Project Administration Manual

Project Number: 51081-002
Loan and/or Grant Number(s): XXXX
November 2018

Kyrgyz Republic: Climate Change and Disaster-Resilient Water Resources Sector Project

ABBREVIATIONS

ADB	–	Asian Development Bank
DWR	–	Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration
EA	–	executing agency
EMP	–	environmental management plan
IEE	–	initial environmental examination
LARF	–	land acquisition and resettlement framework
LARP	–	land acquisition and resettlement plan
M&E	–	monitoring and evaluation
MOES	–	Ministry of Emergency Situations
PIU	–	project implementation unit
SEMP	–	site-specific environmental management plan

TABLE OF CONTENTS

I.		PROJECT DESCRIPTION	1
II.		IMPLEMENTATION PLANS	2
	A.	Project Readiness Activities	2
	B.	Overall Project Implementation Plan	3
III.		PROJECT MANAGEMENT ARRANGEMENTS	5
	A.	Project Implementation Organizations: Roles and Responsibilities	5
	B.	Key Persons Involved in Implementation	8
	C.	Project Organization Structure	12
IV.		COSTS AND FINANCING	13
	A.	Cost Estimates Preparation and Revisions	13
	B.	Key Assumptions	13
	C.	Detailed Cost Estimates by Expenditure Category	14
	D.	Allocation and Withdrawal of Loan and Grant Proceeds	15
	E.	Detailed Cost Estimates by Financier	16
	F.	Detailed Cost Estimates by Outputs and/or Components	19
	G.	Detailed Cost Estimates by Year	20
	H.	Contract and Disbursement S-Curve	21
	I.	Fund Flow Diagram	23
V.		FINANCIAL MANAGEMENT	24
	A.	Financial Management Assessment	24
	B.	Disbursement	27
	C.	Accounting	29
	D.	Auditing and Public Disclosure	29
VI.		PROCUREMENT AND CONSULTING SERVICES	30
	A.	Advance Contracting and Retroactive Financing	30
	B.	Procurement of Goods, Works, and Consulting Services	30
	C.	Procurement Plan	31
	D.	Consultant's Terms of Reference	35
VII.		SAFEGUARDS	35
VIII.		GENDER AND SOCIAL DIMENSIONS	38
IX.		PERFORMANCE MONITORING, EVALUATION, REPORTING, AND COMMUNICATION	41
	A.	Project Design and Monitoring Framework	41
	B.	Monitoring	43
	C.	Evaluation	44
	D.	Reporting	45
	E.	Stakeholder Communication Strategy	45
X.		ANTICORRUPTION POLICY	46
XI.		ACCOUNTABILITY MECHANISM	46
XII.		RECORD OF CHANGES TO THE PROJECT ADMINISTRATION MANUAL	47
APPENDIX 1:		IMPLEMENTATION PROCEDURES AND RESPONSIBILITIES FOR OUTPUTS 1 AND 2	48
APPENDIX 2:		DRAFT DESCRIPTION OF KYRGYZHYDROMET COMPONENT	63
APPENDIX 3:		DRAFT HEAVY MACHINERY AND SPECIAL EQUIPMENT	74
APPENDIX 4:		DRAFT TERMS OF REFERENCE FOR PROJECT IMPLEMENTATION CONSULTANTS	80

Project Administration Manual Purpose and Process

The project administration manual (PAM) describes the essential administrative and management requirements to implement the project on time, within budget, and in accordance with the policies and procedures of the government and Asian Development Bank (ADB). The PAM should include references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

The executing and implementing agencies are wholly responsible for the implementation of ADB-financed projects, as agreed jointly between the borrower and ADB, and in accordance with the policies and procedures of the government and ADB. ADB staff is responsible for supporting implementation including compliance by {executing and implementing agencies} of their obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

At loan negotiations, the borrower and ADB shall agree to the PAM and ensure consistency with the loan and grant agreements. Such agreement shall be reflected in the minutes of the loan negotiations. In the event of any discrepancy or contradiction between the PAM and the loan and grant agreements, the provisions of the loan and grant agreements shall prevail.

After ADB Board approval of the project's report and recommendations of the President (RRP), changes in implementation arrangements are subject to agreement and approval pursuant to relevant government and ADB administrative procedures (including the Project Administration Instructions) and upon such approval, they will be subsequently incorporated in the PAM.

I. PROJECT DESCRIPTION

1. The project will strengthen the climate change and disaster resilience of the water sector through: modernized and well-maintained infrastructure, enhanced agricultural and on-farm water management, and improved disaster risk management. The project interventions will be both structural (including civil works and equipment) and non-structural (including capacity building and demonstration activities). The interventions will be focused in the Ferghana Valley in the southwest of the country and the Chui River Basin in the north of the country, which are vulnerable to flooding, landslides (including mudflows), and drought risks that are likely to be exacerbated by climate change.

2. The project is aligned with the following impact: losses in the agriculture and water resources sectors from extreme weather events reduced.[1] The project will have the following outcome: climate change and disaster resilience of infrastructure and water security improved.[2]

3. **Output 1: Irrigation infrastructure protected and modernized.** The project will protect and modernize irrigation systems to improve the productivity and disaster resilience of about 20,000 hectares of irrigated land. It will upgrade and construct main (primary and secondary) canals; lower-level (inter-farm and on-farm) canals; and associated infrastructure such as protective mudflow crossing structures, cross-regulators, and offtakes.[3] Infrastructure design specifications will incorporate disaster risk mitigation measures for future climate conditions. The project will mobilize a participatory planning and design process involving the DWR, WUAs, WUA subgroups, and other key stakeholders to ensure equitable and sustainable outcomes. One representative subproject has been selected and developed during project preparation and two or three additional subprojects will be identified for investment during implementation.[4] Community-based contracting will be pilot tested for lower-level canal modernization in the representative subproject and will be expanded to further subprojects if shown to be successful.

4. **Output 2: Irrigation system and agricultural land management enhanced.** The project will strengthen management and O&M of target irrigation systems, including practical drought and climate risk management, to ensure the sustainability of the investment benefits. In conjunction with output 1, under the participatory planning process, the project will (i) reorganize and strengthen the institutional capacity of WUAs and WUA subgroups for more effective organization; and (ii) build the capacity of the DWR representatives, WUA and WUA subgroup representatives, and farmers on effective and resilient irrigation system management, water use, and agronomy. The project will develop and implement joint DWR–WUA irrigation system management plans, including water delivery scheduling and O&M financing and planning. WUA on-farm water management and agricultural management plans with gender elements will be developed, including irrigation scheduling, cropping patterns, and cultural methods, and will be supported with capacity building for farmers and community members (including women), such as comparative field trials and farmer field days.

---

[1] Government of the Kyrgyz Republic. 2015. *The Kyrgyz Republic: Intended Nationally Determined Contribution.* Bishkek; and footnote **Error! Bookmark not defined.**.

[2] The design and monitoring framework is in Appendix 1.

[3] This output will have an estimated 75,000 beneficiaries.

[4] Project Administration Manual (accessible from the list of linked documents in Appendix 2). The selection criteria for subsequent irrigation subprojects in Appendix 1 of the Project Administration Manual are (i) 9% minimum expected economic internal rate of return, (ii) location in Chui and lower Syr Darya river basins with close proximity to Bishkek or Osh, (iii) 3,000-hectare minimum target cropped area size, and (iv) *category B* or *C* environment and social safeguard classification and avoiding land acquisition and minimize resettlement.

5. **Output 3: National disaster risk management capacity improved.** The project will support capacity building and upgrade equipment for national DRM in the water resources sector. Heavy machinery and specialist equipment for preventive and rehabilitation works, such as excavators, bulldozers, and cranes, will be purchased and installed in the Northern and Southern Emergency Response Centers of the MOES. This will be accompanied by enhancement of the Centers' asset management and capacity building on DRM, including project planning, to undertake preventive and rehabilitation works more efficiently in the water resources sector. Hydrological posts for KyrgyzHydromet will be installed in about 20 sites in the project's target areas and an information system for enhanced data collection, processing, and flood warning will be pilot tested for improved efficiency and accuracy.

6. Implementation procedures for Output 1 and 2 are presented in Appendix 1. Draft description of KyrgyzHydromet component is presented in Appendix 2. The draft list of heavy machinery to be purchased are presented in Appendix 3. Draft TOR for project implementation consultants is presented in Appendix 4.

II. IMPLEMENTATION PLANS

A. Project Readiness Activities

Table 1: Project Readiness and Startup Schedule

Indicative Activities	2018					2019				Responsibility
	8	9	10	11	12	1	2	3	4	
Readiness support consultant mobilized				X						ADB
Start advertisement and processing to recruit consulting services					X					DWR and MOES
Undertake topographic survey of Pravaya Vetka irrigation system (Nooken area)				X						ADB
Project implementation consultant mobilized							X			
Establish PIU and commence recruitment						X	X	X		DWR and MOES
Loan and grant negotiations			X							ADB-GoKR
ADB Board approval				X						ADB
Grant signing					X					ADB-GoKR
Government legal opinion provided					X					GoKR
Government budget inclusion									X	GoKR
Loan and grant effectiveness									X	GoKR-ADB

DWR = Department of Water Resources of Ministry of Agriculture; GoKR = Government of Kyrgyz Republic; MOES = Ministry of Emergency Situations.
Source: Asian Development Bank.

B. Overall Project Implementation Plan

7. The initial project implementation schedule is presented below. The chart will be updated annually with key implementation activities and submitted to ADB with contract and disbursement projections for the following year.[5]

Table 2: Implementation Schedule

Year:	2018		2019				2020				2021				2022				2023				2024				2025			
Quarter:	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Project Management																														
PIU established and staffed																														
RFP issued for project implementation consultant																														
Project implementation consultant mobilized																														
Establishment of project performance monitoring system																														
Facilitation teams recruited and mobilized																														
Topographic surveys and productivity of water assessments																														
Audit submissions																														
Physical close																														
Financial close																														
Outputs 1 and 2																														
1.1 Core subproject																														
1.1.1 Mobilization phase																														
1.1.2 Detailed design and bidding																														
1.1.3 Construction phase																														
1.1.4 Management phase																														
1.2 Non-core subproject #2																														
1.2.1 Mobilization phase																														
1.2.2 Detailed design and bidding																														
1.2.3 Construction phase																														
1.2.4 Management phase																														
1.3 Non-core subproject #3																														
1.3.1 Mobilization phase																														

[5] Gantt chart available in e-handbook on project implementation at http://www.adb.org/documents/handbooks/project-implementation/

Year:	2018		2019				2020				2021				2022				2023				2024				2025			
Quarter:	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
1.3.2 Detailed design and bidding																														
1.3.3 Construction phase																														
1.3.4 Management phase																														
1.4 Non-core subproject #4																														
1.3.1 Mobilization phase																														
1.3.2 Detailed design and bidding																														
1.3.3 Construction phase																														
1.3.4 Management phase																														
Output 3																														
2.1 Emergency Response Centers																														
2.1.1 Bidding for heavy machinery																														
2.1.2 DRM capacity building																														
2.2 Hydromet stations																														
2.2.1 Design and bidding																														
2.2.2 Construction and installation																														
2.2.3 Pilot of information system																														

DRM = disaster risk management.
Source: Asian Development Bank.

III. PROJECT MANAGEMENT ARRANGEMENTS

A. Project Implementation Organizations: Roles and Responsibilities

8. **Executing Agencies (EA).** The Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration (DWR) and the Ministry of Emergency Situations (MOES) are the two executing agencies (EAs) for project. DWR is responsible for implementing outputs 1 and 2 and MOES is responsible for implementing output 3. DWR will assign one staff representative as Project Focal Point for outputs 1 and 2; MOES will assign one staff representative as Project Focal Point for North/South Emergency Response Center components of output 3 and one staff representative as Project Focal Point for KyrgyzHydromet component of output 3. The Project Focal Points will monitor the respective activities and supervise the activities of the project implementation unit (PIU). They are also responsible for compliance with the loan and grant covenants.

9. **Project Implementation Unit (PIU).** A new PIU will be established within DWR to implement the entire project scope, comprising: (i) a PIU Director to manage the overall project; (ii) a Compliance Unit covering finance, safeguards, and monitoring and evaluation (M&E) for the entire project; (ii) a DWR Unit to implement outputs 1 and 2; and (ii) MOES Unit to implement output 3 (see Figure 1 below). The PIU will be responsible for (i) implementing project activities in accordance with the project design; (ii) coordinating activities between DWR, MOES, WUAs, and other stakeholders and agencies concerned; (iii) ensuring compliance with environmental and social safeguard requirements; (iv) maintaining appropriate accounts, including reports on withdrawal applications and disbursement; (v) carrying out recruitment of consulting services and procurement activities; (vi) developing sustainable management plans and asset management plans; (vii) monitor, evaluate and report on project progress, and disseminate project progress (e.g., planned and completed project activities including procurement) through a dedicated project website; and (viii) preparing quarterly progress and other reports in format acceptable to ADB in line with reporting plan (see Section IX below). DWR and MOES shall establish the PIU and appoint the PIU director; DWR unit head; MOES unit head; chief accountant; financial specialist; and procurement specialists for the PIU, and these PIU staff shall have commenced their employment within 15 days of the effectiveness of the project. DWR and MOES shall ensure that throughout the project implementation the PIU is staffed with personnel, each of whom is fully qualified to carry out his assigned responsibilities and familiar with and knowledgeable about the details of the project, and all of whom together are familiar with and knowledgeable about the applicable policies, rules and regulations of ADB including, but not limited to, the Procurement Regulations, SPS, and Loan Disbursement Handbook. DWR and MOES shall ensure that the terms of reference, recruitment, evaluation, and appointment of all key PIU staff identified in the PAM have the prior approval of ADB. DWR and MOES shall cause the PIU to be fully functional and operational, with staff, financial and other resources as required and contemplated by the PAM and adequate to carry out the project a throughout the duration of the project.

10. DWR and MOES shall provide adequate office space with basic facilities for the PIU and the Project implementation consultant throughout the duration of the project.

Table 3: Project Implementation Roles and Responsibilities

Project Implementation Organizations	Management Roles and Responsibilities
Ministry of Finance (MOF)	Designated representative of the borrower: (i) Sign loan and grant agreements; (ii) Monitor project implementation and providing respective coordination and facilitation; (iii) Allocate and release counterpart funds in a timely manner; (iv) Establish project advance accounts for ADB loan and grant funds; (v) Establish account for counterpart funds; (vi) Endorse to ADB the authorized staff with approved signatures for withdrawal applications (WAs) processing; and (vii) Process and submit to ADB any request, when required, for reallocating the grant and loan proceeds.
Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration	Executing Agency: (i) Assign a Project Focal Point for outputs 1 and 2; (ii) Establish the PIU legal structure; (iii) Recruit and sign contracts with PIU staff for DWR unit; (iv) Jointly with MOES recruit PIU Director and staff for Compliance Unit; (v) Sign contracts with PIU Director, staff for Compliance Unit, and necessary support staff with cross-agency responsibility; (vi) Overall responsibility for managing of outputs 1 and 2 including financial management and procurement systems; (vii) Overall responsibility for reporting on physical, non-physical, financial progress for project activities including the development of the government's project completion report and its submission to ADB; (viii) Ensure PIU conduct timely financial and management audits as per agreed timeframe and taking recommended actions; (ix) Comply with Loan and Grant Agreement covenants; (x) Sign all contracts with suppliers of works, goods, and services for output 1 and 2; (xi) Jointly with MOES recruit project implementation consultant; (xii) Sign contract with project implementation consultant; and (xiii) Public disclosure of project outputs.
Ministry of Emergency Situations	Executing Agency: (i) Assign a Project Focal Points for output 3: one for the Emergency Response Center Component and one for the Kyrgyz Hydromet component; (ii) Recruit and sign contracts with PIU staff for MOES unit; (iii) Jointly with DWR recruit PIU Director and staff for Compliance Unit. (iv) Overall responsibility for managing of output 3 including financial management and procurement systems; (v) Overall reporting on physical, non-physical, procurement and financial progress for project activities including the development of the government's project completion report and its submission to ADB; (vi) Sign all contracts with suppliers of works, goods, and services for output 3; (vii) Comply with Loan/Grant Agreement covenants; and (viii) Public disclosure of project outputs.

Project Implementation Organizations	Management Roles and Responsibilities
Project Implementation Unit	(i) Update and implement an overall project plan, establish financial management and procurement system, and preparing annual project budget; (ii) Responsible project advance accounts and manage counterpart fund account on behalf of MOF; (iii) Prepare and submit timely disbursement claims and WAs on behalf of DWR and MOES; (iv) Update procurement plan, as necessary; (v) Disseminate project progress (e.g., planned and completed project activities including procurement) through Project's website; (vi) Recruit consultants and procure works and goods; (vii) Coordinate with other government agencies, departments and units, local governments, district and local offices, communities as necessary; (viii) Guide the plans, surveys, studies, detailed designs, capacity development activities, demonstration activities, workshops to be prepared or implemented by the consultants; (ix) Monitor and supervise consulting services; (x) Monitor and supervise works conducted by contractors, and the delivery of goods procured by suppliers with the support of the consultants; (xi) Implement gender action plan and updating the plan as necessary; (xii) Monitor project progress and evaluating project benefits and social and environmental impacts; (xiii) Conduct economic analysis at the midterm of the project implementation; (xiv) Implement required loan and grant covenants including the development of O&M plans; (xv) Manage loan disbursement and maintaining financial accounts; (xvi) Reconcile project accounts and ensure timely requests and release of fund to the support departments/PIUs. Overall project fund reconciliation after every fiscal year closing and as required by ADB; (xvii) Prepare periodic implementation progress reports; (xviii) Prepare supporting documents for replenishment of imprest account, financial statements, and arrangement of the annual audit report in close consultation with concerned government agencies.
Subproject Steering Committees (Outputs 1 and 2)	For each subproject: (i) Coordinate the activities and stakeholder activities at subproject and system levels; (ii) Support monitoring of project activities and reporting of progress; and (iii) Resolve conflicts and disputes between stakeholders involved.
ADB	Financier: (i) Assist the EAs and PIU in providing timely guidance at each stage of the project for smooth implementation; (ii) Review all the documents that require ADB approval upon the submission by the PIU; (iii) Conduct periodic project review missions, a midterm review, and a completion mission;

Project Implementation Organizations	Management Roles and Responsibilities
	(iv) Monitor EAs' compliance of all loan and grant covenants; (v) Timely process withdrawal applications and release eligible funds; (vi) Monitor EAs' compliance of financial audit recommendations; (vii) Regularly update the project performance review reports with the assistance of the EAs and PIU; and (viii) Regularly post on ADB website the updated project information documents for public disclosure, and the safeguards documents as per disclosure provision of the ADB Safeguards Policy Statement (2009), and ADB Public Communications Policy.

ADB = Asian Development Bank; DWR = Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration; PIU = project implementation unit; MOES = Ministry of Emergency Situations.
Source: Asian Development Bank

B. Key Persons Involved in Implementation

1. Executing Agencies and ADB

Executing Agencies	
Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration	Mr. K. Tashtanaliev Director General 4-A Toktonalieva St. Bishkek 720055 Kyrgyz Republic +996 312 54 90 87
Ministry of Emergency Situations	Mr. A. Mambetov State Secretary 2-1 Toktonalieva St. Bishkek 720055 Kyrgyz Republic

Asian Development Bank	
Agriculture, Natural Resources, and Environment Division	Ms. Donneth Walton Director 6 ADB Ave Mandaluyong City 1550 Philippines +63 2 632 4444
Mission Leader	Mr. Nathan Rive Climate Change Specialist
Resident Mission Contact	Ms. Ainagul Amanova Senior Project Officer Kyrgyz Republic Resident Mission Orion Business Center, 21 Erkindik Prospect, 6th Floor Bishkek 720040 Kyrgyz Republic

2. Project Implementation Unit

11. In line with the project structure in Figure 1, below in Table 4 is the staffing requirements in the PIU. DWR and MOES are responsible for recruiting staff in their respective units; DWR and MOES are jointly responsible for recruiting PIU Director and Compliance Unit staff. Recruitment for PIU positions will follow a transparent and competitive process with ADB's prior review and approval. The roles and tasks of key PIU positions Table 5.

