pong](#) Preliminary Study:

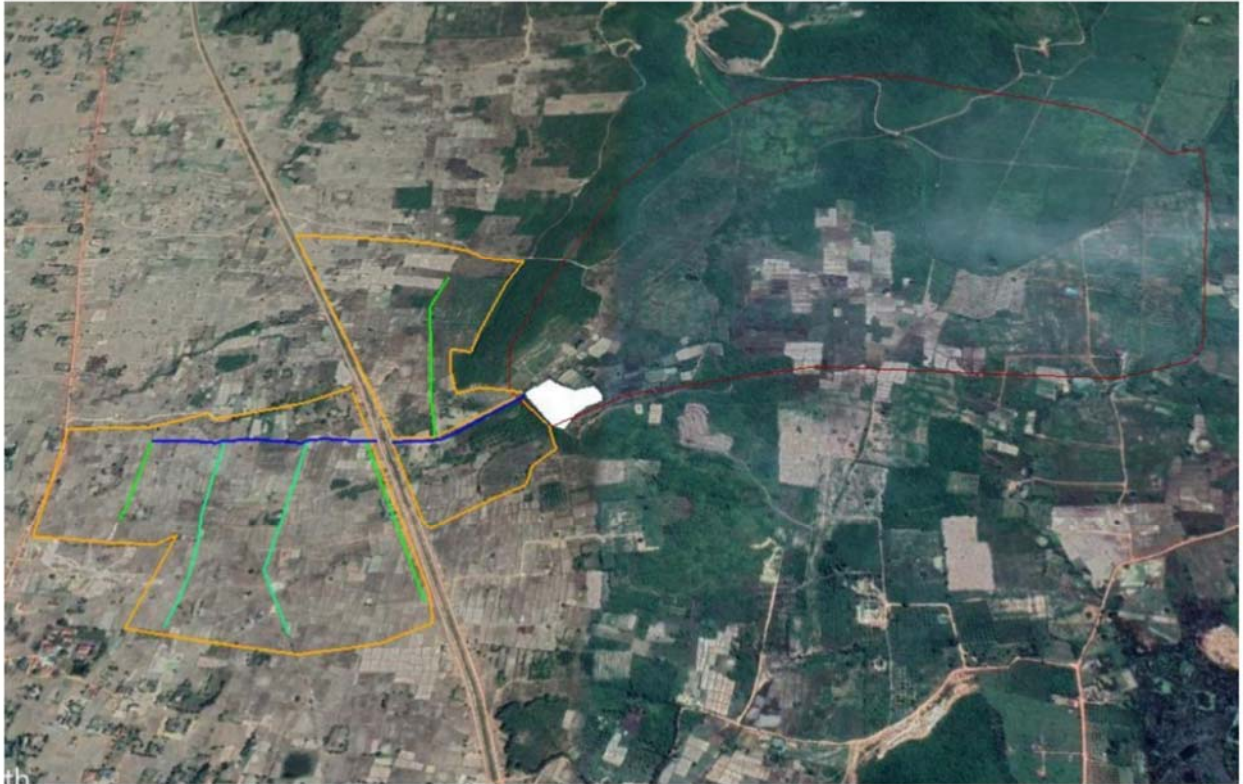
7. Water availability/Water Sources:

The runoff water will be collected from the surrounding mountains which. The total catchment is **8.80 Sq.Km** (Figure 1). Due to the reservoir area is too small, estimated **2.20** ha and average deep **2** m. however, from early rain that normally, rainfall begin in late March till wet season it can refill the reservoir very quick which give much opportunity for farmer start to cultivate vegetable and early wet season rice at lower fields.

Irrigation System:

Prawoek Pong is type of compound reservoir that collect runoff water from surround mountain. The total area of Reservoir Prawoek Pong is approximately 2 ha and there will need two mains reservoir structure such as spillway and headwork. Then MC 900 m long it can be from the reservoir to the cross drainage earth canal and after cross drainage will construct by line canal. The secondary canal will 600 m and 3 SCs will be constructed by concrete. The total SC will be 1500 m long. The structure will need to construct four MC outlets, four check structure and MC structure crossing the MD Figure 1.