Table 4: Staff Requirement for PIU

PIU Staff		Location	Expected Total Months	# Staff
1	PIU Director	Bishkek	72	1
Compliance Unit				
2	Chief Accountant (Financial Manager)	Bishkek	72	1
3	Financial Specialist (Disbursement Specialist)	Bishkek	72	1
4	Safeguards Specialist	Bishkek	72	1
5	M&E Specialist	Bishkek	36*	1
6	Chief Procurement Specialist	Bishkek	72	1
7	Associate Procurement Specialist	Bishkek	72	1
DWR Unit				
6	Irrigation Specialist (Unit Head)	Bishkek/Osh	72	1
7	Agriculture Specialist	Bishkek/Osh	72	1
MOES Unit				
9	Disaster Risk Management Specialist (Unit Head)	Bishkek	36	1
10	Hydromet Specialist	Bishkek	36	1
Support Staff				
12	Office Manager/Translator	Bishkek/Osh	72	2
13	Driver	Bishkek/Osh	72	2

* Intermittent inputs
Source: DWR and MOES.

Table 5: Roles and Responsibilities of Key PIU Staff

Position	Roles and Responsibilities
PIU Director	(i) Draft annual work programs for each output, based on design and monitoring framework, gender action plan, and agreed implementation plans and terms of reference (TOR) appended to PAM, and submit them to the Project Focal Points and obtaining their agreements; (ii) Consult with the chief accountant to monitor budgetary expenditure, review disbursement requests, prepare the annual budget and submit these the Project Focal Points for agreements; (iii) Ensure the hiring of suitably qualified staff to implement the all outputs in accordance with ADB requirements; (iv) Guide and collaborate with the relevant staff to monitor output implementation in accordance with the agreed work program described in PAM and appendices; (v) Attend, hold or participate in seminars, workshops, media events etc. to represent the project; (vi) Conduct site visits as required to monitor and correct implementation of the project; (vii) Develop and submit recommendations to the Project Focal Points to resolve issues which arise during project implementation; (viii) Support the Project Focal Points in the overall project management and preparation of reports for the Government and its relevant agencies; (ix) Manage all staff directly working on the project, including staff grievance procedures and make recommendations to the Project Focal Points on hiring decisions; (x) Coordinate with relevant key staff to maintain an overview of the day-to-day operations of the project; (xi) Provide operational support to key staff members in the implementation of their responsibilities; (xii) Draft a comprehensive project reporting system, submit it to the Project Focal Points for agreements and implementations; (xiii) Coordinate implementation of project outputs with the relevant project related agencies; (xiv) Draft O&M plans for DWR's and MOES's review and approval;

Position	Roles and Responsibilities
	(xv) Assist the Project Focal Points to coordinate interaction with relevant ministries and agencies, as may be required; (xvi) Liaise with local government administrations participating in the project to ensure successful implementation of project activities; (xvii) Draft project implementation reports and submit to the Project Focal Points for agreements and distributions; (xviii) Ensure Project website is established; (xix) Liaise with ADB staff and supervision missions to ensure successful completion of missions and ongoing project monitoring; and (xx) Implement recommendations of ADB supervision missions and associated aide-memoires, as agreed by the Project Focal Points.
Chief Accountant (Financial Manager)	(i) Responsible for taking care of recording, and monitoring of both ADB and Government funds; (ii) Ensure timely preparation of the annual audited project accounts and management audit report and submission to ADB within 6 months of financial year end; (iii) Ensure that adequate financial controls related to financial management and reporting; (iv) Cooperate with the PIU Director and the Unit Heads to develop a strategy for guiding and supporting purchase operations made by the PIU in regard to project components; (v) Maintain an information on ADB disbursement guidelines, and other resources needed by staff in carrying out disbursements, advance account operation, SOE procedures; (vi) Support procurement specialists to negotiate and prepare standard bidding packages and specifications to evaluate, enter into contracts, oversee delivery, issue invoices, inspect/test procured items, and make payments to suppliers/contractors; (vii) Coordinate with the PIU Director and Unit Heads, to develop and implement payment mechanisms and procedures to support purchases of goods, technical assistance, and construction services; and (viii) Communicate through the PIU Director information and/or documentation to the Government or ADB for their inspection, obtaining comments and/or for commencement of funding.
Financial Specialist (Disbursement Specialist)	(i) Responsible for financing, funds flow arrangements, payments, and monitoring of the advance account; managing procedures for the advance account and Statement of Expenditure (SOE) procedures; (ii) Establish program account(s) to manage and record utilization of project funds; (iii) Prepare withdrawal applications, statements of expenditures, and disbursement requests for replenishment of the impress account in accordance with provisions in ADB Loan Disbursement Handbook; (iv) Maintain payment records of all invoices received; (v) Ensure that payments for all program related expenditures are made in a timely manner; (vi) Ensure that adequate financial controls for fund management and reporting; and (vii) Perform other related functions, duties, and tasks as may be requested by PIU Manager.
Safeguards Specialist	(viii) Conduct review of prospective project works sites for eligibility with regards to environment and social safeguards impact; (ix) Ensure preparation of initial environmental examination (IEE) for additional subprojects and all civil works and ensure that bidding documents include all requirement to implement IEE and its EMP; (x) Ensure that EMP will be updated during detailed design completed; (xi) Ensure that the bidder selected will have adequate resources to implement and update EMP; (xii) Undertake environmental safeguards monitoring activities and prepare environmental safeguard reports to be submitted to ADB; (xiii) Ensure preparation of due diligence report (DDR) and/or land acquisition and resettlement plan (LARP) for additional subprojects and other works; (xiv) Ensure that LARP will be updated during detailed design; (xv) Ensure that bidding documents, capacity building programs, demonstration activities, and any other activities include all requirement to implement LARP and gender action plan; (xvi) Ensure that the bidder selected will have adequate resources to implement and update LARP and gender action plan; (xvii) Undertake social safeguards and gender monitoring activities and prepare social safeguard and gender reports to be submitted to ADB; and (xviii) Ensure that the any works are implemented in accordance with ADB SPS 2009 as well as the government law and regulation related to resettlement.
M&E Specialist	(i) Ensure that an appropriate M&E strategy and plans are developed to assess the achievement of each project output;

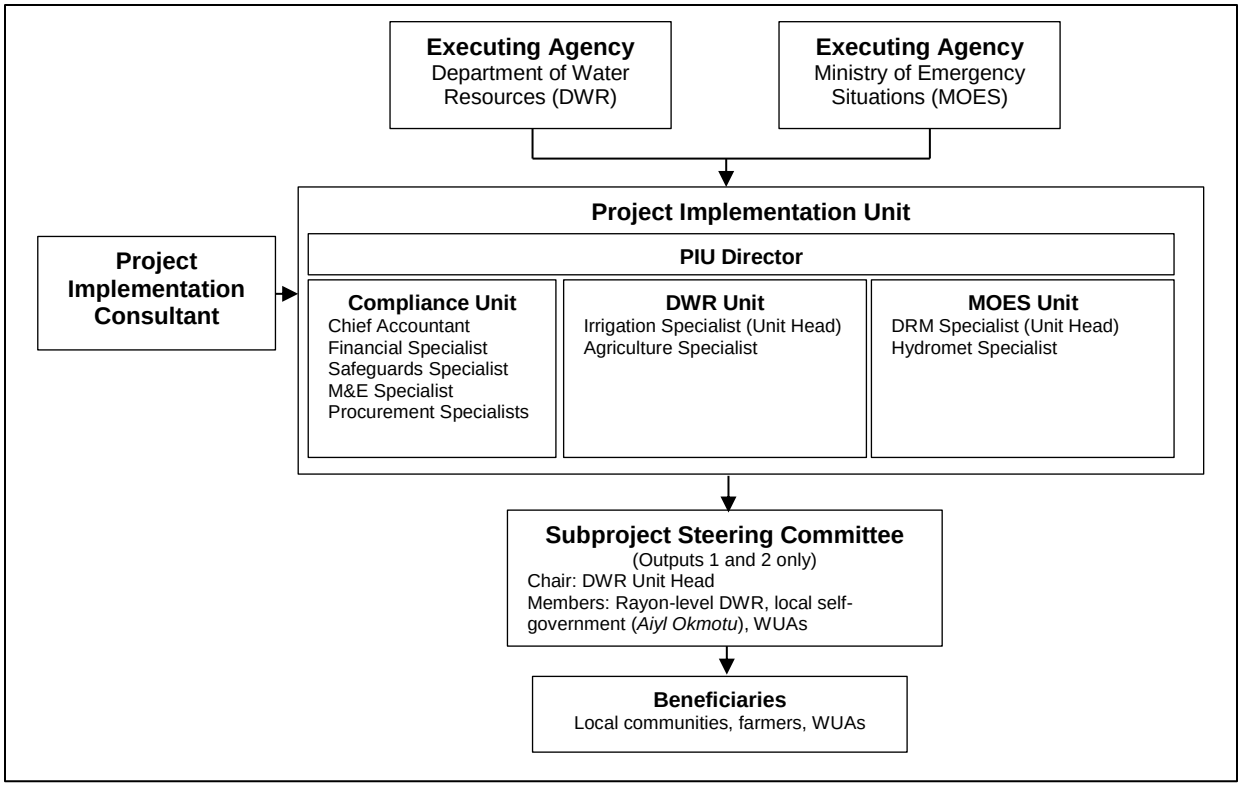
Position	Roles and Responsibilities
	(ii) During initial phase of the implementation of the project, reconfirm and/or update: (a) activities with milestones, performance targets and indicators with baselines, all of which are defined in the Design and Monitoring Framework, (b) requirements indicated in the Summary Poverty Reduction and Social Strategy, and (c) Gender Action Plan; (iii) Ensure to update (a) activities with milestones, performance targets and indicators with baselines, all of which are defined in the Design and Monitoring Framework, (b) requirements indicated in the Summary Poverty Reduction and Social Strategy at the project completion, and (c) Gender Action Plan; (iv) Ensure that baseline, intermediate and end-of project socio-economic surveys and impact assessment in each output of the project are planned and conducted; and (v) Disseminate project progress (e.g., planned and completed project activities including procurement) through Project's website.
Irrigation Specialist (DWR Unit Head)	(i) Serve as the 'Engineer' and 'Coordinator' for all activities including design and construction of all civil works, delivery of goods, services, capacity building, demonstration activities for outputs 1 and 2; (ii) Review and verify deliverables and claims of suppliers of civil works, goods, services, capacity building, and demonstration activities and report/submit to PIU Director; (iii) Ensure coordination and mobilization of key local stakeholders including local government representatives, WUAs, farmers; (iv) Prepare prioritization and selection of additional subprojects in line with agreed criteria for approval by PIU Director; (v) Oversee recruitment, management, and training of community development teams; (vi) Organize and conduct local consultation seminars, workshops, and training sessions; (vii) Oversee all activities for outputs 1 and 2, specifically monitor their implementation in relation to the agreed work plan; (viii) Report any deviations from the work plan to the PIU Director; (ix) Support development and implementation for monitoring and evaluation system for output implementation; (x) Support the PIU director for the execution of the outputs 1 and 2; (xi) Identify any operational problems and raise them with the PIU Director; (xii) Coordinate with district MOA office, WUAs, local governments to resolve any issues in implementing outputs 1 and 2, inform them of the outputs status; (xiii) Organize orientation or training programs to educate project participants; and (xiv) Cooperate with the PIU Director, to draft an annual work plan for the PIU, which will be submitted to the Project Director for approval.
Agriculture Specialist	(i) Support Irrigation Specialist in all planning, management, and implementation of outputs 1 and 2 with a focus on agriculture components including system design, cropping patterns, agricultural management plans, farmer field days, and field trials; (ii) Oversee, develop, and verify capacity building and demonstration activities for agriculture under outputs 1 and 2; (iii) Provide expert agricultural advice to delivery of outputs 1 and 2; (iv) Support recruitment, management, and training of community development teams; (v) Organize and conduct local consultation seminars, workshops, and training sessions; and (vi) Support Irrigation Specialist in monitoring and reporting of output 1 and 2 activities.
Disaster Risk Management Specialist (MOES Unit Head)	(i) Serve as the 'Engineer' and 'Coordinator' for all activities including design and construction of civil works, delivery of goods, services, capacity building, demonstration activities for output 3; (ii) Review and verify deliverables and claims of suppliers of civil works, goods, services, capacity building, and demonstration activities and report/submit to PIU Director; (iii) Coordinate key local stakeholders including local government representatives and stakeholders and beneficiaries of disaster risk reduction public services; (iv) Organize and conduct local consultation seminars, workshops, and training sessions; (v) Oversee all activities for output 3, specifically monitor their implementation in relation to the agreed work plan; (vi) Report any deviations from the work plan to the PIU Director; (vii) Support development and implementation for monitoring and evaluation system for output implementation; (viii) Support the PIU Director or the execution of the output 3; (ix) Identify any operational problems and raise them with the PIU Director; (x) Coordinate with district MOES and KyrgyzHydromet offices, local governments, and other stakeholders to resolve any issues in implementing outputs 3, inform them of the outputs status; (xi) Organize orientation or training programs to educate project participants; and

Position	Roles and Responsibilities
	(xii) Cooperate with the PIU Director, to draft an annual work plan for the PIU, which will be submitted to the Project Director for approval.
Hydromet Specialist	(i) Support Disaster Risk Management Specialist in all planning, management, and implementation of output 3 with a focus on hydromet components; (ii) Oversee, develop, and verify capacity building activities for hydromet components under output 3; (iii) Ensure appropriate selection of sites for hydrological monitoring stations with agreed criteria, including safeguards criteria; (iv) Provide expert advice to delivery of outputs 3; (v) Organize and conduct local consultation seminars, workshops, and training sessions; and (vi) Support Disaster Risk Management Specialist in monitoring and reporting of output 3 activities.
Procurement Specialists	(i) Develop an Operational Manual covering the procurement policies, procedures and standard documents to minimize cost and ensure a scheduled carrying out of procurement activities in line with the requirements of the Government and ADB; (ii) Maintain an information database on procurements of technical services, suppliers of equipment, ADB procurement guidelines, standard and model bidding documents, and other resources needed by staff in carrying out project components; (iii) Negotiate and prepare standard bidding packages and specifications to evaluate, enter into contracts, oversee delivery, issue invoices, inspect/test procured items, and make payments to suppliers/contractors; (iv) Establish a monitoring system for overseeing project procurement actions, coordinating necessary approvals or correcting shortcomings in procedures, and monitoring and managing progress and deliverables of approved contracts; and (v) Communicate through the PIU Director information and/or documentation to the Government or ADB for their inspection, obtaining comments and/or for commencement of funding.

Source: Asian Development Bank.

C. Project Organization Structure

Figure 1: Project Organization Structure



Source: Asian Development Bank.

IV. COSTS AND FINANCING

12. The project is estimated to cost $43.6 million. The government has requested (i) concessional loan of $21.8 million from ADB's ordinary capital resources to help finance the project; and (ii) a grant not exceeding $16.8 million from ADB's Special Funds resources (Asian Development Fund) to help finance the project.[6] Key expenditure items financed by ADB under the project are: civil works, goods, consulting services, income tax of local PIU staff and local consultants and other non-identifiable taxes, and land acquisition and resettlement costs. The government contribution is estimated at $5.0 million cash contributions for taxes and duties on civil works, goods, and services, and income tax of international consultants. ADB will explore collaborative parallel co-financing with UNDP project totaling approximately $28 million.

A. Cost Estimates Preparation and Revisions

13. Cost estimates were prepared by the consultant financed under the project preparation transactional technical assistance.[7] Cost estimates will be revised by the PIU with support of project implementation consultant during feasibility study and/or preparation of bidding documents.

B. Key Assumptions

14. The following key assumptions underpin the cost estimates and financing plan:

(i) Exchange rate: 68.25 som = $1.00 (July 2018 average).

(ii) Price contingencies based on expected cumulative inflation over the implementation period are as follows:

Table 6: Escalation Rates for Price Contingency Calculation

Item	2019	2020	2021	2022	2023	2024	2025	Average
Foreign rate of price inflation	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Domestic rate of price inflation	4.5%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	4.9%

Source: Asian Development Bank.

[6] The ADB finance includes $10 million grant and $10 million loan from the Asian Development Fund disaster risk reduction financing mechanism. The ADB financing will be disbursed on a pro-rata basis.

[7] ADB. 2017. *Preparing the Climate Resilience and Disaster Risk Reduction in Water Resources Management Project*. Manila. (TA 9390-KGZ).

C. Detailed Cost Estimates by Expenditure Category

Table 7: Estimated Foreign and Local Costs by Expenditure Category
($ thousand)

	Foreign Currency	Local Currency	Total
A. Investment Cost			
1. Civil Works			
a. Main canal and ancillary	3,360	9,308	12,668
b. Lower-level canal and ancillary	1,200	3,324	4,524
c. Hydrological monitoring stations	480	1,330	1,810
2. Equipment	10,440	2,680	13,120
3. Study, survey & design	100	466	566
4. Training and workshops			
a. Community mobilization[a]	0	566	566
b. Seminars and workshops	6	62	68
c. Demonstration activities[b]	50	516	566
5. Consulting services	1,960	1,156	3,117
6. Land acquisition and resettlement	8	4	11
Subtotal	17,604	19,410	37,014
B. Recurrent Cost			
1. PIU salaries	0	888	888
2. Operation and maintenance	39	404	443
3. PIU office equipment/vehicles and audit	45	462	507
Subtotal	84	1,754	1,838
Total Base Cost	17,688	21,164	38,852
C. Contingencies			
1. Physical	864	1,034	1,898
2. Price	911	1,090	2,000
Subtotal	1,775	2,124	3,899
D. Finance Charges During Implementation			
1. Interest	849	0	849
2. Commitment	0	0	0
Subtotal	849	0	849
Total Project Cost (A+B+C+D)	20,312	23,288	43,600

[a] Comprises remuneration, travel and subsistence costs, and training activities of community development teams.
[b] Comprises comparative field trials and farmer field days capacity-building and other demonstration activities.
[c] Includes estimated audit fees of $120,000 for the audit of the annual project financial statements for the period 2019–2025 to be financed from ADB resources.
Source: Asian Development Bank.