Figure 1: Irrigation layout of Prawoekpong irrigation sub-project



8. Scheme inventory

Table 2: Preliminary project planning for rehabilitation

It	Structure	Long (m)	Command area (ha)
1	Dike rehabilitation	150m	Capacity 60 000 m ³
2	Main Canal (Earth)	210m	6
3	Main Canal (line)	340m	4
4	Secondary Canal 1 (earth)	525 m	22
5	SC2 (line)	470 m	13
6	SC3 (line)	530 m	10
7	SC4 (line)	490 m	6
8	SC5 (line)	230 m	5

It	Structure	Long (m)
1	Spillway	10m
2	Head works	1
3	Crossing structure for MC	40m
4	Secondary Canal inlets	5
5	Check structure	5
6	Crossing for boxes cards	6

From the table about had walk through to the field for registration the irrigation layout as shown in Figure 1. There are detail the tentative dike canals and hydraulic structures for further cost estimation.

9. Preliminary Irrigation Area Estimation

The total command area of Prawoek Pong Irrigation System is approximately round 310 ha for supplementary irrigation rice and few hectares of dry crops such as mango, durian and vegetable. After reservoir rehabilitation there will **50 ha** of early wet season rice and **10 ha** of dry crops such as vegetable/home garden, Mango farm and durian farm irrigation (Table 2).

10. Preliminary Environment Assessment:

There secondary forest and few tree and bushes long existing main canal there will have no fruit trees. Engineering view, there is no major problem for mitigation will be taking into account.

11. Preliminary Social Safeguards

Prawoek Pong will not have resettlement issue which will consider as Type C, because there is no rest element problem, and if the line canal construct at second half of the irrigation system there will no effect on land loss.

12. Preliminary Existing Agricultural Practice

The average land holding will be round 0.5 hectare per HHs and the main crop is wet season rice, vegetable and Durian production and Mango.

If the water available in the reservoir, the command area can be convert to grow the vegetable because there is close to the Kampot city and also Kep city which are the tour city in Cambodia. So, vegetable product can sell in locally markets.

13. Preliminary study on FWUC and O&M

The sub-group of FWUC had recently established, but there is inactive WUG because the communities had not been trained yet. There also operation and maintenance had not been done yet. It is proposed that CFAVC project must provide capacity building to the community of irrigation in Prawoek Pong irrigation sub-project in the coming days.

14. Conclusion

From the field investigation, Prawoekpong irrigation subproject will need to get further study such as IRR, and engineering cost estimation. At this early assessment we can recommend this scheme for first priority for detail feasibility, DDR, Gender development.

Preliminary Field Report of Kandal Subproject

Kampot Province 05 to 07 December 2019

1. Introduction:

From 05 to 07 December 2019, the mission was done in Kampot Province. The mission was attempted to implementation of the preliminary of sub-projects section. The sub-projects selection was going to overview the subprojects which in the prescreening list in Kampot that had done by the PPTA during Project preparation. These projects were included Prawoek Pong Reservoir Scheme, Kandal Reservoir, and Trapeang Boeung Reservoir.

2. Aims of Preliminary Mission

The mission aims to classify the sub-projects for inception report in prior of feasibility study. The preliminary study will apply the selection criteria that had provided in PAM. Then, after applying selection criteria the sub-projects will be classified and categorized A, B, and C for feature study for designed phases.

3. Purpose of Preliminary Mission:

In order to confirm conditions of Pre-Selected Sub-Projects there were 8 crucial tasks to be done as following:

- (i) Site visit to verify pre-selection criteria of pre-selected projects
- (ii) Determine scheme-status (A, B or C) for involuntary resettlement and ethnic minority by walk through in the field
- (iii) Determine scheme-status (A, B or C) for environmental impact by walk through in the field
- (iv) Determine reliability or water availability for second irrigated dry season crop
- (v) Determine status/existence of primary, secondary and tertiary irrigation canals
- (vi) Conform likelihood of viable economic return (EIRR > 12 %)
- (vii) Draft sub-projects layout for rehabilitation by walk through in the field
- (viii) Identification of existing infrastructure rehabilitation requirement for Sub-Projects.

4. Mission Members:

The mission members were consisted of 6 people, (detail in the attached list). Every member was specialized on Designed Engineer from SC5, AutoCad Operator SC5, Agronomist SC5, Hydrologist SC5, Social Safeguards Specialist SC1 and DTL SC1 who was supporting to Designed Engineer to identify the scheme layout and hydraulic structures location (Table 1).