D. Allocation and Withdrawal of Loan and Grant Proceeds

Table 8: Allocation and Withdrawal of Grant Proceeds

Category			Percentage and Basis for Withdrawal from the Grant Account
Number	**Item**	**Amount Allocated ($)**	
1	PIU operational expenditures, vehicles, and audit services; land acquisition and resettlement	1,442,803	100.00% of total expenditure claimed.*
2	Consulting services for project implementation; study, survey and design; seminars and workshops; community mobilization	4,062,478	100.00% of total expenditure claimed.*
3	DWR - Civil works (on-farm canal and ancillary) and demonstration activities	4,986,934	100.00% of total expenditure claimed.*
4	DWR - Civil works (off-farm canal and ancillary); equipment and machinery; O&M; services	3,128,516	23.14% of total expenditure claimed.*
5	MOES - Civil works; equipment and machinery; O&M; services	3,179,269	23.14% of total expenditure claimed.*
	Total	16,800,000	

***** Exclusive of taxes and duties imposed within the territory of the Recipient.
Source: Asian Development Bank.

Table 9: Allocation and Withdrawal of Loan Proceeds

Category			Percentage and Basis for Withdrawal from the Loan Account
Number	**Item**	**Amount Allocated ($)**	
1	DWR - Civil works (off-farm canal and ancillary); equipment and machinery; O&M; services	10,390,973	76.86% of total expenditure claimed.*
2	MOES - Civil works; equipment and machinery; O&M; services	10,559,541	76.86% of total expenditure claimed.*
3	Interest during implementation	849,486	100.00% of amounts due.
	Total	21,800,000	

***** Exclusive of taxes and duties imposed within the territory of the Borrower.
Source: Asian Development Bank.

E. Detailed Cost Estimates by Financier

Table 10: Detailed Cost Estimates by Financier ($ thousand)

	ADB Loan		ADF Grant		Government		Total
	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	
A. Investment Cost							
1. Civil Works							
a. Main canal and ancillary	8,608	68%	2,592	20%	1,468	12%	12,668
b. Lower-level canal and ancillary	0	0%	4,000	88%	524	12%	4,524
c. Hydrological monitoring stations	1,230	68%	370	20%	210	12%	1,810
2. Equipment	8,916	68%	2,684	20%	1,520	12%	13,120
3. Study, Survey & Design	0	0%	500	88%	66	12%	566
4. Training and workshops							
a. Community mobilization	0	0%	500	88%	66	12%	566
b. Seminars and workshops	0	0%	60	88%	8	12%	68
c. Demonstration activities	0	0%	500	88%	66	12%	566
5. Consulting services	0	0%	2,614	84%	503	16%	3,117
6. Land acquisition and resettlement	0	0%	10	88%	1	12%	11
Subtotal	18,754	51%	13,830	37%	4,430	12%	37,014
B. Recurrent Cost							
1. PIU salaries	0	0%	888	100%	0	0%	888
2. Operation and maintenance	301	68%	91	20%	51	12%	443
3. PIU office equipment/vehicles and audit	0	0%	448	88%	59	12%	507
Subtotal	301	16%	1,427	78%	110	6%	1,838
Total Base Cost	19,055	49%	15,257	39%	4,540	12%	38,852
C. Contingencies							
1. Physical	953	50%	718	38%	227	12%	1,898
2. Price	943	47%	825	41%	233	12%	2,000
Subtotal	1,896	49%	1,543	40%	460	12%	3,899
D. Finance Charges During Implementation							
1. Interest	849	100%	0	0%	0	0%	849
2. Commitment	0		0		0		0
Subtotal	849	100%	0	0%	0	0%	849
Total Project Cost (A+B+C+D)	21,800	50%	16,800	39%	5,000	11%	43,600

Source: Asian Development Bank.

Table 11: Detailed Cost Estimates by Financier and Taxes and Duties ($ thousand)

	ADB Loan	ADF Grant	Government	Total	Taxes and Duties
A. Investment Cost					
1. Civil Works					
a. Main canal and ancillary	8,608	2,592	1,468	12,665	1,468
b. Lower-level canal and ancillary	0	4,000	524	4,523	524
c. Hydrological monitoring stations	1,230	370	210	1,809	210
2. Equipment	8,916	2,684	1,520	13,230	1,520
3. Study, Survey & Design	0	500	66	565	66
4. Training and workshops					
a. Community mobilization	0	500	66	565	66
b. Seminars and workshops	0	60	8	68	8
c. Demonstration activities	0	500	66	565	66
5. Consulting services	0	2,614	503	3,116	503
6. Land acquisition and resettlement	0	10	1	11	1
Subtotal	18,754	13,830	4,430	37,119	4,430
B. Recurrent Cost					
1. PIU salaries	0	888	0	888	0
2. Operation and maintenance	301	91	51	519	51
3. PIU office equipment/vehicles and audit	0	448	59	394	59
Subtotal	301	1,427	110	1,800	110
Total Base Cost	19,055	15,257	4,540	38,919	4,540
C. Contingencies					
1. Physical	953	718	227	1,902	227
2. Price	943	825	233	2,002	233
Subtotal	1,896	1,543	460	3,904	460
D. Finance Charges During Implementation					
1. Interest	849	0	0	777	0
2. Commitment	0	0	0	0	0
Subtotal	849	0	0	777	0
Total Project Cost (A+B+C+D)	21,800	16,800	5,000	43,600	5,000

Source: Asian Development Bank.

Table 12: Detailed Cost Estimates by Output and Financier with Contingencies ($ thousand)

	Allocation Table Categories[a]	Output 1		Output 2		Output 3		Total	
		ADF Grant	ADB Loan	ADF Grant	ADB Loan	ADF Grant	ADB Loan	ADF Grant	ADB Loan
A. Investment Cost with Contingency									
1. Civil Works									
a. Main canal and ancillary	G-4, L-1	2,878	9,558	0	0	0	0	2,878	9,558
b. Lower-level canal and ancillary	G-3	4,424	0	0	0	0	0	4,424	0
c. Hydrological monitoring stations	G-5, L-2	0	0	0	0	409	1,357	409	1,357
2. Equipment	Output 1: G-4, L-1 Output 3: G-5, L-2	202	670	0	0	2,722	9,039	2,923	9,710
3. Study, Survey & Design	G-2	491	0	0	0	50	0	541	0
4. Training and workshops									
a. Community mobilization	G-2	278	0	278	0	0	0	557	0
b. Seminars and workshops	G-2	33	0	33	0	0	0	67	0
c. Demonstration activities	G-3	0	0	563	0	0	0	563	0
5. Consulting services	G-2	1,316	0	1,015	0	567	0	2,898	0
6. Land acquisition and resettlement	G-1	10	0	0	0	1	0	11	0
Subtotal		9,633	10,228	1,889	0	3,748	10,397	15,270	20,625
B. Recurrent Cost with Contingency									
1. PIU salaries	G-1	316	0	316	0	316	0	948	0
2. Operation and maintenance	Output 1: G-4, L-1 Output 3: G-5, L-2	49	163	0	0	49	163	98	326
3. PIU office equipment/vehicles and audit	G-1	161	0	161	0	161	0	483	0
Subtotal		526	163	477	0	526	163	1,530	326
Total Base Cost with Contingency		10,159	10,391	2,367	0	4,274	10,560	16,800	20,951
C. Finance Charges During Implementation									
1. Interest	L-3	0	374	0	0	0	475	0	849
2. Commitment		0	0	0	0	0	0	0	0
Subtotal		0	374	0	0	0	475	0	849
Total Project Cost (A+B+C)		10,159	10,765	2,367	0	4,274	11,035	16,800	21,800

[a] See Table 8 and Table 9. G-X = grant allocation table item; L-X = loan allocation table item.
Source: Asian Development Bank.

F. Detailed Cost Estimates by Outputs and/or Components

Table 13: Detailed Cost Estimates by Output ($ thousand)

	Output 1		Output 2		Output 3		Total
	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	
A. Investment Cost							
1. Civil Works							
a. Main canal and ancillary	12,668	100%	0	0%	0	0%	12,668
b. Lower-level canal and ancillary	4,524	100%	0	0%	0	0%	4,524
c. Hydrological monitoring stations	0	0%	0	0%	1,810	100%	1,810
2. Equipment	905	7%	0	0%	12,215	93%	13,120
3. Study, Survey & Design	513	91%	0	0%	52	9%	566
4. Training & Workshops							
a. Community mobilization	283	50%	283	50%	0	0%	566
b. Seminars and workshops	34	50%	34	50%	0	0%	68
c. Demonstration activities	0	0%	566	100%	0	0%	566
5. Consulting services	1,416	45%	1,098	35%	602	19%	3,117
6. Land acquisition and resettlement	10	90%	0	0%	1	10%	11
Subtotal	20,353	55%	1,980	5%	14,680	40%	37,014
B. Recurrent Cost							
1. PIU salaries	296	33%	296	33%	296	33%	888
2. Operation and maintenance	222	50%	0	0%	222	50%	443
3. PIU office equipment/vehicles and audit	169	33%	169	33%	169	33%	507
Subtotal	687	37%	465	25%	687	37%	1,838
Total Base Cost	21,040	54%	2,445	6%	15,367	40%	38,852
C. Contingencies							
1. Physical	1,037	55%	107	6%	754	40%	1,898
2. Price	1,206	60%	151	8%	643	32%	2,000
Subtotal	2,243	58%	259	7%	1,396	36%	3,899
D. Finance Charges During Implementation							
1. Interest	374	44%	0	0%	475	56%	849
2. Commitment	0		0		0		0
Subtotal	374	44%	0	0%	475	56%	849
Total Project Cost (A+B+C+D)	23,657	54%	2,704	6%	17,239	40%	43,600

Source: Asian Development Bank.

G. Detailed Cost Estimates by Year

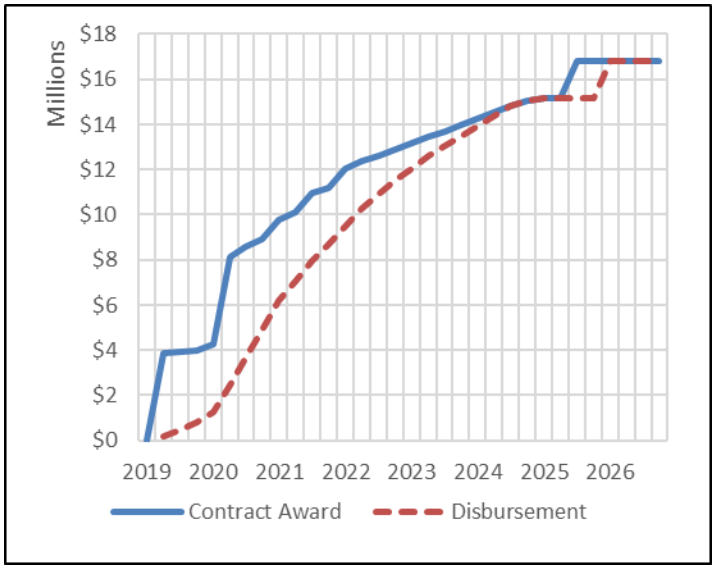
Table 14: Detailed Cost Estimates by Year ($ thousand)

	Total	2019	2020	2021	2022	2023	2024	2025
A. Investment Cost								
1. Civil Works								
a. Main canal and ancillary	12,668	0	2,969	4,618	5,080	0	0	0
b. Lower-level canal and ancillary	4,524	0	1,380	2,096	1,048	0	0	0
c. Hydrological monitoring stations	1,810	0	724	724	362	0	0	0
2. Equipment	13,120	2,771	8,720	1,312	317	0	0	0
3. Study, Survey & Design	566	283	283	0	0	0	0	0
4. Training & Workshops								
a. Community mobilization	566	102	102	102	102	102	57	0
b. Seminars and workshops	68	12	12	12	12	12	7	0
c. Demonstration activities	566	0	113	113	113	113	113	0
5. Consulting services	3,117	699	600	600	502	502	213	0
6. Land acquisition and resettlement	11	0	3	3	3	3	0	0
Subtotal	37,014	3,867	14,906	9,581	7,539	732	389	0
B. Recurrent Cost								
1. PIU salaries	888	111	148	148	148	148	148	37
2. Operation and maintenance	443	222	222	0	0	0	0	0
3. PIU office equipment/vehicles and audit	507	459	9	9	9	9	9	2
Subtotal	1,838	792	379	157	157	157	157	39
Total Base Cost	38,852	4,659	15,285	9,738	7,696	889	546	39
C. Contingencies								
1. Physical	1,898	227	757	479	377	37	20	0
2. Price	2,000	110	609	557	577	82	60	5
Subtotal	3,899	338	1,366	1,037	954	119	80	5
D. Finance Charges During Implementation								
1. Interest	849	0	38	127	170	187	188	141
2. Commitment	0	0	0	0	0	0	0	0
Subtotal	849	0	38	127	170	187	188	141
Total Project Cost (A+B+C+D)	43,600	4,997	16,688	10,902	8,820	1,195	814	185

Source: Asian Development Bank.

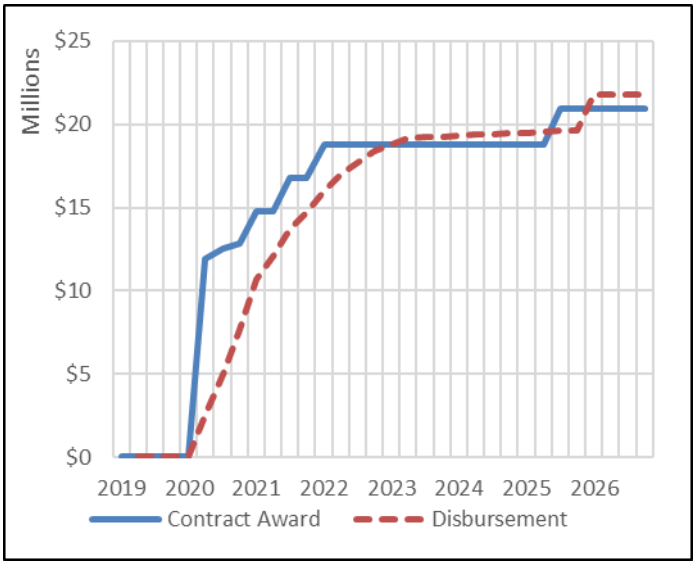
H. Contract and Disbursement S-Curve

Figure 2: Contract Award and Disbursement S-Curve (ADF Grant)



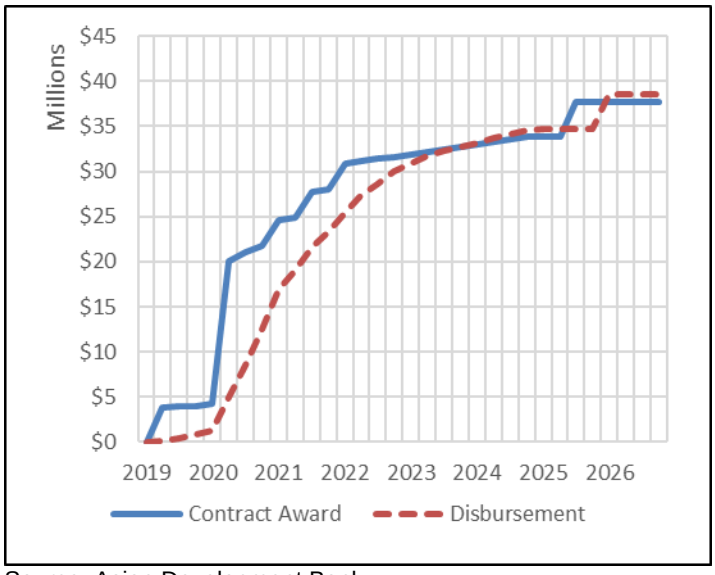
Source: Asian Development Bank.

Figure 3: Contract Award and Disbursement S-Curve (Loan)



Source: Asian Development Bank.

Figure 4: Contract Award and Disbursement S-Curve (Loan and ADF Grant)



Source: Asian Development Bank.

Table 15: Quarterly Contract Award and Disbursements (ADF Grant)

Projections for Contract Award
($ million)

Year	Q1	Q2	Q3	Q4	Total
2019	0.00	3.87	0.06	0.06	3.99
2020	0.26	3.89	0.45	0.35	4.95
2021	0.85	0.30	0.85	0.26	2.27
2022	0.85	0.30	0.26	0.26	1.68
2023	0.26	0.30	0.26	0.26	1.08
2024	0.26	0.30	0.26	0.26	1.08
2025	0.10	0.00	1.64	0.00	1.74
2026	0.00	0.00	0.00	0.00	0.00
Total					16.80

Projections for Disbursement
($ million)

Year	Q1	Q2	Q3	Q4	Total
2019	0.00	0.20	0.29	0.33	0.82
2020	0.43	1.21	1.17	1.24	4.05
2021	1.34	0.86	0.92	0.71	3.83
2022	0.81	0.76	0.63	0.63	2.83
2023	0.53	0.57	0.43	0.43	1.95
2024	0.43	0.47	0.43	0.26	1.58
2025	0.10	0.00	0.00	0.00	0.10
2026	1.64	0.00	0.00	0.00	1.64
Total					16.80

Source: Asian Development Bank.

Table 16: Quarterly Contract Award and Disbursements (Loan)

Projections for Contract Award
($ million)

Year	Q1	Q2	Q3	Q4	Total
2019	0.00	0.00	0.00	0.00	0.00
2020	0.00	11.91	0.61	0.31	12.84
2021	1.97	0.00	1.97	0.00	3.95
2022	1.97	0.00	0.00	0.00	1.97
2023	0.00	0.00	0.00	0.00	0.00
2024	0.00	0.00	0.00	0.00	0.00
2025	0.00	0.00	2.20	0.00	2.20
2026	0.00	0.00	0.00	0.00	0.00
Total					20.95

Projections for Disbursement
($ million)

Year	Q1	Q2	Q3	Q4	Total
2019	0.00	0.00	0.00	0.00	0.00
2020	0.00	2.47	2.48	2.72	7.67
2021	3.05	1.33	1.66	0.98	7.02
2022	1.31	1.03	0.70	0.70	3.75
2023	0.37	0.38	0.05	0.05	0.84
2024	0.05	0.05	0.05	0.05	0.19
2025	0.05	0.05	0.05	0.00	0.14
2026	2.20	0.00	0.00	0.00	2.20
Total					21.80

Source: Asian Development Bank.

Table 17: Quarterly Contract Award and Disbursements (Loan and ADF Grant)

Projections for Contract Award
($ million)

Year	Q1	Q2	Q3	Q4	Total
2019	0.00	3.87	0.06	0.06	3.99
2020	0.26	15.80	1.06	0.66	17.78
2021	2.83	0.30	2.83	0.26	6.22
2022	2.83	0.30	0.26	0.26	3.65
2023	0.26	0.30	0.26	0.26	1.08
2024	0.26	0.30	0.26	0.26	1.08
2025	0.10	0.00	3.84	0.00	3.94
2026	0.00	0.00	0.00	0.00	0.00
Total					37.75

Projections for Disbursement
($ million)

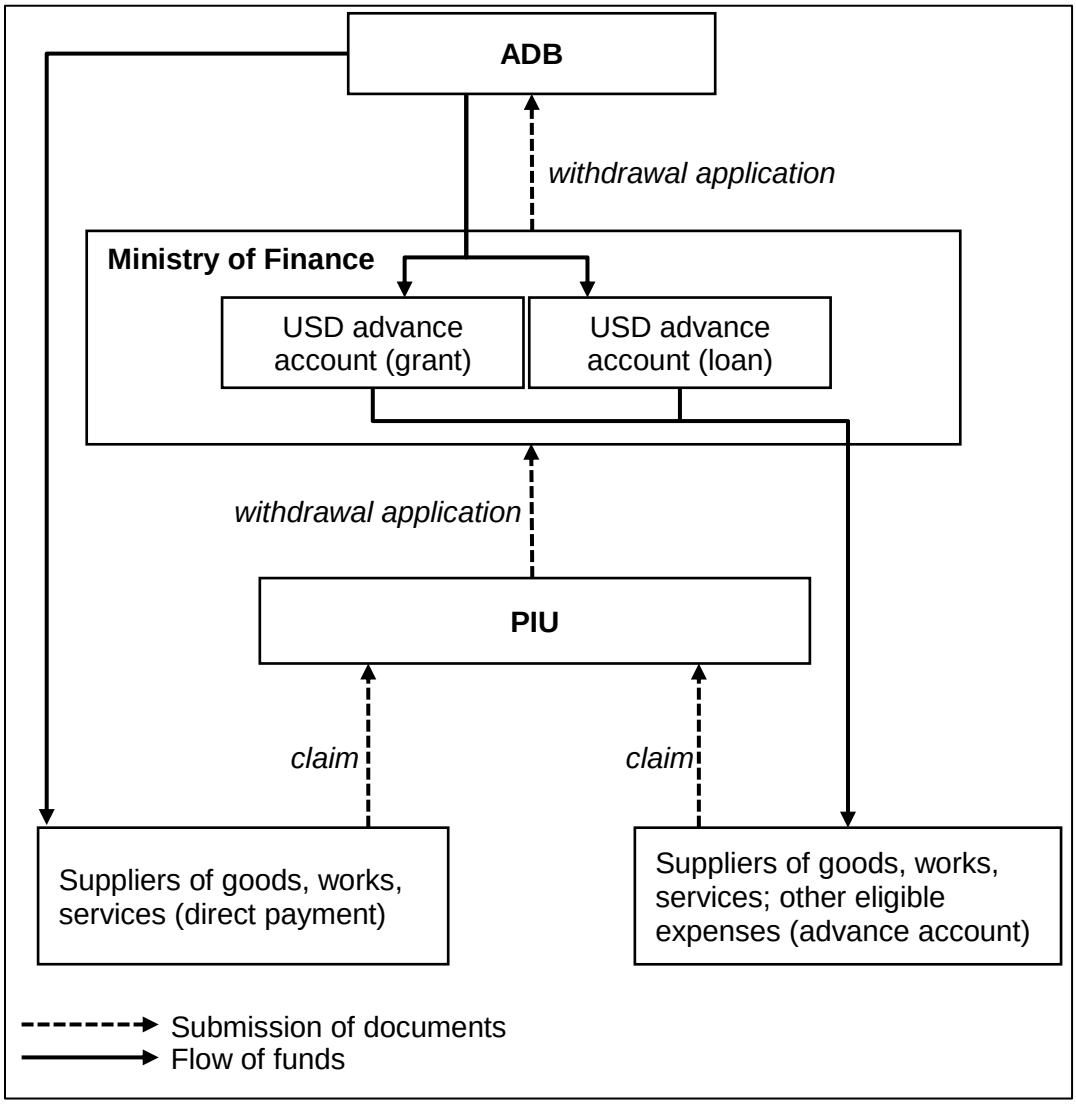
Year	Q1	Q2	Q3	Q4	Total
2019	0.00	0.20	0.29	0.33	0.82
2020	0.43	3.68	3.65	3.96	11.71
2021	4.39	2.18	2.58	1.69	10.85
2022	2.13	1.79	1.33	1.33	6.57
2023	0.90	0.94	0.47	0.47	2.79
2024	0.47	0.51	0.47	0.31	1.77
2025	0.15	0.05	0.05	0.00	0.24
2026	3.84	0.00	0.00	0.00	3.84
Total					38.60

Source: Asian Development Bank.

I. Fund Flow Diagram

15. The fund flow diagram in Figure 5 below shows how the funds will flow from ADB to implement project activities, and how documents for requests for disbursement will flow to ADB.

Figure 5: Fund Flow Diagram



V. FINANCIAL MANAGEMENT

A. Financial Management Assessment

16. The financial management assessment (FMA) was conducted in July and August 2018 in accordance with ADB's Guidelines for the Financial Management and Analysis of Projects and the Financial Due Diligence: A Methodology Note. The FMA considered the capacity of the DWR of MOA and MOES, including funds-flow arrangements, staffing, accounting and financial reporting systems, financial information systems, and internal and external auditing arrangements. It is concluded that the overall pre-mitigation financial management risk of executing agencies is substantial. The Financial Management Internal Control and Risk Management Assessment is found in Table 2 of the Financial Management Assessment linked document. The borrower and executing agencies have agreed to implement an action plan as key measures to address the deficiencies. The financial management action plan is provided in Table 18. Taking in to considerations the pre-mitigation risk and the financial management action plan for risk mitigation, it is concluded that the capacity and suitability of DWR and MOES is

adequate to utilize the advance fund and statement of expenditure procedures with the proposed ceilings described below, accompanied by the use of direct payment and reimbursement procedures.

Table 18: Financial Management Action Plan

Risks	Description	Rating	Actions	Responsibility	Timing
Staffing Risk	Few professional accountants and staff who are trained in finance and accounting; limited opportunity for training.	S	Additional support staff in PIU to be recruited based upon workload. As needed, project implementation consultants will also be recruited under the project to support PIU staff in the conduct of financial management.	DWR, MOES	Key PIU staff recruited within 15 days of loan and grant effectiveness. Implementation consultant mobilized within 30 days of loan and grant effectiveness.
Internal audit arrangements.	Internal audit is at very early stages with emphasis on investigation but without reviews of systems and processes.	S	Management audit function to be outsourced to a firm of chartered accountants for effective internal audit of PIU. ADB to provide training to Ministry of Agriculture (DWR) and MOES internal audit staff to support long-term capacity.	DWR, MOES, ADB	Management audit function: first two years of project, with possible extension by ADB. Internal audit training to be held in 2019.
Financial and operational risk	Project financial management policies and procedures/financial covenants of the legal agreement are not fully followed.	S	PIU staff will be recruited early and trained to understand ADB's requirements including disbursement, financial reporting and audit requirements. Project implementation consultant and	ADB, DWR and MOES	Key PIU staff recruited within 15 days of loan and grant effectiveness. Implementation consultant mobilized within 30 days of loan and grant effectiveness. Training conducted within 1 month of

Risks	Description	Rating	Actions	Responsibility	Timing
			ADB will provide financial management training to clarify ADB's requirements on disbursement, financial reporting and audit requirements.		implementation consultant mobilization, and ongoing during implementation.
Compliance risk	Project financial management policies and procedures/financial covenants of the legal agreement are not fully followed.	S	Financial Policies and Procedures Manual to be established (if not yet available) to enhance internal controls and used for project financial management requirements. This document to be issued for use in all PIUs. The implementation consultant will monitor internal controls on a periodic basis.	DWR, MOES	Within 1 months of loan and grant effectiveness.
Delay in financial reporting	Financial reports are not prepared properly and timely.	M	PIU will have a separate management information system (MIS) on off-the-shelf accounting software	DWR	Within 1 months of loan and grant effectiveness.
Incomplete and inaccurate financial reporting	Financial reports are not prepared properly and timely.	M	To use computerized accounting and asset management system or acquire a separate MIS on off-the-shelf accounting	DWR	Financial management system, including software installation, established within 1 month of effectiveness.

Risks	Description	Rating	Actions	Responsibility	Timing
			software for the project uses		
Financial management of WUAs and WUA sub-groups.	Financial management may be inadequate for optimal and sustainable O&M.	M	To be eligible for grant finance, WUAs and WUA sub-groups will undergo training on accounting and irrigation service fee calculation and collection.	DWR	Training to be undertaken within 30 days of mobilization phase of each subproject.
Budget execution risk	Possible delay in budget appropriation and actual expenditure deviating from budget estimates.	M	To monitor the expenditures against budget on a monthly basis. Any deviations from approved budget require justification and approval within 15 days.	DWR, MOES	Monthly basis during project implementation.

H = high, S = substantial; M = moderate

B. Disbursement

1. Disbursement Arrangements for ADB Funds

17. The concessional loan and ADF grant proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2017, as amended from time to time)[8], and detailed arrangements agreed upon between the government and ADB. Online training for project staff on disbursement policies and procedures is available.[9] Project staff are encouraged to avail of this training to help ensure efficient disbursement and fiduciary control.

18. The PIU will be responsible for (i) preparing disbursement projections, (ii) requesting budgetary allocations for counterpart funds from MOF, (iii) collecting and retaining supporting documents, and (v) preparing and sending withdrawal applications to ADB.

19. **Advance fund procedure**. The MOF will establish a separate advance account for each the ADB loan and grant funds at a commercial bank. The currency of the advance accounts is US dollar. The advance account is to be used exclusively for ADB's share of eligible expenditures. The DWR and MOES are accountable and responsible for proper use of advances to the advance account.

20. The total outstanding advance to the advance account should not exceed the estimate of

[8] The handbook is available electronically from the ADB website (http://www.adb.org/documents/loan-disbursement-handbook)
[9] Disbursement eLearning. http://wpqr4.adb.org/disbursement_elearning

ADB's share of expenditures to be paid through the advance account for the forthcoming 6 months. The PIU may request for initial and additional advances to the advance accounts based on an Estimate of Expenditure Sheet[10] setting out the estimated expenditures to be financed through the accounts for the forthcoming 6 months. Supporting documents should be submitted to ADB or retained by the borrower in accordance with ADB's *Loan Disbursement Handbook* (2017, as amended from time to time) when liquidating or replenishing the advance account.

21. **Statement of expenditure procedure**.[11] The SOE procedure may be used for reimbursement of eligible expenditures or liquidation of advances to the advance accounts. The ceiling of the SOE procedure is the equivalent of $100,000 per individual payment. Supporting documents and records for the expenditures claimed under the SOE should be maintained and made readily available for review by ADB's disbursement and review missions, upon ADB's request for submission of supporting documents on a sampling basis, and for independent audit. Reimbursement and liquidation of individual payments in excess of the SOE ceiling should be supported by full documentation when submitting the withdrawal application to ADB.

22. Before the submission of the first withdrawal application (WA), MOF should submit to ADB sufficient evidence of the authority of the person(s) who will sign the withdrawal applications on behalf of the government, together with the authenticated specimen signatures of each authorized person. The minimum value per WA is stipulated in the *Loan Disbursement Handbook* (2017, as amended from time to time). Individual payments below such amount should be paid (i) by the executing agencies and subsequently claimed to ADB through reimbursement, or (ii) through the advance fund procedure, unless otherwise accepted by ADB. The borrower should ensure sufficient category and contract balances before requesting disbursements. The use of ADB's Client Portal for Disbursements (CPD)[12] system is encouraged for submission of withdrawal applications to ADB.

23. **Direct Payment.** Generally, for payments exceeding $100,000 (e.g. large payments, consultant's fees, procurement of goods). ADB may make payments, at the project implementing unit's request, directly to a third party (e.g., supplier, contractor, and consultant) for eligible expenditures.

2. Disbursement Arrangements for Counterpart Fund

24. The government will provide counterparts funds for the project to finance taxes and duties on civil works, goods, and services and income tax on international consultants under the project, estimated at $5.0 million equivalent. MOF will open a separate bank account for use only for the government's counterpart funding of eligible expenditures under the project. The currency of the counterpart fund bank account is KGS.

25. The PIU will be responsible for (i) projecting duties and taxes to be financed by the governments in the forthcoming 12 months, and (ii) requesting on a monthly basis budgetary allocation for the government counterpart funds. The DWR and MOES will be accountable and responsible for proper use of counterpart funds.

---

[10] Estimate of Expenditure sheet is available in Appendix 8A of ADB's *Loan Disbursement Handbook* (2017, as amended from time to time),

[11] SOE forms are available in Appendix 7B and 7D of ADB's *Loan Disbursement Handbook* (2017, as amended from time to time).

[12] The CPD facilitates online submission of WA to ADB, resulting in faster disbursement. The forms to be completed by the Borrower are available online at https://www.adb.org/documents/client-portal-disbursements-guide.

C. Accounting

26. The DWR and MOES through the PIU will maintain, or cause to be maintained, separate books and records by funding source for all expenditures incurred on the project following International Public-Sector Accounting Standard for cash-based accounting. The DWR and MOES through the PIU will prepare consolidated project financial statements in accordance with the government's accounting laws and regulations which are consistent with international accounting principles and practices. The PIU will purchase and install commercial accounting software for use under the project.

D. Auditing and Public Disclosure

27. **External Audit.** The DWR and MOES through the PIU will cause the detailed consolidated project financial statements to be audited in accordance with International Standards on Auditing by an independent auditor acceptable to ADB. The DWR and MOES through the PIU will submit the audited project financial statements together with the auditor's opinion will be presented in the English language to ADB within 6 months from the end of the fiscal year.

28. The audit report for the project financial statements will include a management letter and auditor's opinions, which cover (i) whether the project financial statements present an accurate and fair view or are presented fairly, in all material respects, in accordance with the applicable financial reporting standards; (ii) whether the proceeds of the loan and grant were used only for the purpose(s) of the project; and (iii) whether the borrower or executing agency was in compliance with the financial covenants contained in the legal agreements (where applicable).

29. Compliance with financial reporting and auditing requirements will be monitored by review missions and during normal program supervision, and followed up regularly with all concerned, including the external auditor.

30. The government and the executing agencies have been made aware of ADB's approach to delayed submission, and the requirements for satisfactory and acceptable quality of the audited project financial statements.[13] ADB reserves the right to require a change in the auditor (in a manner consistent with the constitution of the borrower), or for additional support to be provided to the auditor, if the audits required are not conducted in a manner satisfactory to ADB, or if the audits are substantially delayed. ADB reserves the right to verify the project's financial accounts to confirm that the share of ADB's financing is used in accordance with ADB's policies and procedures.

[13] ADB's approach and procedures regarding delayed submission of audited project financial statements:
(i) When audited project financial statements are not received by the due date, ADB will write to the executing agency advising that (a) the audit documents are overdue; and (b) if they are not received within the next 6 months, requests for new contract awards and disbursement such as new replenishment of advance accounts, processing of new reimbursement, and issuance of new commitment letters will not be processed; (ii) When audited project financial statements are not received within 6 months after the due date, ADB will withhold processing of requests for new contract awards and disbursement such as new replenishment of advance accounts, processing of new reimbursement, and issuance of new commitment letters. ADB will (a) inform the executing agency of ADB's actions; and (b) advise that the loan may be suspended if the audit documents are not received within the next 6 months; and (iii) When audited project financial statements are not received within 12 months after the due date, ADB may suspend the loan and grant.

31. Public disclosure of the audited project financial statements, including the auditor's opinion on the project financial statements, will be guided by ADB's Public Communications Policy 2011.[14] After the review, ADB will disclose the audited project financial statements and the opinion of the auditors on the project financial statements no later than 14 days of ADB's confirmation of their acceptability by posting them on ADB's website. The management letter, additional auditor's opinions, and audited entity financial statements will not be disclosed.[15]

32. **PIU Management Audit.** For the first two fiscal years of project implementation, the DWR and MOES through the PIU will cause an annual PIU management audit report to be presented in the English language to ADB within 6 months from the end of the fiscal years. The report will be prepared by an independent auditor acceptable to ADB, and cover (but not be limited to) the PIU procurement processes, payment processes and systems (including bank reconciliation), and fixed asset management. The auditor producing the PIU management audit must not be the same as that auditing the project financial statements. ADB, at its own discretion, may extend the requirement for the PIU management audit report beyond the first two years of project implementation. Within 30 days of effectiveness, the Borrower, through DWR and MOES, shall engage an independent auditor, whose qualifications, experience and terms of reference are acceptable to ADB, to conduct the annual management audits on the PIU and its operations

VI. PROCUREMENT AND CONSULTING SERVICES

A. Advance Contracting and Retroactive Financing

33. All advance contracting and retroactive financing will be undertaken in conformity with ADB Procurement Policy (2017, as amended from time to time). The issuance of invitations to bid under advance contracting and retroactive financing will be subject to ADB approval. The borrower and executing agencies have been advised that approval of advance contracting and retroactive financing does not commit ADB to finance the project.

34. **Advance contracting.** No advance contracting is currently anticipated, but subject to sufficient progress of advance action, advanced contracting may be used for PIU staff and consultant recruitment.

40. **Retroactive financing.** Retroactive financing will not be used under the project.

B. Procurement of Goods, Works, and Consulting Services

35. All procurement of goods, works, consulting services, and non-consulting services will be undertaken in accordance with ADB's Procurement Policy (2017, as amended from time to time).[16] A procurement plan indicating threshold and review procedures, goods, works, and consulting service contract packages and national competitive bidding guidelines is in Section C.

36. A consultant firm led by international experts will be recruited to support implementation of the project. The consulting services are estimated to require 58 person-months (PM) of international specialists and 121 PM of national specialist. The services will cover: overall project management, oversight, and coordination; design and procurement; financial management; monitoring and evaluation; construction supervision; community mobilization and demonstration

[14] Public Communications Policy: http://www.adb.org/documents/pcp-2011?ref=site/disclosure/publications
[15] This type of information would generally fall under public communications policy exceptions to disclosure. ADB. 2011. *Public Communications Policy*. Paragraph 97(iv) and/or 97(v).
[16] Available online: https://www.adb.org/documents/procurement-regulations-adb-borrowers

activities; and capacity building. All consultants will be recruited according to Procurement Policy (2017, as amended from time to time). The firms will be engaged using the quality- and cost-based selection (QCBS) method with a standard quality–cost ratio of 90:10.

C. Procurement Plan

Basic Data

Project Name: Climate Change and Disaster-Resilient Water Resources Sector Project	
Project Number: 51081-002	**Approval Number**: XXXX
Country: Kyrgyz Republic	**Executing Agencies**: Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration (DWR); and Ministry of Emergency Situations (MOES)
Project Procurement Classification: B	
Procurement Risk: Substantial	
Project Financing Amount: $43.6 million **ADB Financing:** $38.6 million **Government:** $5.0 million	**Project Closing Date:** 31 March 2025
Date of First Procurement Plan: 19 October 2018	**Date of this Procurement Plan**: 19 October 2018

A. Methods, Thresholds, Review and 18-Month Procurement Plan

1. Procurement and Consulting Methods and Thresholds

Except as the Asian Development Bank (ADB) may otherwise agree, the following process thresholds shall apply to procurement of goods and works.

Procurement of Goods and Works		
Method	**Threshold**	**Comments**
Internationally-advertised open competitive bidding (IA-OCB) for Works	$5,000,000	
IA-OCB for Goods	$1,000,000	
Nationally-advertised open competitive bidding (NA-OCB) for Works	Beneath that stated for IA-OCB, Works and above that stated for Shopping, Works	
NA-OCB for Goods	Beneath that stated for IA-CB, Goods and above that stated for Shopping, Goods	
Shopping for Works	Below $100,000	
Shopping for Goods	Below $100,000	
Community Contracting for Works	$20,000 for first contract; up to $50,000 for subsequent contracts for same community organization	Increased threshold subject to successful completion of first contract.

Note: Refer to Guidance Note on Open Competitive Bidding (https://www.adb.org/documents/open-competitive-bidding) and Project Administration Instructions (PAI) 5.10 for community contracting (https://www.adb.org/documents/project-administration-instructions).

Consulting Services	
Method	**Comments**
Quality and Cost Based Selection (QCBS)	90:10 quality to cost ratio will apply
Quality Based Selection	
Consultants' Qualifications Selection	
Least-Cost Selection	

Note: Refer to Guidance Note on Consulting Services (https://www.adb.org/documents/consulting-services).

2. Goods and Works Contracts Estimated to Cost $1 Million or More

The following table lists goods and works contracts for which the procurement activity is either ongoing or expected to commence within the next 18 months.

Package Number	General Description	Estimated Value	Procurement Method	Review	Bidding Procedure	Advertisement Date (quarter/year)	Comments
MOES-G-ICB-1	Heavy machinery for Northern and Southern Response Centers	$9.0 million	IA-OCB	Prior	1S1E	Q2 2019	Goods bidding documents
MOES-G-ICB-2	Equipment for hydrological monitoring	$1.4 million	IA-OCB	Prior	1S1E	Q1 2020	Goods bidding documents
DWR-W-NCB-1	Off-farm canal and ancillary works for Pravaya Vetka irrigation system	$3.7 million	NA-OCB	Prior	1S1E	Q1 2020	Small works bidding documents
MOES-W-NCB-1	Hydrological monitoring station works	$1.6 million	NA-OCB	Prior	1S1E	Q1 2020	Small works bidding documents
CC-1	On-farm canal and ancillary works for Pravaya Vetka Irrigation System	$1.2 million	Community Contracting for Works	Prior	N/A	Q1 2020	Roughly 60 contracts expected

Note: Estimates exclude taxes and duties. Bidding document templates and guidelines available online: https://www.adb.org/site/business-opportunities/operational-procurement/goods-services/documents

3. Consulting Services Contracts Estimated to Cost $100,000 or More

The following table lists consulting services contracts for which the recruitment activity is either ongoing or expected to commence within the next 18 months.