Table 2: List of Mission Members

No.	Name	Package	Position
1	Khin Toda	CS5	Mission Leader/ Deputy Team Leader/ Irrigation Design Engineer
2	Chhit Kimhor	CS5	Hydrologist Specialist
3	Hy Sopheap	CS5	Agriculturalist
4	Chhoun Sovannara	CS5	CAD Operator
5	Srey Heang	CS1	Deputy Team Leader (CS1, MOWARM)
6	Oum Sith (Tara)	CS1	Social safeguard specialist

5. Method of Preliminary Study:

The preliminary data collection will be applied as following methodologies:

- Reservoir infrastructure identification and conduct irrigation system layout inventory for further applying into the selection criteria excel spread sheet,
- Water source identification and pre- assessment
- Pre-Agricultural data collection will be conducted on survey questionnaires
- Pre-Assessment on resettlement issued in order to overview of DDR, type, A, B and C.
- Preliminary rehabilitation/construction cost estimation

6. Expected Results:

After Preliminary study the number of sub-projects will be identified and type of sup-project will be finalized, and the final selected sub-projects will be presented in the conceptual workshop.

Results of **Kandal** Preliminary Study:

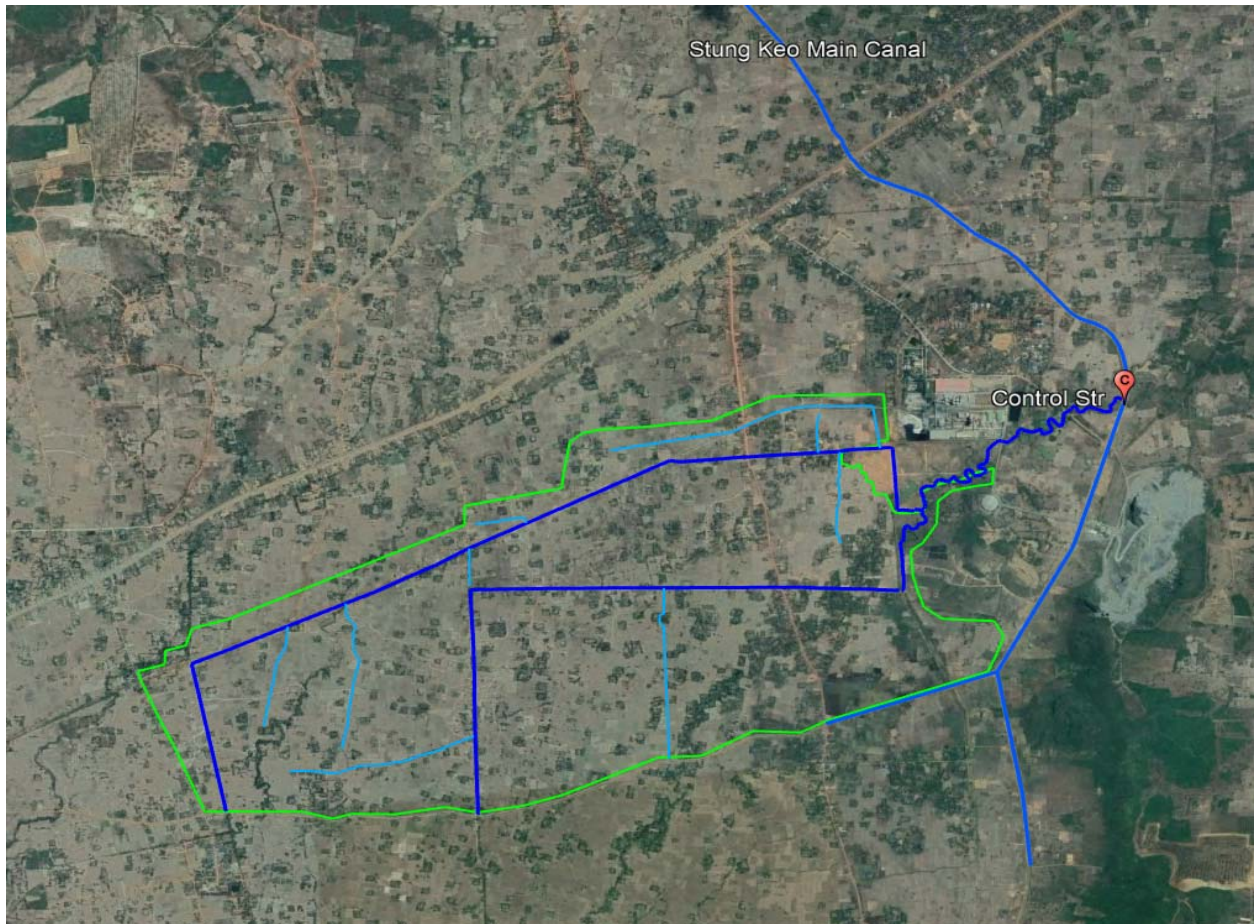
7. Water availability/Water Sources:

The runoff water from the surrounding mountains was cut off by Stung Keo Main Canal. which the total catchment is 960 Sq.Km (Stung Keo). Due to the reservoir area is occupied by some HHs using the reservoir area for living there and having big farm land with some houses there, such as paddy field, coconuts, mango and other crops. And to minimize resettlement problem, the design may change from reservoir to feeder canal divert water from main canal of Stung Keo for farmer start to cultivate vegetable and early wet season rice at lower fields.

Irrigation System:

Kandal become part of Stung Keo Scheme that divert water from Stung Keo main canal by construct cross regulator structure and convey to two secondary by a feeder canal (dig natural creek) about 2,600m. The water distributes to rice field by 2 secondary canals (5,400m and 3,600 m respectively) and some tertiary canals of total length around 6,500 m and appurtenant structures Figure 1.

Figure 1: Irrigation layout of Kandal irrigation sub-project



8. Scheme inventory

Table 2: Preliminary project planning for rehabilitation

Item	Structure	Long (m)	Command area (ha)
1	Feeder Canal	2,600 m	600 ha
2	Secondary Canal 1 (earth)	5,400m	
3	Secondary Canal 2 (earth)	3,600m	
4	Tertiary Canal 9 lines (earth)	6,500 m	
5	Appurtenant structures		Cross regulators, Head regulators, Outlets(turnout), Road crossing and tail structures...

From the table about had walk through to the field for registration the irrigation layout as shown in Figure 1. There are detail the tentative dike canals and hydraulic structures for further cost estimation.

9. Preliminary Irrigation Area Estimation

The total command area of Kandal Irrigation System is approximately round **650 ha** for supplementary irrigation rice and few hectares of dry crops such as coconuts, mango and vegetable and other crops. After reservoir rehabilitation there will **600 ha** of early wet season rice and 10 ha of dry crops such as vegetable/home garden, Mango farm and coconuts farm irrigation (Table 2).

10. Preliminary Environment Assessment:

There secondary forest and few tree and bushes long existing Secondary canals there will have few fruit trees. Engineering view, there is no major problem for mitigation will be taking into account.

11. Preliminary Social Safeguards

It is not in Category A for this Kandoul Scheme, but whether it is category B or C it will be depended on the design of the engineering; because there are around 5 HHs using the reservoir area for living there and having big farm land with some houses there, such as coconuts, mango and other crops.

And other existing canals and dams are still remaining with big width

12. Preliminary Existing Agricultural Practice

The average land holding will be round 0.5 hectare per HHs and the main crop is wet season rice, vegetable and Coconuts production and Mango.

If the water available in the reservoir, the command area could plant two crops and grow the vegetable because there is close to the Kampot city and also Kep city which are the tour city in Cambodia. So, vegetable product can sell in locally markets.

13. Preliminary study on FWUC and O&M

The sub-group of FWUC had recently established, but there is inactive WUG because the communities had not been trained yet. There also operation and maintenance had not been done yet. It is proposed that CFAVC project must provide capacity building to the community of irrigation in Kandal irrigation sub-project in the coming days.

14. Conclusion

From the field investigation, Kandal irrigation subproject will need to get further study such as IRR, and engineering cost estimation. At this early assessment we can recommend this scheme for first priority for detail feasibility, DDR, Gender development.

Preliminary Field Report Trapeang Boeung Subproject

Kampot Province 05 to 07 December 2019

1. Introduction:

From 05 to 07 December 2019, the mission was done in Kampot Province. The mission was attempted to implementation of the preliminary of sub-projects section. The sub-projects selection was going to overview the subprojects which in the prescreening list in Kampot that had done by the PPTA during Project preparation. These projects were included Prawoek Pong Reservoir Scheme, Kandal Reservoir, and Trapeang Boeung Reservoir.

2. Aims of Preliminary Mission

The mission aims to classify the sub-projects for inception report in prior of feasibility study. The preliminary study will apply the selection criteria that had provided in PAM. Then, after applying selection criteria the sub-projects will be classified and categorized A, B, and C for feature study for designed phases.

3. Purpose of Preliminary Mission:

In order to confirm conditions of Pre-Selected Sub-Projects there were 8 crucial tasks to be done as following:

- (i) Site visit to verify pre-selection criteria of pre-selected projects
- (ii) Determine scheme-status (A, B or C) for involuntary resettlement and ethnic minority by walk through in the field
- (iii) Determine scheme-status (A, B or C) for environmental impact by walk through in the field
- (iv) Determine reliability or water availability for second irrigated dry season crop
- (v) Determine status/existence of primary, secondary and tertiary irrigation canals
- (vi) Conform likelihood of viable economic return (EIRR > 12 %)
- (vii) Draft sub-projects layout for rehabilitation by walk through in the field
- (viii) Identification of existing infrastructure rehabilitation requirement for Sub-Projects.

4. Mission Members:

The mission members were consisted of 6 people, (detail in the attached list). Every member was specialized on Designed Engineer from SC5, AutoCad Operator SC5, Agronomist SC5, Hydrologist SC5, Social Safeguards Specialist SC1 and DTL SC1 who was supporting to Designed Engineer to identify the scheme layout and hydraulic structures location (Table 1).

Table 3: List of Mission Members

No.	Name	Package	Position
1	Khin Toda	CS5	Mission Leader/ Deputy Team Leader/ Irrigation Design
2	Chhit Kimhor	CS5	Hydrologist Specialist
3	Hy Sopheap	CS5	Agriculturalist
4	Chhoun Sovannara	CS5	CAD Operator
5	Srey Heang	CS1	Deputy Team Leader (CS1, MOWARM)
6	Oum Sith (Tara)	CS1	Social safeguard specialist

5. Method of Preliminary Study:

The preliminary data collection will be applied as following methodologies:

- Reservoir infrastructure identification and conduct irrigation system layout inventory for further applying into the selection criteria excel spread sheet,
- Water source identification and pre assessment
- Pre-Agricultural data collection will be conducted on survey questionnaires
- Pre-Assessment on resettlement issued in order to overview of DDR, type, A, B and C.
- Preliminary rehabilitation/construction cost estimation

6. Expected Results:

After Preliminary study the number of sub-projects will be identified and type of sup-project will be finalized, and the final selected sub-projects will be presented in the conceptual workshop.

Results of [Trapeang Boeung](#) Preliminary Study:

7. Water availability/Water Sources:

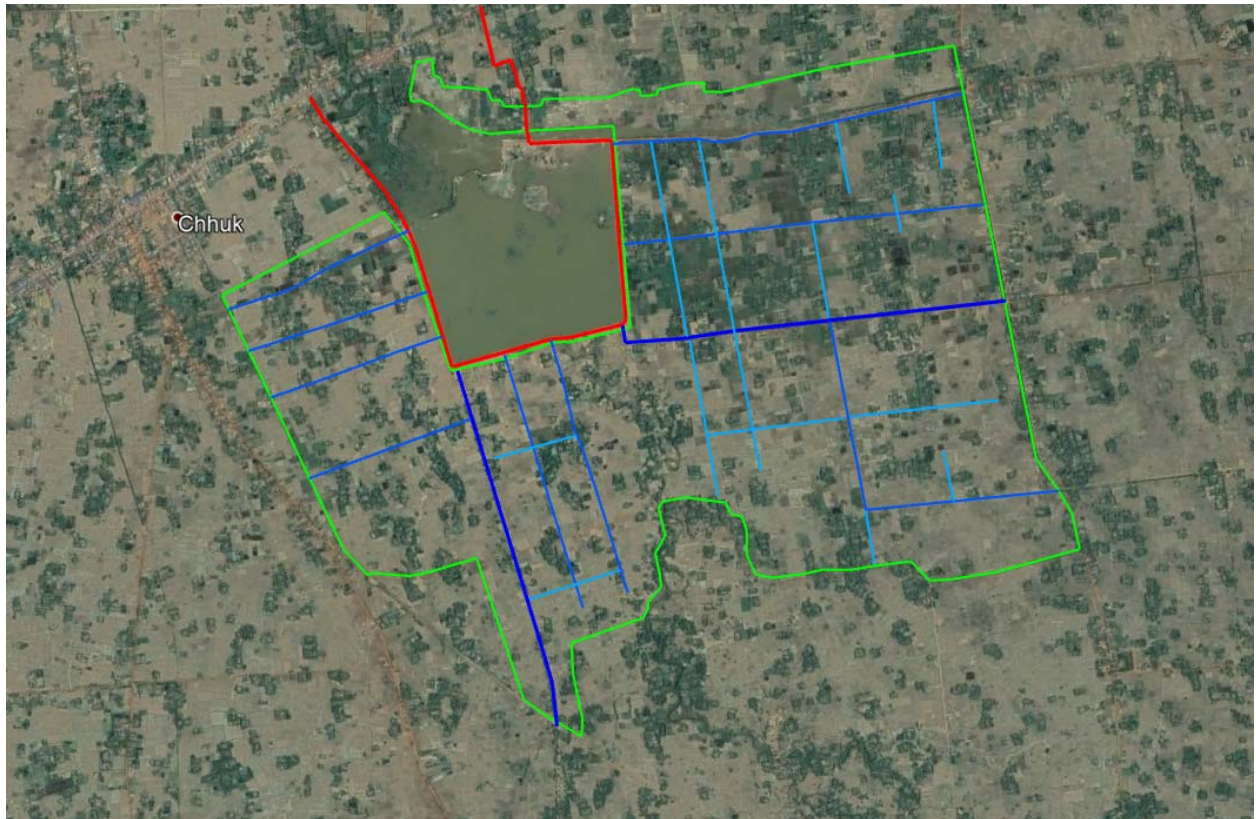
The runoff water will be collected from the Stung Pae of Chum Kiri district which the total catchment is **249 Sq.Km** (Figure 1). Due to the reservoir area is estimated **130** ha and average deep **3** m. however, from early rain that normally, rainfall begin in late March till wet season it can refill the reservoir very quick which give much opportunity for farmer start to cultivate vegetable and early wet season rice at lower fields.

Irrigation System:

Trapeang Boeung is type of compound reservoir that collect runoff water from Catchment at upstream area. The total area of Reservoir Trapeang Boeung is approximately 130 ha and has constructed mains reservoir dike and structure such as spillway and headworks.

Then the propose subproject aim to rehabilitate on irrigation level such as 2 MCs 1,950m and 2,100 m long it can be from the reservoir by earth canal with 2 functions irrigate and drain canals. The secondary canals will be 7 SCs directed from reservoir and 2 Scs from main canals of total length 12,400m, will be constructed by earth canal except some sections by concrete to reduce impact. The total TCs will be around 8,100 m long. The structures will need to construct MC SC and TCs outlets, check structure, road crossing and structure crossing the MD Figure 1.

Figure 1: Irrigation layout of Trapeang Boeung irrigation sub-project



8. Scheme inventory

Table 2: Preliminary project planning for rehabilitation

Item	Structure	Long (m)	Command area (ha)
1	Dike constructed by MOWRAM		800
2	Main Canal 1 (Earth)	1,950m	
3	Main Canal 2 (Earth)	2,100m	
4	Secondary Canals 7 lines from reservoir and 2 lines from MCs (earth some sections by concrete)	12,400 m	
5	Tertiary Canals from MCs and SCs (earth)	8,100 m	
6	Appurtenant structures		Intakes, Cross regulators, Head regulators, Outlets(turnout), Road crossing and tail structures...

From the table about had walk through to the field for registration the irrigation layout as shown in Figure 1. There are detail the tentative dike canals and hydraulic structures for further cost estimation.