Package Number	General Description	Estimated Value	Recruitment Method	Review (Prior / Post)	Advertisement Date (quarter/year)	Type of Proposal	Comments
PIC-1	Project implementation consultant	$3.6 million	QCBS 90:10	Prior	Q4 2018	Full technical	Estimate includes provisional sums for design, study, and community mobilization

Note: Estimates exclude taxes and duties.

4. Goods and Works Contracts Estimated to Cost Less than $1 Million and Consulting Services Contracts Less than $100,000 (Smaller Value Contracts)

The following table groups smaller-value goods works and consulting services contracts for which the activity is either ongoing or expected to commence within the next 18 months.

Goods and Works								
Package Number	**General Description**	**Estimated Value (cumulative)**	**Number of Contracts**	**Procurement Method**	**Review** [Prior / Post/Post (Sampling)]	**Bidding Procedure**	**Advertisement Date** (quarter/ year)	**Comments**
VE-1	Vehicles for PIU	$100,000	1	Request for quotations	Prior	N/A	Q1 2019	Three 4x4 vehicles
SOF-1	Accounting software for PIU	$20,000	1	Request for quotations	Prior	N/A	Q1 2019	"1C" software or equivalent
OFF-1	Office equipment for PIU	$37,000	2-3	Request for quotations	Prior	N/A	Q1 2019	Chairs, tables, computers, printers, scanners, office consumables

Note: Estimates exclude taxes and duties.

Consulting Services								
Package Number	**General Description**	**Estimated Value (Cumulative)**	**Number of Contracts**	**Recruitment Method**	**Review** (Prior / Post)	**Advertisement Date** (quarter/ year)	**Type of Proposal**	**Comments**
AU-E-1	External audit services	$60,000	1	LCS	Prior	N/A	BTP	External audit services (3-year contract)
AU-M-1	PIU management audit services	$40,000	1	LCS	Prior	N/A	BTP	Annual PIU management audit services (2-year contract)

Note: Estimates exclude taxes and duties.

B. Indicative List of Packages Required Under the Project

The following table provides an indicative list of goods, works and consulting services contracts over the life of the project, other than those mentioned in previous sections (i.e., those expected beyond the current period).

Goods and Works							
Package Number	**General Description**	**Estimated Value (cumulative)**	**Estimated Number of Contracts**	**Procurement Method**	**Review** [Prior / Post/Post (Sampling)]	**Bidding Procedure**	**Comments**
DWR-W-NCB-X	Off-farm canal and ancillary works for additional subprojects	$7.5 million	2-3	NA-OCB	Prior	1S1E	Sub-projects to be selected during implementation
CC-X	On-farm canal and ancillary works for additional subprojects	$2.8 million	140	Community Contracting for Works	Prior	N/A	Sub-projects to be selected during implementation
MOES-G-NCB-1	Computer equipment for data processing and forecasting	$400,000	1	NA-OCB	Prior	1S1E	
DWR-G-NCB-1	Heavy machinery	$800,000	1	NA-OCB	Prior	1S1E	Heavy machinery for O&M of irrigation systems

Note: Estimates exclude taxes and duties.

Consulting Services							
Package Number	**General Description**	**Estimated Value (cumulative)**	**Estimated Number of Contracts**	**Recruitment Method**	**Review** (Prior / Post)	**Type of Proposal**	**Comments**
AU-X-X	Audit services	$140,000	3	LCS	Prior	N/A	Remainder of annual external and PIU management audit services required.

Note: Estimates exclude taxes and duties.

C. List of Awarded and On-going, and Completed Contracts

The following tables list the awarded and on-going contracts and completed contracts.

1. Awarded and On-going Contracts

Goods and Works							
Package Number	**General Description**	**Estimated Value**	**Awarded Contract Value**	**Procurement Method**	**Advertisement Date** (quarter/ year)	**Date of ADB Approval of Contract Award**	**Comments**

Consulting Services							
Package Number	**General Description**	**Estimated Value**	**Awarded Contract Value**	**Recruitment Method**	**Advertisement Date** (quarter/year)	**Date of ADB Approval of Contract Award**	**Comments**

2. Completed Contracts

Goods and Works								
Package Number	**General Description**	**Estimated Value**	**Contract Value**	**Procurement Method**	**Advertisement Date** (quarter/ year)	**Date of ADB Approval of Contract Award**	**Date of Completion**	**Comments**

Consulting Services								
Package Number	**General Description**	**Estimated Value**	**Contract Value**	**Recruitment Method**	**Advertisement Date** (quarter/ year)	**Date of ADB Approval of Contract Award**	**Date of Completion**	**Comments**

D. Consultant's Terms of Reference

37. Draft terms of reference for the project implementation consultant are provided in Appendix 4.

VII. SAFEGUARDS

38. **Environment.** The project is classified as category B for environment. An initial environmental examination (IEE), including an environmental management plan (EMP), has been prepared for the core subproject. Public consultations were conducted and involved affected people from nearby houses and other project stakeholders. Remaining sub-projects will be selected after project's Board approval and an Environmental Assessment and Review Framework (EARF) has been prepared. Subproject selection criteria will rule out projects with significant environmental impacts (Category A), and an IEE will be performed for each subsequent subproject and any civil works.

39. Project impacts during construction are expected to be site-specific and temporary and related to the construction of the core sub-project components. Expected impacts include noise, dust and exhaust emissions from equipment and construction vehicles; impacts on the river/ surface water, waste management, occupational health and safety, site accessibility, community health and safety, construction traffic. During operation phase, potential impacts are related to limited local capacity to maintain functionality of the components, with expected positive impacts due to the rehabilitation works. Adequate mitigation measures are included as part of the assessment, and will be implemented through, the EMP and Site-specific Environmental Management Plans (SEMP).

40. The PIU will be responsible for environmental management plan (EMP) implementation will ensure that EMP will be adequately included in bidding documents and all environmental mitigation measures will be included in construction contracts. PIU will be responsible to ensure the Contractor prepares SEMPs and PIU will approve all SEMPs before start of any construction works.

41. Monitoring of environmental quality and the implementation of mitigation measures will be performed by the PIU, with support from project implementation consultant as required with sufficient TORs and staff-time for this task. The monitoring results will be included in the project quarterly progress reports and semi-annual environmental reports to be submitted to ADB.

42. The cost for implementing EMP will be financed by the grant and loan, specifically the costs of mitigation measures will be included in the construction contracts, and the cost for supporting environmental monitoring will be included in the consulting service of the project implementation consultant. Mitigation measures and a monitoring plan have been developed and incorporated into the EMP, which form the basis for the future SEMP. The contractor will have to submit Site-specific Environmental Management Plans (SEMP), which will contain the method statement for construction, and the site-specific plans prepared with IEE prior to commencing operations. The SEMPs shall be endorsed by the project implementation consultant before submission to the PIU for approval.

43. PIU will promptly inform ADB of the occurrence of any risks or impacts, with detailed description of the event and proposed corrective action plan if any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the initial environmental examination. PIU will report any actual or potential breach of compliance with the measures and requirements set forth in the IEE and EMP promptly after becoming aware of the breach.

44. The project implementation consultant will assist PIU in compiling and submitting semiannual monitoring reports during project construction within one month after each reporting period. Environmental monitoring reports will be disclosed at ADB website and to local authorities.

45. **Social Safeguards.** The project is classified as category B for involuntary resettlement impacts. The Land Acquisition and Resettlement Plan (LARP) has been prepared for the core subproject to ensure that resettlement activities will be carried out in accordance with Kyrgyz applicable laws and regulations and ADB SPS (2009).

46. Since this project will employ sector loan modality, Land Acquisition and Resettlement Framework (LARF) has also been prepared to guide the EAs to conduct screening, assessment, institutional arrangements, and processes to be followed for subsequent subprojects to be selected during project implementation. For all civil works sites, DWR and MOES through the PIU will ensure that all requirements prescribed in the LARF will be complied with during preparation of relevant safeguard documents and implementation. A screening checklist in LARF will be used by DWR and MOES to select only category B (avoiding land acquisition and minimizing resettlement impact) or category C subprojects and civil works sites during project implementation. The executing agencies through PIU and the project implementation consultants will ensure that meaningful consultations are carried out with the project affected persons throughout the project cycle with attention to the needs of the vulnerable and the disadvantaged groups.

47. Surveys carried out during the project preparation for the representative subproject identified approximately 2 affected households with a total of 12 household members[17]. According to the local government and department of water resources (DWR), the affected land plots are public lands designated as water conservation zone, for which the 2 affected households have been permitted to use without any cost or financial obligation for small scale farming. Therefore, compensation only for affected assets on the land have been calculated during draft LARP preparation and included to the project budget. No households will experience severe impacts from the core subproject nor belong to vulnerable groups. Draft LARP for core subproject will be updated upon completion of the detailed design. The civil works could only be commenced after full compensation payment to the affected households.

48. For implementing the LARPs, the PIU will ensure that:

(i) The safeguards specialist recruited as part of the PIU and project implementation consultant team will conduct LARP implementation and monitoring, including facilitation of resolution of affected households' concerns and grievances;
(ii) Continuous meaningful consultations with affected households, and no change is made on the entitlement matrix of the draft LARP and LARF that provides a clear guidance on entitlements for compensation;
(iii) The final LARP is submitted to ADB for concurrence prior to implementation, as early as detailed design is available;
(iv) The final LARP is disclosed through the Project's and ADB's website; and
(v) Reports on monitoring of the LARP implementation including grievances is submitted to ADB on a semi-annual basis.

49. In case of any changes, additional land acquisition and involuntary resettlement, or related unanticipated impacts will be identified, then addendum LARP will be prepared and implemented in accordance with approved LARF.

50. Compensation for land acquisition and resettlement will be covered under the ADB financing. Initial budget of $10,000 has been set for all subprojects across DWR and MOES activities, as site selection will avoid land acquisition and minimize resettlement impacts. These funds may be used to (i) provide payments to affected persons in line with the associated approved updated LARP and (ii) cover incremental expenses directly associated with implementation of the LARP and grievance redress mechanism (including by affected persons) excluding those covered under the TOR of the project implementation consultant. Payments will be disbursed from the advance account and liquidated through the SOE procedure with submission of (i) signed contract between PIU and affected persons based on results of the valuation survey; (ii) confirmation from bank that payment is transferred to affected persons' account; and (iii) written acknowledgment from affected persons of receipt of payment.

51. The PIU will establish a grievance redress mechanism (GRM) in accordance with the EARF, IEE/EMP, LARF and LARP to receive and facilitate the resolution of the affected persons' concerns and grievances.

52. **Indigenous Peoples.** The country does not have indigenous people's communities as defined in the SPS for operational purposes. As such, the project is classified as C for indigenous peoples.

[17] Their fences, crops and trees will be affected. No land will be acquired.

53. **Prohibited Investment Activities.** Pursuant to ADB's Safeguard Policy Statement (2009), ADB funds may not be applied to the activities described on the ADB Prohibited Investment Activities List set forth at Appendix 5 of the Safeguard Policy Statement (2009).

VIII. GENDER AND SOCIAL DIMENSIONS

54. The project is categorized as effective gender mainstreaming (EGM), as it addresses the gender issues relevant to the project, such as (i) women's participation in WUAs and WUA sub-groups, (ii) gender-sensitive plans for improved irrigation and agricultural management; and (iii) participation of women in training. The gender action plan (GAP) provides targets for: (i) increased female leadership positions in WUAs and WUGs; and (ii) women's involvement in all capacity building activities. To ensure gender-inclusiveness of disaster-risk management and irrigation systems, as well as all project activities, the GAP requires that: (i) all public awareness campaigns and materials on the project benefits are gender-sensitive; (ii) infrastructure planning is gender-responsive and social-inclusive and that contracts ensure women-friendly working conditions for female workers, as well as ensuring that all work camps have explicit policies on zero tolerance for use of illegal drugs, sexual harassment, and use of prostituted women; and (iii) gender capacity building be conducted for staff of executing agencies. To implement and monitor the benefits to women, the GAP includes targets for female beneficiaries. This entails the collection of sex-disaggregated data, which is included as a key element in project monitoring and information system.

55. The executing agencies through the PIU will ensure that the projects gender targets are met during implementation, with resources allocated in the project implementation consultant for gender activity monitoring. The PIU Director is responsible for achievement of GAP targets and is supported by safeguards specialist in the PIU and gender and social development specialist in project implementation consultant.

GENDER ACTION PLAN

Activity	Performance Targets/Indicators	Responsibility	Time Frame
Output 1: Irrigation infrastructure protected and modernized			
1.1 Conduct gender sensitive public awareness campaign on the project benefits for local communities, women, poor households	1.1.1. At least 1 awareness campaign activity conducted per year including and eligibility. 1.1.2. All campaign materials produced and disseminated have been reviewed for gender bias and include gender-sensitive messages.	PIU and PIC	Ongoing
1.2 Ensure gender-responsive and social-inclusive tendering of civil works	1.2.1 Civil works contracts committed to: (a) hiring local labor, (b) non-use of child labor and forced labor, and (c) providing gender-sensitivity training to workers to ensure women-friendly working conditions for female workers, and (d) zero-tolerance for drug use and use of prostituted women in work camps.	PIU	Ongoing
Output 2: Irrigation system and agricultural land management enhanced			
2.1. Increase capacity of WUAs for gender-responsive and social-inclusive water management	2.1.1. WUAs or WUA sub-groups (WUGs) must have or elect 20% women representation on their respective Councils to be eligible to receive project funds for lower-level canal civil works. 2.1.2 At least 30% female membership in WUAs. 2.1.3 Subproject Coordination Committees must have 20% women representation.	PIU, DWR, WUAs, WUGs	Ongoing
2.2. Include women farmers in trainings on disaster- and climate-resilient OFWM and agricultural practices.	2.2.1. At least 30% women out of approximately 6,000 farmers and community members with improved knowledge of disaster and climate-resilient OFWM and agricultural practices.	PIU	2021-2024
2.3 Ensure women's participation in and benefit from the development of OFWM and agricultural extension plans.	2.3.1 At least 25% of comparative field trials are conducted on land owned by or registered under a woman farmer's name. 2.3.1 At least 25% of participants in farmer field days are women.	PIU	2021-2024
Output 3: National disaster risk management capacity improved.			
3.1 Include women in trainings in disaster risk management practices.	3.1.1 At least 30% women out of a total 50 MOES staff with improved disaster risk management practices.	MOES, ERCs, PIU	2020-2021
3.2 Ensure gender-sensitive and socially-inclusive disaster risk management	3.2.1 Disaster risk management plans include guidelines for consultation with women and vulnerable groups for project planning.	MOES, ERCs, PIU	2020-2021
Project Management			
(a) Recruit women staff in PIU	a.1. At least 25% of PIU staff are women.	MOES, DWR	Q2 2019
(b) Collect and utilize sex-disaggregated data for planning, implementation and monitoring.	b.1 Project monitoring and information system includes gender indicators and regularly populated with sex-disaggregated data.	PIU	Ongoing

DWR = Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration; ERCs = Emergency Response Centers (North and South); GAP = Gender Action Plan; MOES = Ministry of Emergency Situations; OFWM = on-farm water management; PIC = project implementation consultant; PIU = Project Implementation Unit; WUGs = water user groups.

IX. PERFORMANCE MONITORING, EVALUATION, REPORTING, AND COMMUNICATION

A. Project Design and Monitoring Framework

Impact the Project is Aligned with Losses in the agriculture and water resources sectors from extreme weather events reduced (Intended Nationally Determined Contribution and Development Program of the Kyrgyz Republic for 2018–2022)[a]			
Results Chain	**Performance Indicators with Targets and Baselines**	**Data Sources and Reporting Mechanisms**	**Risks**
Outcome Climate change and disaster resilience of infrastructure and water security improved	By 2026: a. Average gross margin of agricultural production increased to $2,350 per ha across target areas of about 20,000 ha (2017 baseline: about $1,900 per ha)[b] b. Average productivity of water withdrawn increased to 0.85 kg/m^3 for wheat and 0.95 kg/m^3 for corn across target areas of about 20,000 ha (2017 baseline: 0.6 kg/m^3 for wheat and 0.6 kg/m^3 for corn)[b] c. Annual number of households and area of agricultural land protected and rehabilitated from disaster impacts by the Northern and Southern ERC works increased to 50,000 households and 24,000 ha (2015–2017 annual average baseline: 20,700 households and 10,700 ha)	a–b. Annual WUA reports c. MOES annual reports	Unfavorable market conditions diminish returns to agricultural production.
Outputs 1. Irrigation infrastructure protected and modernized	By 2025: 1a. About 60 cross-regulating structures with associated offtakes and flow-measuring devices constructed in the main (primary and secondary off-farm) canals (2018 baseline: not applicable) 1b. Unlined lower-level (inter-farm and on-farm) canals increased to about 650 km (2018 baseline: 500 km) and lined lower-level (inter-farm and on-farm) canals increased to about 150 km (2018 baseline: 100 km)	1a–c. Annual PIU project reports	Extreme climatic and geophysical hazards adversely affect construction.

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
	1c. About 30 climate-proofed mudflow crossing structures constructed or modernized (2018 baseline: not applicable)		
	By 2025:		
2. Irrigation system and agricultural land management enhanced	2a. For each of approximately 4 irrigation subprojects, a joint irrigation system sustainable operation and maintenance plan developed and endorsed by the respective Subproject Coordinating Committee (2018 baseline: 0)	2a–c. Annual PIU project reports	
	2b. For each of approximately 4 irrigation subprojects, WUA agriculture and OFWM plans with gender elements developed and endorsed by their respective WUA councils (2018 baseline: 0)		
	2c. About 6,000 farmers and community members (of whom 30% women) improved their knowledge of climate change and disaster-resilient OFWM and agricultural practices (2017 baseline: 0)		
	By 2025:		
3. National disaster risk management capacity improved	3a. Number of well-functioning heavy machinery and special equipment for disaster prevention and rehabilitation works installed in the Northern and Southern ERCs increased to about 150 (2018 baseline: 89)	3a–c. Annual PIU project reports	
	3b. Number of well-functioning hydrological monitoring stations connected to the monitoring network increased to about 96 (2018 baseline: 76)		
	3c. Disaster risk management plans for each Northern and Southern ERC, including asset management and project planning with gender elements, developed (2018 baseline: 0)		

Key Activities with Milestones

1. Irrigation infrastructure protected and modernized

1.1 Commence topographic and water productivity baseline surveys on subprojects by Q4 2018
1.2 Mobilize gender- and socially-inclusive WUAs and WUA subgroups by Q3 2019
1.3 Issue IFB for first main canal and mudflow works by Q1 2020

1.4 Award contract for mudflow and main canal works for first subproject by Q2 2020 1.5 Issue IFB for final main canal and mudflow works by Q4 2021 1.6 Award contract for mudflow and main canal works in final subproject by Q1 2022 1.7 Commence community contracting for lower-level canal works by Q2 2020 1.8 Complete works on all canal and mudflow works by Q3 2023 **2. Irrigation system and agricultural land management enhanced** 2.1 Commence participatory planning and training workshops with government and community representatives by Q3 2019 2.2 Commence comparative field trials by Q1 2021 2.3 Commence farmer field days by Q1 2021 **3. National disaster risk management capacity improved** 3.1 Issue IFB for main goods contract for the MOES by Q2 2019 3.2 Issue IFB for main goods and works contracts for KyrgyzHydromet by Q1 2020 3.3 Commence training of the ERC and MOES representatives on disaster risk management by Q2 2020 3.4 Implement asset management system by Q4 2020 3.5 Implement pilot data collection, processing, and forecasting system by Q2 2021
Project Management Activities Mobilize implementation support consultants by Q2 2019 Establish project performance monitoring system by Q2 2019 Purchase office equipment, furniture, and vehicles by Q2 2019 Finalize project completion report by Q2 2025
Inputs Asian Development Bank $21.8 million (concessional OCR loan) $16.8 million (ADF grant) Government: $5.0 million
Assumptions for Partner Financing Not applicable

ADF = Asian Development Fund, ERC = emergency response center, ha = hectare, IFB = invitation for bids, kg/m^3 = kilogram per square meter, km = kilometer, KyrgyzHydromet = Agency for Hydrometeorology under the MOES, MOES = Ministry of Emergency Situations, OCR = ordinary capital resources, OFWM = on-farm water management, PIU = project implementation unit, Q = quarter, WUA = water users association.