9. Preliminary Irrigation Area Estimation

The total command area of Trapeang Boeung Irrigation System is approximately round **1400 ha** for supplementary irrigation rice and few hectares of dry crops such as corn and vegetable. After reservoir rehabilitation there will have **800 ha** of early wet season rice and around **300 ha** of dry crops such as paddy rice, vegetable/home garden, corn farm irrigation.

10. Preliminary Environment Assessment:

There secondary forest and few tree and bushes long existing main canal there will have no fruit trees. Engineering view, there is no major problem for mitigation will be taking into account.

11. Preliminary Social Safeguards

Trapeang Boeung will have consider as Type B category for resettlement, because there are structures located along the Main Canals and secondary canals. 7 shops and 3 graves are located on the Canals Alignment, a lot of trees other house fence, unless the design team should update the maps layout with scope of works such as the estimated acquired length and width of all canals in each subproject. So, we just present to the local authorities what to do and where are the alignments, then each village headman can work with us on the screening checklist. and if the line canal or concrete covered canal is constructed there will be less effect on land loss.

12. Preliminary Existing Agricultural Practice

The average land holding will be round 0.5 hectare per HHs and the main crop is wet season rice, vegetable and Durian production and Mango.

If the water available in the reservoir, the command area can be converted to grow the vegetable because there is close to the Chhouk district town center. So, vegetable product can sell in locally markets.

13. Preliminary study on FWUC and O&M

The FWUC had recently established, but there is inactive WUG because the communities had not been trained yet. There also operation and maintenance had not been done yet. It is proposed that CFAVC project must provide capacity building to the community of irrigation in Trapeang Boeung irrigation sub-project in the coming days.

14. Conclusion

From the field investigation, Trapeang Boeung irrigation subproject will need to get further study such as IRR, and engineering cost estimation. At this early assessment we can recommend this scheme for first priority for detail feasibility, DDR, Gender development.

Appendix C

Sample Format for Monthly Progress Report

Time Based Contract for Consultancy Services for Feasibility Study and Detailed Engineering Design

Short Monthly Progress Report: _____ 2020

Sr. No.	Description of Tasks / Activities / Reports	Status	Remarks
Output 1: Critical Agribusiness Value Chain Infrastructure Improved and made Climate Resilient.			
A.1	Staff Input/Visitors		
B	Irrigation Subprojects		
1	Reconnaissance Survey and Feasibility		
2	Topographic Survey and Report		
3	Detailed Engineering Design		
4	Preparation of Tender Documents including		

Sr. No.	Description of Tasks / Activities / Reports	Status	Remarks
	Drawings, BoQs, Cost Estimates, Bid Doc and Technical Specification.		
B	For Farm and Market Roads Subprojects		
1	Reconnaissance Survey and Feasibility		
2	Topographic Survey and Report		
3	Detailed Engineering Design		
4	Preparation of Tender Documents including Drawings, BoQs, Cost Estimates, Bid Doc and Technical Specification.		
C	Social Safeguards		

Sr. No.	Description of Tasks / Activities / Reports	Status	Remarks
D	Environmental Safeguards		
E	Report and Deliverables		
F	Problems and Constraints		

Appendix D

Sample TOC for Feasibility Study Report

Feasibility Study Report for xxxx Irrigation Subproject

Project Number: 48409-002

Date

Cambodia: Climate-friendly Agribusiness Value
Chains Sector Project

LIST OF ABBREVIATIONS

ADB	-	Asian Development Bank
AHH	-	affected households
CAMGAP	-	Cambodia Good Agricultural Practice
CARDI	-	Cambodia Agricultural Research and Development Institute
CAVAC	-	Cambodia Agriculture Value Chain Program
CCSP	-	climate change strategic plan
CSA	-	climate smart agriculture
CSC	-	community construction sub-committee
EIA	-	environmental impact assessment
EIRR	-	economic internal rate of return
EMP	-	environmental management plan
EWSR	-	early wet season rice
FWUC	-	farmer water user community
HH	-	household
IFC	-	International Finance Corporation
IEE	-	initial environmental examination
IWRM	-	integrated water resources management
MAFF	-	Ministry of Agriculture, Forestry and Fisheries
MEF	-	Ministry of Economy and Finance
M&I	-	modernization and improvement
MOWRAM	-	Ministry of Water Resources and Meteorology
O&M	-	operation and maintenance
PDA	-	Provincial Department of Agriculture
PDWRAM	-	Provincial Department of Water Resources and Meteorology
PIC	-	project implementation consultants
PMU	-	project management unit
SOP	-	standard operation procedures
WSR	-	wet season rice
REA	-	rapid environmental assessment

NOTE

In this report “\$” refers to United States dollars.