[a] Government of the Kyrgyz Republic. 2015. *The Kyrgyz Republic: Intended Nationally Determined Contribution.* Bishkek; and Government of the Kyrgyz Republic. 2018. *The Development Program of the Kyrgyz Republic for the Period 2018–2022*: *Unity. Trust. Creation*. Bishkek.

[b] Baseline estimate will be confirmed during implementation following subproject selection.

Source: Asian Development Bank.

D. Monitoring

56. **Project performance monitoring.** The executing agencies will ensure PIU, with support of the project implementation consultant, undertake monitoring project performance using the targets, indicators, milestones/activities, assumptions, and risks in the DMF and GAP, and establish an adequate project performance monitoring system within 3 months of project effectiveness. The project performance monitoring system will assess the following outputs and indicators (i) progress of planned activities according to the milestones; (ii) progress in achieving each project output and project outcome according to the performance targets and indicators indicated in the DMF and GAP, and (iii) social and economic benefits with focus on the poor and women. Disaggregated baseline data for output and outcome indicators gathered during project processing will be updated and reported quarterly through the executing agency's quarterly progress reports and after each ADB review mission. These quarterly reports will provide

information necessary to update ADB's project performance reporting system.[18] The project performance monitoring will involve a participatory approach, including inputs form WUAs and local DWR offices facilitated by the project implementation consultant and community development teams to ensure timely collection of quality data.

57. **Compliance monitoring.** All project assurances including policy, legal, financial, economic, physical, environmental, gender, and other safeguard measures will be monitored through quarterly progress reports, and twice a year, during ADB loan review missions. ADB will also monitor the progress of achievement of each output and outcome based on performance indicators with targets, and each activity based on milestones indicated in the DMF through a project management information system (i.e., e-Ops).

58. **Safeguards monitoring.** The monitoring and reporting of the activities identified in the environment and resettlement action plans is discussed in Section VII.

59. **Gender and social dimensions monitoring.** The PIU, with support of the project implementation consultant, will be responsible for monitoring the implementation of the GAP and for the preparation of the monitoring reports that will be submitted to ADB.[19]

E. Evaluation

60. **Inception Mission.** ADB will conduct an inception mission within 3 months of loan and grant signing to assess project readiness and implementation arrangements including establishment of PIU, opening of advance accounts, progress of recruitment of consulting services, status of the development of the project performance monitoring system, and progress of advance procurement actions. **Review Missions.** ADB will field review missions at least twice a year to (i) assess the progress of project activities and outputs and effectiveness of implementation arrangements, (ii) monitor the implementation of GAP and safeguard compliance with ADB Safeguard Policy Statement (2009), (iii) review compliance with loan and grant agreements and related matters, (iv) follow up on decisions and actions agreed during previous review missions, and (v) resolve any project implementation issues that may arise. ADB will conduct a midterm review in the third year of project implementation. The midterm review will (i) assess the project performance and achievement against targets and milestones in the DMF; (ii) review the initial outcomes, benefits, and impact of the project, and (iii) identify gaps, if any, and recommend necessary changes to strengthen implementation arrangements or modify project design. **Project Completion Review.** Within 6 months of physical completion of the project, the executing agencies will submit a project completion report to ADB.[20] ADB will field a project completion review mission upon physical completion of the project to commence preparation of ADB's project completion report. The mission will (i) assess the project performance against all targets, indicators, and benchmarks (including any revised at the midterm review); (ii) evaluate initial benefits, and outcome of the project across outputs, and (iii) identify any incomplete activities and agree on the necessary actions.

---

[18] ADB's project performance reporting system is available at http://www.adb.org/Documents/Slideshows/PPMS/default.asp?p=evaltool

[19] ADB's Handbook on Social Analysis: A Working Document, is available at: http://www.adb.org/Documents/Handbooks/social-analysis/default.asp, *Staff Guide to Consultation and Participation*: http://www.adb.org/participation/toolkit-staff-guide.asp, and, *CSO Sourcebook: A Staff Guide to Cooperation with Civil Society Organizations*: http://www.adb.org/Documents/Books/CSO-Staff-Guide/default.asp

[20] Project completion report format is available at: http://www.adb.org/Consulting/consultants-toolkits/PCR-Public-Sector-Landscape.rar

F. Reporting

61. The executing agencies will ensure that the PIU provides ADB with (i) quarterly progress reports in a format consistent with ADB's project performance reporting system; (ii) consolidated annual reports including (a) progress achieved by output as measured through the indicator's performance targets, (b) key implementation issues and solutions, (c) updated procurement plan, and (d) updated implementation plan for the next 12 months; (iii) bi-annual reporting of environmental and social safeguards due within 30 days of end of each half-year period; and (iv) a project completion report within 6 months of physical completion of the project. To ensure that projects will continue to be both viable and sustainable, project accounts and the executing agency audited financial statement together with the associated auditor's report, should be adequately reviewed.

62. The PIU will establish a project website with suitable domain and email address within three months of project effectiveness. The PIU will ensure that the website, presented in English and Russian (and optionally Kyrgyz language), is periodically updated with (i) general information on the project objectives including links to project documents; (ii) summary updates on project progress including summary quarterly reports; (iii) procurement plans and advertisements; and (iv) other relevant project information.

G. Stakeholder Communication Strategy

63. Project information will be strategically disseminated through media at main milestones including loan signing, contract awards and project completion. A grievance redress mechanism will be established at the PIU, by phone and email, and through public consultation events.

Table 19: ADB Public Communications Strategy

Project Documents	Means of Communication	Responsible Party	Frequency	Audience(s)
Project data sheet (PDS)	ADB's website	ADB	Initial PDS posted on the website no later than two weeks after approval of the concept paper; updated at least twice a year	General Public
Design and Monitoring Framework (DMF)	ADB's website	ADB	Key information from the draft reflected in project data sheet; final version posted on the website at the same time it is circulated to the Board for approval, subject to the concurrence of the government	General Public
Initial Environmental Examination	ADB's website	ADB	Post fact-finding mission	General Public, project-affected people in particular
Land Acquisition and Resettlement Documents	ADB's website	ADB	Post fact-finding mission	General Public, project-affected people in particular
Report and Recommendation of the President	ADB's website	ADB	Posted on the website within two weeks of Board approval of the loan and grant	General Public

Project Documents	Means of Communication	Responsible Party	Frequency	Audience(s)
Legal and Grant Agreements	ADB's website	ADB	No later than 14 days of Board approval of the project	General Public
Summary of Poverty Reduction and Social Strategy	ADB's website	ADB	Posted on the website at the same time it is circulated to the Board for approval, subject to concurrence of the government	General Public
Documents Produced under Technical Assistance	ADB's website	ADB	within 2 weeks of completion	General Public
Project Administration Manual	ADB's website	ADB	Posted on the website at the same time it is circulated to the Board for approval, subject to concurrence of the government	General Public
Social and Environmental Safeguard Monitoring Reports	ADB's website	ADB	Within 1 month after each 6-month monitoring period	General Public, project-affected people in particular
Audited project financial statements and the auditors' report	ADB's website	ADB	Within 30 days of receipt	General Public
Project Completion Report	ADB's website	ADB	Within two weeks of circulation to the Board for information	General Public
Evaluation Report	ADB's website	ADB	Within two weeks of circulation to Management and the Board	General Public
Project progress information	Project's website	PIU	Quarterly	General Public

Source: Asian Development Bank.

X. ANTICORRUPTION POLICY

64. ADB reserves the right to investigate, directly or through its agents, any violations of the Anticorruption Policy relating to the project.[21] All contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agency and all project contractors, suppliers, consultants, and other service providers. Individuals and/or entities on ADB's anticorruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contracts under the project.[22] To support these efforts, relevant provisions are included in the loan and grant agreements and the bidding documents for the project.

XI. ACCOUNTABILITY MECHANISM

65. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability

[21] Anticorruption Policy: http://www.adb.org/Documents/Policies/Anticorruption-Integrity/Policies-Strategies.pdf
[22] ADB's Integrity Office web site: http://www.adb.org/integrity/unit.asp

Mechanism, affected people should make an effort in good faith to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.[23]

XII. RECORD OF CHANGES TO THE PROJECT ADMINISTRATION MANUAL

66. All revisions of the PAM will be recorded in this section.

[23] Accountability Mechanism. http://www.adb.org/Accountability-Mechanism/default.asp.

APPENDIX 1: IMPLEMENTATION PROCEDURES AND RESPONSIBILITIES FOR OUTPUTS 1 AND 2

1. INTRODUCTION

1. This document details the specific procedures and responsibilities for the implementation of outputs 1 and 2, which comprises an integrated and participatory process to system design, construction, and management. As described in the project administration manual (PAM), the project will protect and modernize irrigation systems (output 1) and modernize irrigation system and agricultural land management (output 2). This approach will consult and plan jointly among irrigation system stakeholders for a bottom-up approach to modernization.

2. Under output 1 and 2, the project will:

i. Invest in modernizing and protective works for main canal and associated infrastructure[24] that are under responsibility of Department of Water Resources (DWR) of the Ministry of Agriculture and Melioration through international or national competitive bidding;
ii. Invest in modernization of lower-level canals that are under the responsibility of water user associations (WUAs) and pilot community contracting for these works;
iii. Develop and implement irrigation system and agricultural management plans; and
iv. Provide extension and capacity building for farmers and other community representatives on on-farm water management and agricultural practices.

3. The design and monitoring framework (DMF) in Section IX(A) of the PAM tabulates the output performance indicators which will guide their design and implementation. As described, the project outcome, is climate change and disaster resilience of infrastructure and water security improved as measured by improvements in productivity of water (PoW) and net value of agricultural production (NVP).

2. PROJECT IMPLEMENTATION ARRANGEMENTS

4. The DWR is the project executing agency responsible for outputs 1 and 2, while MOES is the implementation agency responsible for output 3. A project implementation unit (PIU) will be established to implement the project on behalf of both DWR and MOES. A project implementation consultant (PIC) will be recruited to support the PIU to implement all outputs. Numerous small community development teams (CDT) will be recruited under the PIC to facilitate community contracting and capacity building activities to ensure sufficient coverage of the large number of farmers in each target system.

5. As described in Section III of the PAM, the PIU staff have responsible for delivery of project outcomes 1 and 2 including: (i) selection of additional subprojects in line with agreed criteria; oversight the PIC and support and coordination of WUAs and rayon DWR offices and other stakeholders; and (iii) oversight and accountability for all civil works, goods delivery, and capacity building activities.

6. For outputs 1 and 2, the PIC will provide key expertise and manpower for implementation, including but not limited to: (i) provide conventional engineering services to deliver outputs including oversight of civil works and delivery of goods; (ii) lead development and implementation of the integrated technical-participatory process to modernize irrigated agriculture systems in

[24] Mudflow crossing structures, cross-regulators, offtakes.

target subprojects; (iii) recruit, train, deploy, and support CDTs; and (iv) help rayon DWR offices, WUAs, and CDTs to develop and implement their capacity development plans.

7. CDTs are small three-person teams whose function is to provide on-the-ground support for the implementation of the participatory system design, construction, and management. Numerous teams are required because the PIU and PIC on their own will not have the resources to reach out the large number of farmers in the target areas for the period (over two to three years) required to ensure the outcome and benefits of the project. The CDTs will (i) organize and mobilize stakeholders including WUAs, WUA sub-groups (WUGs), farmers, and others for participatory design, construction, and management activities; (ii) provide technical advice and training in line with the cascading capacity development structure (see Table 1 below); (iii) facilitate collective decision-making on planning, design, and management; (iv) provide support for development and implementation of community contracts including technical advice, supervision, and monitoring and reporting; and (v) help modern WUAs to develop their capacity for irrigation management transfer (IMT) and / or participatory irrigation management (PIM). One CDT is expected to be required per 1800 ha target area, meeting bi-weekly to monthly for three years. Total CDT requirements for approximately 20,000 ha target area under the project are expected to total 900 person-months over the project.

Table 1: Indicative cascading capacity development and integrated work teams

Level	Trainer / Facilitators	Trainee / Implementers
1	Project Implementation Consultant	CDTs and DWR
2	CDTs and DWR	WUA and WUG Council
3	WUA and WUG Council	All WUG members

Source: Asian Development Bank

8. One Subproject Coordinating Committee (SCCs) will: (i) coordinate the parties and activities at subproject and system levels, and (ii) resolve conflicts and disputes between the parties. The head of the DWR unit in the PIU will Chair the SSC; the PIC will act as Secretary; and each relevant Rayon DWR, Local Self Government (LSG or *Aiyl Okmotu*), and tertiary-level WUA(s) in the subproject target area will each delegate a representative as a Member of the SSC.

9. DWR rayon offices will facilitate delivery of outputs 1 and 2, including responsibility for: (i) assisting PIC in oversight and accountability for civil works delivery and (ii) developing and implementing joint DWR-WUA management plan.

3. IRRIGATED AGRICULTURE SUBPROJECTS

10. Achievement of the project outcome indicators will, requires the phased development and implementation of an efficient and effective innovative behavioral change process. Table 2 presents several of the underlying problems experienced by irrigated agriculture systems in Kyrgyz Republic, and the proposed solutions that the project aims to deliver.

Table 2: Summary of irrigated agricultural system strategic problems and proposed solutions

Strategic Problems	Proposed Solutions
Traditional risk-aversive farmers and water users	Mobilize communities to catalyze latent demand and form new lower level sub-WUA groups
Existing WUAs are too large to be effective	
Low-level performance equilibrium of existing governance and management organizations	Reorganize and strengthen existing WUAs to form modern representative democratic WUAs
Existing main canals are often too low, are not equipped with cross or head-regulators and there are not enough suitable lower-level canals; Therefore, irrigation systems cannot command their full permissible service area (PSA).[a]	Modernize and revitalize system management. Modernize infrastructure to facilitate operation
Systems designed to meet social equity objective; limited water is overallocated = scarcity by design	Optimize the win-win trade-off between the social equity and economic efficiency objectives.
Irrigation systems are in a low-level performance equilibrium and are not achieving their considerable agricultural PoW and NVP potential	Organization and community behavioral change to modernize system management and achieve the PoW and NVP *outcome*.

Source: Summary Sector Assessment Linked Document.

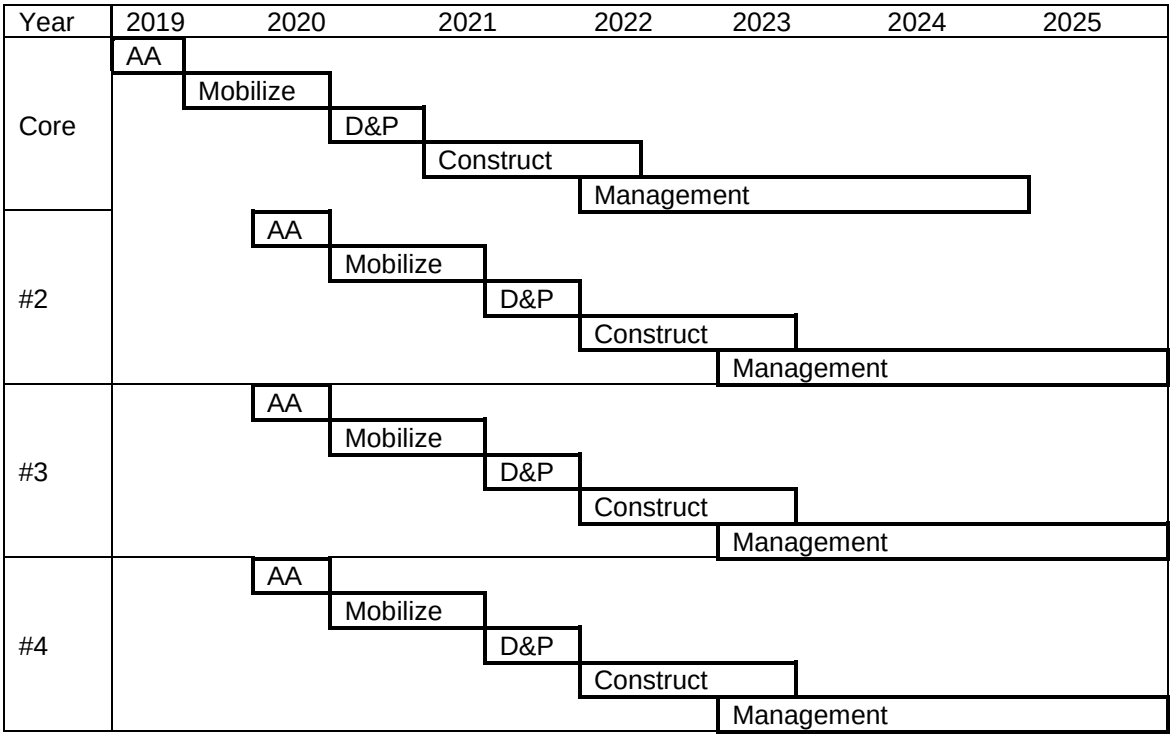
[a] Command is the head (difference in elevation), between the canal water level and the farmers field, required to make water flow by gravity to irrigate or "command" the farmers field without pumping. The permissible service area (PSA) excludes villages and government infrastructure (canals, drains and roads etc). However, the PSA includes both: (i) similar WUA or farmer infrastructure as well as (ii) land that is too high to irrigate by gravity. Therefore, the size of the PSA is between the sizes of the gross and net service areas, where net service area is defined as the irrigable area.

11. The project, using the sector project modality, will undertake a total of approximately 4 investment sub-projects under outputs 1 and 2 to achieve the targets presented in the DMF. The subprojects are expected to be implemented sequentially in a phased approach (see Figure 6 below). The subproject phases described below in Section 4, are expected to comprise: advanced action, mobilization, design and procurement, construction, and management.

12. The participatory approach to system design, construction, and management will be undertaken with the following principles: (i) investments must be requested by genuine representatives of the stakeholders, such as revitalized WUAs and other community groups, interested in improving water resources management in the target areas; (ii) local beneficiaries (notably, farmers) must be involved in all stages of key decision-making processes; and (iii) the approach will address two inter-related processes related to technical/engineering aspects of irrigation system design and institutional/management of the system.

13. The representative (core) subproject has been selected as Pravaya Vetka irrigation system comprising main and secondary canal works and lower-level canal works for the command area served by the third secondary canal (most distant from headworks) covering approximately 6000 ha. A feasibility study including economic analysis, initial environmental examination (IEE), land acquisition and resettlement plan (LARP), and design specifications incorporating climate change considerations has been undertaken during project preparation, to serve as a demonstration and template for further subprojects to be selected under implementation.

Figure 6: Indicative subproject implementation process



Legend: AA = advance actions and D&P = design and procurement.
Note: Timing and sequencing of subprojects is purely indicative and will be finalized during implementation.

14. The core subproject will be the first subproject implemented. Subsequent subprojects will be selected during the by the PIU-A in consultation with the Department of Water Resources and incorporating expert advice from the PIC-A to ensure eligibility. A long list of prospective subprojects has been prepared by DWR. To be eligible to be selected, the subproject is **required** to meet the following criteria (see Table 3). Proposed subprojects, along with assessment against eligibility criteria, will be submitted to ADB for prior approval. In selecting the site as a sub-project, due consideration will be given to the remaining budget for main and secondary canal works and the appropriateness of the expected target area for lower-level canal works (i.e. contiguous area, investment needs, and capacity and willingness of WUAs to participate). The budget for lower-level canal works is expected to be divided roughly equally among subprojects (e.g. around $200 per hectare or around $1 million each) but substantial changes in distribution may be allowed with ADB prior approval. Further sections of Pravaya Vetka irrigation system may also be selected as “additional” subprojects.

Table 3: Eligibility criteria for irrigation systems to be selected as subprojects

Criterion	Passing Standard
Expected environment and social safeguards categorization[a]	B or C only. Minimal resettlement impacts. Avoid land acquisition.
Expected economic viability[b]	>9% economic internal rate of return.
Existing structure	No new land for irrigation, no new systems.
System boundary	No cross-country transboundary systems.
Maximum cumulative water pumping height	<30 m lift (or gravity-fed).
Diversion capacity at headworks	>1.5 l s^{-1} ha^{-1}
Accessibility	Within easy access of Bishkek or Osh city.[c]
River basin	Lower Syr Darya and Chui river basin.[d]
Service area of beneficiary (sub-)system	>3000 ha

[a] In line with ADB's Safeguards Policy Statement (2009, as amended to date). To be confirmed during mobilization.
[b] In line with ADB Guideline for Economic Analysis of Projects (2017, as amended to date). To be confirmed during mobilization.
[c] Maximum approximately 3 hours' drive one-way.
[d] Nominally, Chui, Osh, Jalal-Abad, or Batken oblasts.

4. PHASED IMPLEMENTATION APPROACH

15. The indicative phases of subproject implementation are described below, including expected activities and deliverables (with respect to the DMF). It is expected that the PIU, in collaboration with the PIC, will refine the approach during implementation incorporating the lessons learned from ongoing and earlier subprojects. The estimated time-frames are indicative and based on earlier experience in Kyrgyz Republic and other countries.

4.1 Advanced Action

16. Advance action represents the preparatory phase of subproject implementation, taking place after subproject selection and prior to formal commencement of the participatory design and management process. It may be efficient to undertake advance action on non-core subprojects simultaneously, after which time the mobilization phase may be appropriately staggered. Advanced action is led by the PIU, with expert input and review by the PIC. It is expected that study and design activities are subcontracted by the PIC.

17. **Detailed planning of sub-project phases.** The PIC with oversight from PIU will undertake detailed plan of the subproject phasing and activities, starting with the representative subproject. While some phases cannot start before the prior phase is completed (e.g. Design and Bidding before Construction phases), some phases may overlap (e.g. Construction and Management phases). Lessons learned from previous sub-projects should be incorporated, and the detailed plan should be updated periodically and reported in the quarterly reporting (see PAM Section IX). The PIC should review the Sector Assessment linked document for the project as a guidance document for planning.

18. **Public information campaign.** For each sub-project, the PIU with support of PIC will make announcements in local media targeting the sub-project's stakeholder organizations and target beneficiaries to advise of (i) the objectives and activities of the overall project and (ii) the planned schedule and activities of the sub-project including the intended benefits, phased approach, eligible works and eligibility requirements of WUAs, and community contract approach. The campaign should ideally be conducted 1-2 months prior to the Mobilization phase with 2 weeks duration.

19. **Topographic survey.** A spot-level survey will be carried out on the target area at an adequate grid spacing, levelling accuracy and contour interval. The output will be a permissible service area contour plan suitable for: (i) hydraulic design of 4th and 3rd level canals and (ii) determination of net irrigable service area (NSA). Another output will be longitudinal and cross sections, of main (1st and 2nd) canals, suitable for design of mudflow protection and modern irrigation infrastructure improvements.

20. **Calculation of productivity of water.** The present agricultural PoW ($P_a = Y_a/ET_a$) will be estimated using remote sensing image interpretation or other suitable method.[25,26] Output will be a map of the PSA, showing the spatial variation of present PoW. Potential agricultural PoW ($P_c = Y_c/ET_c$) will be estimated using the following methods:

i. Crop water requirements (ET_c) using standard FAO Penman-Monteith method; [27]
ii. Potential crop yields (Y_c) using the following methods;
    a. FAO AquaCrop model[28, 29] and either the:
    b. FAO[30] and IIASA[31] Global Agro-ecological Zones (GAEZ) Project, or the:
    c. Global Yield Gap Atlas (GYGA).[32]

21. **Prepare initial irrigation system performance assessment and diagnosis (PAD).** Based on survey and initial field work, the PIC with oversight by PIU will prepare a pre-feasibility level plan for irrigation system modernization. This will form the basis for initial presentation and consultation to the stakeholders (WUAs, farmers, and DWR) during mobilization. This will comprise (i) expected irrigation service area; (ii) schematics for options for canal modernization and management; and (iii) expected improvements in yield, PoW, and income. This will include the:

i. PoW outputs of above-mentioned remote sensing image interpretation;
ii. Water accounting[33] and:
iii. Rapid performance procedure (RAP).[34] RAP will be based on the DWR record of regular tertiary-level hydropost flow measurements. These are likely to be reliable as they are made as the basis of irrigation service fee (ISF) payments (0.03 som m^{-3}).

22. PAD outputs will be:

i. Estimates of irrigation efficiencies at 1st, 2nd, 3rd and 4th canal and farmer field levels;

---

[25] Hellegers et al. 2010. *Remote Sensing and Economic Indicators for Supporting Water Resources Management Decisions,* https://www.researchgate.net/publication/228774251.
[26] ADB. 2013. *Developing Water Resources Sector Strategies in Central and West Asia: Kyrgyz Republic,* TACR, Part E and Appendix 10, https://www.adb.org/sites/default/files/project-document/79760/45353-001-tacr-01.pdf.
[27] FAO. 2006. *Crop Evapotranspiration – Guidelines for Computing Crop Water Requirements* – I & D paper 56.
[28] FAO. 2012. *Crop Yield Response to Water* - Irrigation and Drainage Paper 66, http://www.fao.org/docrep/016/i2800e/i2800e00.htm.
[29] Vanuytrecht et al. 2014. *AquaCrop: FAO's Crop Water Productivity and Yield Response Model,* https://www.researchgate.net/publication/265172756.
[30] http://www.fao.org/nr/gaez/en/.
[31] http://www.iiasa.ac.at/web/home/research/researchPrograms/EcosystemsServicesandManagement/GAEZ.en.html.
[32] http://www.yieldgap.org/.
[33] FAO. 2016. *Incorporating Water Accounting Plus, use of remote sensing and GIS in MASSCOTE 2.0*, draft scoping document.
[34] FAO. 2007. *Modernizing Irrigation Management – the MASSCOTE Approach*, Irrigation and Drainage Paper 63 http://www.fao.org/docrep/010/a1114e/a1114e00.htm.

ii. Identification of parts of the irrigation system that are performing poorly in terms of potential agricultural PoW and NVP;
iii. Indications of the likely causes (rather than just symptoms) of poor system performance, and:
iv. Identification of priority irrigation system interventions to improve PoW performance.

23. **Recruitment and preparation of CDT teams.** The PIU and PIC will plan and mobilize required CDT resources appropriate for planned subproject phasing. This includes development of TOR and recruitment, expected to be undertaken under PIC sub-contract. Each CDT is expected to comprise three individuals: (i) a community facilitator to organize and lead consultations and training meetings; (ii) agricultural technician to provide technical advice and training for development and implementation of agricultural management planning and capacity building; and (ii) irrigation technician to provide technical advice and training for participatory irrigation development.

24. **Establish Subproject Coordinating Committee.** An SCC will be established ahead of key mobilization activities.

4.2 Mobilization (expected 6-9 months duration)

25. Mobilization is the first phase of the subproject process and includes a participatory approach for the design of irrigation system modernization with the DWR, WUAs, and farmers. It is a critical phase as it will establish the foundation for the procurement and construction of works and subsequent management phase. Community mobilization is required to: (i) catalyze farmer water user demand for irrigated agriculture modernization to optimize the net value of agricultural production, and to (ii) form representative WUA and WUA sub-groups that are transparent and accountable to their farmer water user members, for informed collective decision-making in planning, construction and system management.

26. **Step 1: Initial mobilization of farmers and WUAs.** Farmers and WUA representatives from the target beneficiary area (nominally, a contiguous area serviced by the same main or secondary canal) will be assembled by the PIC and CDT with oversight by the PIU to present the intended phased approach and activities. The PIC will undertake a capacity assessment of the current WUAs and its sub-units to identify appropriate institutional unit for lower-level canal works and management. It is expected that current “zones” could be (i) reorganized along quaternary system boundaries to empower the members to participate in system planning and management; (ii) as appropriate, aggregated to areas of approximately 120 ha; and (iii) formalized with elected Council. PIC and CDTs will support WUA and WUGs to achieve eligibility, as required. To be eligible for project funds via community contracting for lower-level canal works, WUAs or WUGs must: (i) meet basic self-governance criteria (see Helvetas Kyrgyzstan. 2014. *Governance Self-Assessment Guide*); (ii) female representation on their Council must meet the level stated in the project gender action plan (GAP); (iii) as necessary meet additional community contracting criteria (see Table 7 below); (iv) undergo training on accounting, irrigation service fee calculation and collection; and (v) substantiate financial sustainability for O&M through positive cashflow from previous 24 months[35] and ownership or right of use of land proposed for civil works.

[35] In the event that a newly-formed WUA or WUG is proposed as counterpart, financial sustainability of members must be substantiated.

Table 4: Irrigation system level and management

System Level	Typical Size (ha)	Managed by	
		Present	Future
Application	1-2	Farmers	Farmers
	40	Zones	Zones
Quaternary	120		WUG
Tertiary	1,500	WUA	WUA
Main (1st and 2nd)	Larger	DWR	

Source: See Sector Assessment linked document.

27. **Step 2: Joint system design process.** The PIC and CDT with oversight from PIU will facilitate a joint DWR-WUA design process using bottom-up professional irrigation canal planning and professional hydraulic design procedures and practices[36] and incorporating the results of the Advanced Action to determine:

i. Net service area that is irrigable by gravity from the target canal(s);
ii. Hydraulic boundaries of quaternary and tertiary units, and therefore:
iii. Farmer water user membership of quaternary WUGs and tertiary WUAs.
iv. Determine the number of tertiary canals, locations of their outlets, from main canals, and the required operating head (water level) in main canals at each outlet, and;
v. Therefore, provide a basis for the hydraulic design of main (1st and 2nd) canals.

28. The results of the design process will form a pre-feasibility analysis of the subproject including description of works, to be finalized by the PIC on behalf of the WUGs and revitalized WUAs and approved by the SSC and PIU and submitted to ADB for review.

29. **Step 3: Prepare civil works packages and counterparts for community contracting.** The PIC on behalf of the WUAs and WUGs with oversight from PIU will (i) conduct feasibility study-level assessment of proposed design; (iii) prepare due diligence for economic and financial viability, environment and social safeguards reports; and (iv) prepare packaging of civil works. Eligible infrastructure improvements comprise modernization or protective works in line with the pre-feasibility analysis (see Table 5). Eco-system or nature-based solutions should be considered where feasible and appropriate.

30. Procurement packages will be prepared for the main/secondary canal and associated works in line with the thresholds in the procurement plan in the PAM. Community contracting will be piloted for the Pravaya Vetka irrigation system lower-level canal and ancillary works to be conducted by the WUAs/WUGs. As required, the PIC will facilitate legal establishment of the counterpart units for community contracting and conduct capacity building to ensure eligibility requirements are met (see Mobilization Step 1 above and Section 5 below). If the community contracting pilot is deemed inefficient and unsuccessful, the PIU may request ADB that remaining lower-level and ancillary canal works are conducted using traditional contracting methods.

31. **Deliverable:** The PIU with support from PIC will prepare and submit to ADB for review and approval the feasibility study document including (i) technical feasibility study report; (ii) economic and safeguards due diligence; and (iii) updated procurement plan with indicative list of works packages and cost estimates.

[36] Laycock. 2007. *Irrigation Systems: Design, Planning and Construction*, for example.

Table 5: Eligible infrastructure improvements

Improvement	DWRM Main (1st and 2nd) Canals	WUA Lower (3rd and 4th) Canals
Modernize	More offtakes to tertiary canals	More, higher lower-level earth canals to optimize the NSA + improve efficiency
	Cross-regulators to maintain head during canal flows less than full design capacity	
	Raise canal banks for higher water levels	Division boxes and flow regulating gates
	Limited canal lining (max 10% of total costs)	Limited canal lining (max 15% of total costs)
	Hydraulically efficient siphons under mudflow crossings for min head losses	Other, eg hydraulically efficient flood and mudflow canal crossing structures etc.
	Other interventions identified by PAD	Other interventions identified by PAD
Protect	Upstream mudflow retention basins	WUG and WUA participation in planning, choosing + maintaining preferred options
	Upstream containment embankments	
	Flood and mudflow canal crossings	
	Downstream containment embankments	
	Other downstream protection works	
	Watershed management activities	

Source: Sector Assessment linked document.

32. **Climate change considerations:** Main canal mudflow crossings structures will be designed for the 2050 design flood (Q) based on:

i. Mudflow crossing catchment characteristics and / or areas;
ii. Rainfall intensity, duration and frequency (IDF):
    a. Intensity in 2050 (to account for climate change);
    b. Critical rainfall duration (to be determined for each catchment);
    c. Frequency = 1 in 20-year design flood, with check for 1% flood.

33. To estimate the 2050 rainfall intensity and design flood, the present (stationary climate) critical duration rainfall intensity will be increased by the projected increases in peak daily rainfall intensity (Table 6). See documentation of the approach in Pravaya Vetka Irrigation System – Feasibility Study linked document. If monthly (instead of more normal annual) short-duration rainfall intensity frequency estimates are available, 2050 design Q should be checked in May, June and July.

Table 6: 2050 peak daily rainfall intensities versus present stationary climate

Month	May	June	July	August
Increase (%)	+ 21	+ 26	+ 55	- 34

Source: Asian Development Bank (RCP 8.5 pathway)

34. As necessary, the consultants will also refine the climate risk and vulnerability assessment (CRVA). The refined CRVA will effectively be a 2050 drought risk assessment comparing the difference between 2050 projections and present stationary climate for the: (i) water balance hazard and (ii) irrigated agricultural drought risk and (iii) an adaptation assessment. Relevant projections of 2050 temperature and precipitation are available (see project Sector Assessment).

35. Temperature will be used to project potential (reference crop) evapotranspiration (ET_o). A simple catchment rainfall – runoff water accounting model[37] will be used to project streamflow. The project adaptation assessment will be used to facilitate WUG planning for future 2050 drought disaster risk management. For example, because of temperature rise and earlier snow and glacier melt, the main adaptation intervention is likely to be an earlier start to the annual cropping season.

4.3 Design and Procurement (expected 6-12 months duration)

36. **Lower-level canal.** The CDT teams with oversight from PIC and PIU will assist the counterparts in preparing community contracting project proposals. The PIU will review and approve the contracting proposals. The first 10 proposals for each sub-project will be submitted for ADB prior review and approval, with subsequent packages subject to post review (sampling). ADB may impose additional oversight for prior review as necessary. See further information in Section 5 below.

37. **Main canal and ancillary works.** The PIU and PIC will: (i) sub-contract detailed design of the proposed works, which will incorporate the design considerations described in the feasibility study including climate-proofing elements; (ii) prepare bidding documents including safeguards requirements; and (iii) and conduct tendering in line with the procurement plan requirements including ADB prior review. Contract with winning bidder must not be signed before ADB review and approval of the draft contract.

4.4 Construction (expected 12-18 months duration)

38. If applicable, works may not commence before remedies described in the IEE and/or LARP are undertaken and confirmed by PIC in a report to be submitted to ADB for approval. The PIC with oversight from PIU will conduct construction supervision including review of compliance with safeguards.

4.5 Management (expected 24-36 months duration)

39. The PIU and PIC will commence the management phase during construction. The PIC-A and CDT will facilitate a participatory planning process with the DWR representatives, WUA and WUGs, and farmers to develop and implement: (i) a joint DWR-WUA irrigation management plan to be endorsed by the SCC; (ii) agriculture and on-farm water management plan for each targeted WUA to be endorsed by the respective WUA Council; and (iii) capacity building for farmers to be undertaken by WUAs and WUGs. The plans and capacity building will be developed in an integrated fashion, with each plan/activity ensuring consistency with the other. Implementation support by the PIC will be conducted over 2-3 cropping years.

40. The joint DWR-WUA irrigation management plan is expected to include but not be limited to: (i) water delivery schedule taking into account aggregate cropping pattern based on WUG-level cropping calendar; (ii) asset management plan including operation and maintenance (O&M) financing, cost-sharing, and planning. Irrigation service fee (ISF) level and collection rate should be ensure adequate revenue to cover sustainable long-term maintenance and re-investment. The agriculture and on-farm water management plan is expected to include but not be limited to: (i)

[37] For example, the Soil and Water Assessment Tool (SWAT), https://swat.tamu.edu/, or Water Evaluation and Planning (WEAP) model, http://weap21.org/.

cropping patterns including introduction of and diversification to "win-win" crops;[38] and (ii) precision surface irrigation methods and scheduling.

41. The development and implementation of the management plan will comprise the following activities:

42. *Crop Diversification and Marketing:* Main activity purpose is to promote diversification into modern commercial crops with higher PoW ($\$ m^{-3}$) and NVP ($\$ ha^{-1}$) than present traditional crops, and/or to take advantage of the spring "window of opportunity" from March to June.[39] For example, oils seeds such as rape are presently grown on small areas and generally have as little as a 125 day growing season and a northern planting date as early as March.[40] The PIC and CDT will help WUG members, particularly women, to identify potential diversified crops and potential buyers and negotiate equitable production support and marketing arrangements. This should include information on legal rights, access to finance, and agricultural value chains.

43. *Irrigation Method and Scheduling:* When precipitation is negligible, e.g. during the Kyrgyz summer, agricultural productivity of water applied by farmers is $P_a = (eY_a/ET_a)$ (see Sector Assessment linked document). The primary purpose will be increased actual crop yields (Y_a). However, crop yields can be increased by either improved agronomy (fertilizer and seed, etc.) or by increased water consumption (ET_a). Therefore, if agronomy is also a constraint, this activity will address both these issues together.

44. Where water is scarce, as it is in the Pravaya Vetka irrigation system, the primary method of increasing (ET_a) is to increase irrigation efficiency, starting with farmer field-level where physical water losses are often highest. This requires farmer capacity development to adapt improved irrigation methods and scheduling to increase field-level application efficiency (e = water consumption / water application) and, if water application remains the same, actual crop evapotranspiration (ET_a), yield (Y_a) and NVP.

45. Therefore, this activity will promote farmer adaption of: (i) precision furrow irrigation methods (see Sector Assessment linked document), to increase field-level application efficiency (e), and (ii) scheduling, including the application of more water to less land, to increase (ET_a), (P_a) and NVP.[41]

46. *Comparative Field Trials (CFTs)*. Subject to informed WUG member preferences, PIC and CDT will support CFTs under the target areas, if feasible roughly one per 1000 ha. Progressive farmers would divide their fields and follow: (i) their traditional production practices on one field and (ii) modern crop management practices, irrigation methods and scheduling on others. The latter might include a range of (ET_a) values, at different crop growth stages, up to potential crop evapotranspiration (ET_c). Water applications and actual crop yields (Y_a) would be measured and (ET_a) and PoW (P_a) estimated to determine the optimum NVP.

---

[38] Win-win crops are extensive crops that are both: (a) high-value commercial crops and (b) spring crops (e.g. rape and other oil seeds) that don't compete with traditional crops (e.g. cotton and lucerne) for scarce summer water.

[39] During the spring (March to June) "window of opportunity", crops with this four-month growing season do not compete for scarce summer water with lucerne (perennial), cotton (harvest late September) or corn (August).

[40] FAO. 2006. *Crop Evapotranspiration – Guidelines for Computing Crop Water Requirements* – I & D paper 56.

[41] CRDC. 2012, *WATERpak – a guide for irrigation management in cotton and grain farming systems*, http://cottoninfo.com.au/publications/waterpak.