I. XXXXXX SUBPROJECT SUMMARY

- A. Subproject Context and Rationale**
- B. Subproject Design**
- C. Subproject Cost and Financing Plan**
- D. Implementation Arrangements**
- E. Subproject Impact**
- F. Critical Risks**

II. SUBPROJECTCONTEXT AND RATIONALE

- A. Need for Investment**
 - 1. Provincial and District Development Policies**
 - 2. Location and Natural Features**
 - 3. Social and Cultural Environment**
 - 4. Subproject Rationale**
- B. Subproject Objectives**
- C. Related Development Initiatives**
- D. Subproject Justification**

III. SUBPROJECT DESIGN

A. Subproject Description

- 1. Cropping Pattern**
- 2. Engineering Design**
- 3. Irrigation Water Requirement**

- 4. Recommissioning and increasing the storage capacity of the reservoir**
- 5. Upgrading the distribution system**

- 6. Main canals**
- 7. Secondary Canals**
- 8. Main drain**
- 9. Additional minor structures**
- 10. Drainage siphon**
- 11. Associated Investments**

B. Location and Site

- 1. Socio-economic Conditions**
- 2. Identification Process**
 - (i) There is potential for cluster (cooperative) development and beneficiaries to include vulnerable communities, poor and women farmers.

C. Land Acquisition and Resettlement

D. Indigenous People

E. Environment

1. Environmental Criteria and Standards

2. Management Solutions for Environmental Protection

Structure:

XXX subproject site:

Local ecological features:

Impacts and mitigation measures during the construction phase:

Protected areas:

Cultural heritage:

Construction camps:

Hazardous and polluting materials:

Air pollution:

Dust:

Soil Erosion:

Noise:

Environmental impact and mitigation measures during operation:

Water pollution and chemical fertilizer use:

Worker health and safety

IV. TOTAL INVESTMENT, FUNDING ARRANGEMENTS AND FINANCING PLAN

A. Total Investment Cost

1. Estimation Methods

V. IMPLEMENTATION AND OPERATING ARRANGEMENTS

A. Execution and Implementation Agencies

B. Detailed Design Phase

- 1. Bidding process**
- 2. Construction Phase**
- 3. Operational Phase**

Operation:

Maintenance:

Financial Management:

Conflict resolution:

C. Subproject Implementation Management

- 1. Subproject Organization and Implementation**
- 2. Role of the PDWRAM**
- 3. Role of PDAFF**
- 4. Role of Contractors**
- 5. Role of Project Implementation Consultants**
- 6. Role of Detailed engineering design and supervision consultants**
- 7. Role of Subproject Beneficiaries**

D. Subproject Implementation Schedule

E. Procurement

VI. SUBPROJECT OUTCOME AND IMPACT

A. Subproject Outcome and Impact

- 1. Performance Indicators**
- 2. Evaluation Arrangements**
- 3. Reporting Arrangements**

B. Economic and Financial Evaluation

C. Social Impact Assessment

D. Environmental Impact Assessment

VII. CRITICAL RISKS

Annex 1

DESIGN AND MONITORING FRAMEWORK

Subproject Results Chain	Performance with Targets and Baselines	Data Sources and Reporting	Risks
Impact:			
Outcome:			
Output1:			
Activities and Milestones			
Output 1: The rehabilitation of Inputs			
XXX			

Annex 2

SOCIOECONOMIC SURVEY

Provincial Capital	
Provincial area	
Landscape	
Total Population	
Population Density	
Population age over 18years	
Temperature	
Rainfall	
Administrative Boundary	

Annex 3

ENGINEERING DESIGN

INVESTMENT COST ESTIMATES

Annex 4

RESETTLEMENT PLAN

Annex 5

INITIAL ENVIRONMENTAL EXAMINATION

Annex 6

SOCIAL AND GENDER IMPACT ASSESSMENT AND GENDER ACTION PLAN

Annex 7

ECONOMIC AND FINANCIAL ANALYSIS