47. *Farmer Field Days (FFDs)*. The PIC and CDT will support the WUAs in organizing and mobilizing farmer field days to bring stakeholders including farmers from the target and nearby area as well as nearby areas, DWR and other MOA representatives. The objective of the FFDs will be to demonstrate, share, and discuss agricultural management practices and equipment including results of the CFTs. The field day can include presentations, a farmer's market, and walk-throughs of the fields.

48. *Irrigation System Management* will increase irrigation system efficiency, from headworks to farmer field (e = water application / water withdrawal). However, the main challenge is to improve the timing, adequacy and reliability of water deliveries in a trade-off between the present social equity and future economic efficiency objectives (optimum PoW and NVP). Therefore, this important output comprises activities for assessment and participatory planning of: (i) cropping patterns, (ii) water delivery schedules, management of (iii) drought and (iv) climate change risks and (v) sustained system performance through asset management.

49. *Cropping Patterns and Rotations:* Improve agricultural productivity may include: (i) improved cropping pattern, including diversified high-value crops, and (ii) field rotations to facilitate application of more water to less land to increase (ET_a), (P_a) and NVP. For example, the latter might involve dividing the NSA into (say) three zones and irrigating only two zones each year. To meet the social equity objectives, the zones could be rotated each year:

i. Year 1 = zone 1 (irrigated), zone 2 (irrigated) and zone 3 (not irrigated);
ii. Year 2 = zone 1 (not irrigated), zone 2 (irrigated) and zone 3 (irrigated);
iii. Year 3 = zone 1 (irrigated), zone 2 (not irrigated) and zone 3 (irrigated);
iv. Year 4 = repeat year 1 etc.

50. *Water Delivery Schedules:* to develop associated water delivery schedules, the above cropping patterns, crop water requirements (optimum ET_a) and realistic irrigation efficiencies, will be aggregated from crop-level, to farmer field, to quaternary WUG and so on up to the headworks to determine irrigation water withdrawal requirements. On this basis each tertiary-level WUA will negotiate a water delivery contract with DWRM. WUAs and WUGs will have similar agreements.

51. *Water Balance and Drought Risks:* Above cropping pattern and water delivery schedule will be based on a transparent irrigation system water balance with an agreed specific reliability. For example, irrigation systems are often designed for 80% reliability or probability of exceedance. In this case, the probability of drought is 100% - 80% = 20%. However, to optimize the probabilistic NVP, WUG members may choose to manage their system:

i. Normally, for the normal water balance with (say) 50% probability, and:
ii. Differently, in the event of drought, (in this case) also with 50% probability;

52. Consultants will extend the water balance (see Sector Assessment linked document) to assess drought disaster risks (crop production losses) for different hazard probabilities of (say) 50%, representing no drought risk (in the above example), 20%, 10%, 5%, 1%, 0.1% and 0.01%. The NVPs, of crop production losses, will then be used to derive the annual average damage (AAD) from irrigated agricultural drought. References in Section 7.1.2 will be used for prior transparent and equitable prioritization of zones according to their: (i) crops, (ii) growth stage and (iii) yield response to water stress or agricultural PoW ($\$ m^{-3}$). Potential AAD reductions will then be used to assess alternative drought risk management strategies to facilitate WUG choice of their preferred alternative.

53. *Asset Management:* DWR is presently streamlining and finalizing its current draft asset management guidelines.[42] The DWR guidelines and other relevant publications,[43] will be adapted and applied to help WUGs, WUAs and DWRM to prepare their relevant asset management plans including transparent realistic costs. These will include more equitable ISF collection income and O&M cost-sharing agreements between DWRM and WUAs and WUAs and WUGs. If suitable, cost-sharing agreement could comprise transfer of system O&M from DWR to WUAs as per prevailing government policy (see WUA Law, as amended in 2012).

54. *Capacity development and monitoring plan:* The PIU and PIU will undertake quarterly reporting against DMF outcome and output indicators, supported by reporting of progress and results by WUAs facilitated by CDTs.

55. *Annual cycle of planning.* Each annual cycle, of modern irrigated agriculture system management, will involve:

i. DWR, WUA and WUG implementation of relevant agreed plans;
ii. WUA implementation of monitoring and evaluation facilitated by CDTs;
iii. DWR, WUA and WUG re-planning of the following year's system management to improve performance and increase the net value of agricultural production.

5. COMMUNITY CONTRACTING

56. As per ADB PAI 5.10, the PIC with oversight from PIU will be responsible and accountable, to DWR, for providing community development project technical advice, facilitation and management oversight in line with ADB guidelines and policies and local laws.

57. The process will be:

i. The PIU helps the WUA/WUG (the Counterpart) prepare detailed design, cost estimate and proposal;
ii. The PIU approves it, with review from relevant RC (*Ayil Okmot*) and PIC; and:
iii. The PIU and the Counterpart enter into an implementation agreement. A sample is provided at ADB PIA 5.10, Appendix 2, available online: http://www.adb.org/documents/project-administration-instructions.

58. As required by ADB PAI 5.10, board members of the Counterpart will act as the Managing Committee for community contracting and construction. The Counterpart will be responsible for procurement. To the extent possible, the Counterpart should purchase the construction materials, such as cement, steel, stone aggregate and sand, in bulk through shopping procedures by inviting at least three quotations, preferably from local suppliers. Bulk procurement action should be judiciously exercised to avoid pilferage. Labor component of the subprojects can be extended by the members of the community, provided adequate expertise exists.

[42] DWR. 2015. *Guidelines for Management of Irrigation Infrastructure*, 5th draft.
[43] Skutsch. 1998. *Maintaining the Value of Irrigation and Drainage Projects*, Cornish, 1998. *Improved Irrigation System Planning and Management: Aids to Maintenance, Incorporating Guidelines for Monitoring System Condition* and Skutsch. 2001. *Sustainable Irrigation Turnover: Report on System Infrastructure.*

Table 7: Compliance with relevant ADB community contracting eligibility criteria

Eligibility Criterion	Compliance
The proposed subproject should have been identified through community participation and address community needs in terms of priority	High beneficiary demand for such improvements Participatory prioritization process in Section 7.2
The estimated cost of the subproject should be less than $20,000. The limit can be increased to $50,000 (or more) if the community has previously implemented a project successfully.	WUA/WUGs will implement: (i) one initial less than $20,000 subproject and, if successful, (ii) one or more subsequent less than $50,000 subproject(s).
Normally, no resettlement should be necessary	No resettlement. Participatory process allows canals to be aligned to minimize land acquisition.
The community should demonstrate adequate capacity to execute or supervise the project. If not, acceptable arrangements should exist to appoint a capable qualified service provider.	Two-stage process will develop WUA/WUG capacity. Consultant to facilitate WUA/WUG implementation.
Scope of work should be simple + construction methods labor intensive so that community implementation is the most practical solution.	Mainly quaternary and tertiary earth canals Some small structures and metal gates etc. Concrete canal lining limited to 20% of cost
Community should contribute counterpart funds or in kind and organize recurrent operation and maintenance (O&M) works, if required.	WUA/WUGs will contribute approximately 30% of cost as in-kind labor. WUA/WUGs will plan + implement asset management through joint irrigation management plans.
The community, or its nominated representative, should be authorized legally to sign a contract for procurement purposes and should follow approved procurement procedures.	WUA/WUGs will be legally registered by the GoKR

Source: Asian Development Bank.

59. In case the Counterpart cannot identify adequate skilled labor within the community, specialized labor can be recruited by inviting quotations from three local contractors. The contract should be in the local language and simple, adequately addressing the main issues such as scope of work, date of start, completion period, payment terms, progress and quality review, defect-liability period, responsibilities of the Counterpart and contractor, including review, inspection, payment procedures and contract termination. A sample contract is at ADB PAI 5.10, Appendix 3.

60. The Counterpart shall be responsible for construction of the subproject including supervision of the works. Wherever required, the Counterpart shall nominate either among its own members or a local specialist who will oversee the day-to-day supervision of the project. The Counterpart will submit monthly progress status to the PIU and release payments to the contractor as per contract provisions. On completion of the project, the Counterpart shall prepare a comprehensive completion report and detailed accounts which will be submitted to the PIU for review and approval.

61. On completion of the contract, the Counterpart should advise the PIU who will, if required, depute a representative for inspection, to be conducted jointly with members of the Counterpart and the PIC and CDTs. If the inspection team concludes that a project has been implemented satisfactorily, a completion certificate will be issued by the Counterpart countersigned by the PIU and PIC. In case of defects, the contractor shall be provided in writing the list of defects that have

to be made good. A time limit for correction of the defects should also be indicated. On final acceptance, final payments and retention money should be released with the approval of the PIU.

62. Care should be taken to ensure that fund utilization is transparent, in order and subject to adequate auditing. Members of the communities who provide labor are eligible for payments.

Table 8: Organizations and their deliverables by sub-project phase

DMF Output	Resp Org	Deliverable x Implementation Phase				
		Advance Action	Mobilize	Design and Procure	Construct	Manage (O&M)
Input	PIC	PoW baseline survey and topographic survey	Latent demand catalyzed New WUGs formed Exist WUAs revitalized	WUA capacity for IMT and/or PIM progressively developed through cascading participatory planning and implementation (Figure 2) of following deliverables		
1a	DWR WUA		FS approved by DWR and WUAs	Designed and procured	Civil works constructed	
1b	DWR WUA		FS approved by DWR and WUAs	Designed and procured	Civil works constructed	
1c	WUG		FS prepared by WUGs and approved by WUAs	Participatory design and community procurement	Community construction	
2a	WUG DWR WUA			Asset management plan Asset management plan	System cropping plans including win-win crop Joint system operation plan + delivery schedule including disaster and climate change risk management plans	Joint irrigation system management (O&M) plans implemented
2c						
2a	WUA DWR WUA DWR			Main (1st or 2nd) canal management ISF income and O&M cost sharing agreement	Water User Federation (WUF) formed	ISF income and O&M costs shared equitably
2b	WUG WUG			Agricultural land management plan	CFTs implemented FFDs implemented	CFTs implemented FFDs implemented
M&E	WUA				Participatory monitoring, evaluation and re-planning	

APPENDIX 2: DRAFT DESCRIPTION OF OF KYRGYZHYDROMET COMPONENT

COMPONENT A – RESTORATION OF HYDROMETEOROLOGICAL STATIONS/POSTS

1. The existing hydrological network does not allow to fully and reliably observe/monitor the hydrological regime of the challenging terrains/territories of Kyrgyzstan and does not meet the requirements of full-fledged information support for the tasks of qualitative and quantitative assessment of the region's water resources. The following measures/activities are necessary for a meaningful monitoring of the water resources of the Kyrgyz Republic:

(i) Increase in the number of stations of the State Observation Network (taking into account the recommendations of the World Meteorological Organization) (WMO). In accordance with the WMO recommended estimate of the required number of hydrological posts /gauging stations for various physiographic areas, for the territory of the Kyrgyz Republic an area of 199.9 thousand km^2 should be 107 draining/drain stations/posts assuming 1 post/station per 1875 km^2. At present, there are 78 gauging stations operating in the Kyrgyz Republic, i.e. 1 drain post/station per 2701 km^2.

(ii) Modernization and technical re-equipment of the hydrological observation system, transition to modern remotely-automated methods and measuring instruments/equipment/means in accordance with the provisions of the *Action strategy in the field of Hydrometeorology and related areas for the period until 2030* including the equipping of hydrological posts with modern automated observing devices, instruments, analytical and auxiliary equipment, reliable communication systems.

2. In connection with the foregoing, it is proposed to restore observations at previously existing and currently existing hydrological stations, ensuring uniformity of the series of observations of water levels and water discharges in the Chui river basin and in Batken, Jalal-Abad, Osh oblasts:

Chui river basin:
1. River Kara-Kudzhur – village Sary-Bulak
2. River Sujek – mouth of the stream Ichke-Sai
3. River Karakol – mouth of the river Irisu
4. River Kochkor – village Kochkor
5. River Chon-Kemin - mouth of the river Karagaili-Bulak
6. River Chu – settlement/village Nizhne-Chuiskij
7. River Chu – village Cholok
8. River Isyk-Ata – above mouth of the river Tujuk (village Jur'jevka)
9. River Ala-Archa – mouth of the river Adygine
10. River Chu – village Miljanfan

Batken oblast:
11. River Abshir-Sai – village Uch-Terek

Jalal-Abad oblast:
12. River Shaidan-Sai – village Shaidan
13. River Kegart – village Mikhailovka
14. River Chatkal –mouth of the river Ters
15. River Gava-Sai –mouth of the river Ters
16. River Padysha-Ata-mouth of the river Tostu

Osh oblast:
17. River Ak-Buura –mouth of the river Min-Teke
18. River Ak-Buura –mouth of the river Papan
19. River Kyrgyz-Ata –village Kyrgyz-Ata
20. River Karadar'ja- river Uzgen

List of instrument and equipment for a standard gauging station including hydrometric propellers, thermometers, water-level/stage recorder, automated meteorological station and their commissioning

1. Ranging mark/benchmark/control point with positioning to leveling network (30 pcs. main and checking/testing)
2. Level gage
3. Rod, pile (for construction)
4. Automatic level gage
5. Hydrometric crossing/passage (bridge or cradle crossing/passage)
6. Hoister/winch/windlass for cradle crossing/passage
7. Water flow-rate meter complete with accumulator and spare parts
8. Hydrometric meter rod, 6m
9. Hydrometric freight/cargo, mass of 50-100 kg
10. Hydrometric hoister/winch/windlass
11. Ice cutters
12. Water mercury thermometer in a metal frame/setting
13. Automatic weather/meteo-station with charger
14. Thermometers (mercury, maximum, minimum)
15. Meteorological cabin/Stevenson screen with the support/stand
16. Tret'jakov precipitation gage complete with support/stand, with spare measuring jars/glasses
17. Snow-measuring fixed and portable rods
18. Weighing snow gage/gauge
19. Leveling device complete with (rod, three-legged/tripod stand)

List of instruments/devices and equipment for an automatic weather station

1 Lightning arrester/lightning-discharge protector #1
2 Toolkit to configuring automated meteorological station (AMS)
3 Controller for AMS #1
4 Precipitation gage #1
5 Velocity and wind sensor/transducer #1
6 Temperature and relative air humidity sensor/transducer#1
7 Barometer sensor#1
8 Sun sensor #1
9 Soil surface temperature sensor #1
10 Protective cases/Shielding container for AMS #1
11 Electrical accumulator #1
12 Charge controller/Battery charge controller#1
13 Modem #1
14 UV sensor #1
15 Solar cell module/ Solar cells and module #1

COMPONENT B – TOR FOR INFORMATION SYSTEM

3. In a mountainous area characterized by variations of natural and climatic conditions, the existing hydrologic network of Kyrgyz Republic does not allow to fully and reliably monitor/observe hydrological regime. Nor does the present system meet the requirement of full-fledged information support for qualitative and quantitative assessment of region's water resources. The southern regions of Kyrgyz Republic are specifically vulnerable to floods and flash floods. In 1998 Jalal-Abad and Osh oblasts experienced heavy flooding due to excessive spring rain and snow melt in May and June 1998 (source: (World Bank, 1999)).

4. The present system of flood warning in Kyrgyz Republic is completely manual and has the below mentioned limitations:

(i) The rainfall and discharge data is recorded manually. This data is conveyed to Hydromet Bishkek over phone. Hydromet maintains these records on database and hard copy. Limitations: The data transfer from Site to Hydromet Bishkek office takes significant amount of time.
(ii) Kyrgyzhydromet generates flood warnings relying on validated data based on the dependence of the runoff on rainfall that is developed/designed using historical data and informs Crisis Management Center. The Crisis Management Department runs 'what if' scenarios using this information and generates flood alerts and conveys these to the state (Oblast) and district (Rayon)-level disaster management agencies. Limitations: The generation of flood warnings is a completely manual process and is time consuming. The flood warning contains information about water level and discharge at gauge locations only. Limitations: In absence of information about flood extent and flood depth the evacuation planning and emergency operations are based on experience only.

5. The tasks of obtaining reliable and accurate data about hydrological observations of water bodies and improving the quality of information and hydrological services for water management complexes cannot be solved without measures to restore and further develop the hydrological observation system.

Scope of Work

6. The scope of component B includes:

(i) A phone-based system (SMS or android app) to enter data to be transferred to the hydromet server. This includes:
(ii) A simple android-based form/ or text sms in which user can enter data at site itself and this data will be transferred to the hydromet server in digital format.
(iii) This app will work in offline and online mode i.e. when internet is not available the data will be stored in the mobile and as soon as user will be connected to internet the data will be transferred to centralized server
(iv) Data processing application at server to generate discharge and runoff based on historical rainfall-runoff ratios.
(v) A TRMM rainfall-based system parallel to exiting system
(vi) Developing appropriate inundation models to predict inundation extent, depth at any location in the basin, and validating these against historical flood.
    a. This should be done for observed as well as TRMM data.

(vii) Developing an open-source web-based application to generate institution and community targeted inundation forecasts and/or alert messages (via SMS and e-mails) and web enabling the display of maps based on user-selected geographical area.

7. This has three major components:

(i) Rainfall and runoff data from gauging stations/hydroposts

(ii) Data processing at server (Hydromet, Bishkek)

(iii) Generation of flood warnings

Rainfall and runoff data from gauging stations/hydroposts

8. To automate this process, two software applications may be developed.

9. SMS based: if user is not using a smart phone he/she can use this functionality to send observed rainfall and discharge data to the Hydromet, Bishkek server on real time basis.

User has to send this text in the standard format, e.g.

Site Id : 1234
Site Name : abcd
Water level (m): 120
Rainfall (mm) : 50

User has to send this text to a fixed mobile number as shown in the figure below:

Figure 1: SMS based Hydro-meteorological data collection system

10. Smart phone based: If user is using smart phone, he/she can use this functionality to send observed rainfall and discharge data to the Hydromet, Bishkek server on real time basis.

11. A simple android-based form is provided in which the user can enter data at site itself and this data will be transferred to the Hydromet server in digital format.

12. This app will work in offline and online mode, i.e. when internet is not available the data will be stored in the mobile and as soon as the user is reconnected to internet the data will be transferred to centralized server.

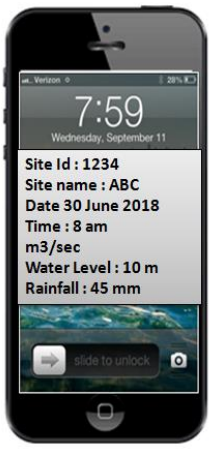


Figure 2: Android (Smart Phone) based Hydro-meteorological data collection system

Data processing at server (Hydromet, Bishkek)

13. Quality check of incoming data: System will provide functionalities so that all the data received by the system is quality checked and approved by a senior officer of the Department of Hydrological Forecasting of KyrgyzHydromet. Any abnormal values (+/- 20% of maximum/minimum of historical data) for any site will be highlighted by the system as shown below in pink color for easy decision-making.

Table 1: Data quality check and approval process

Site ID	Site name	Date	Time	Discharge (Cumec)	Status
1234	ABC	5th July 2018	8:00 AM	1030	Pending
3342	BCD	5th July 2018	8:00 AM	1013	Approved
4004	CDE	5th July 2018	8:00 AM	1424	Approved
9784	DEF	5th July 2018	8:00 AM	1420	Approved
9366	EFG	5th July 2018	8:00 AM	1011	Approved
5214	**FGH**	**5th July 2018**	**8:00 AM**	**12333**	Rejected
9136	GHI	5th July 2018	8:00 AM	1480	Approved
1369	HIJ	5th July 2018	8:00 AM	1081	Approved
5752	IJL	5th July 2018	8:00 AM	1408	Approved
3179	JKL	5th July 2018	8:00 AM	1389	Approved
2738	LMN	5th July 2018	8:00 AM	1017	Approved
8837	PQR	5th July 2018	8:00 AM	1314	Approved

Save Cancel

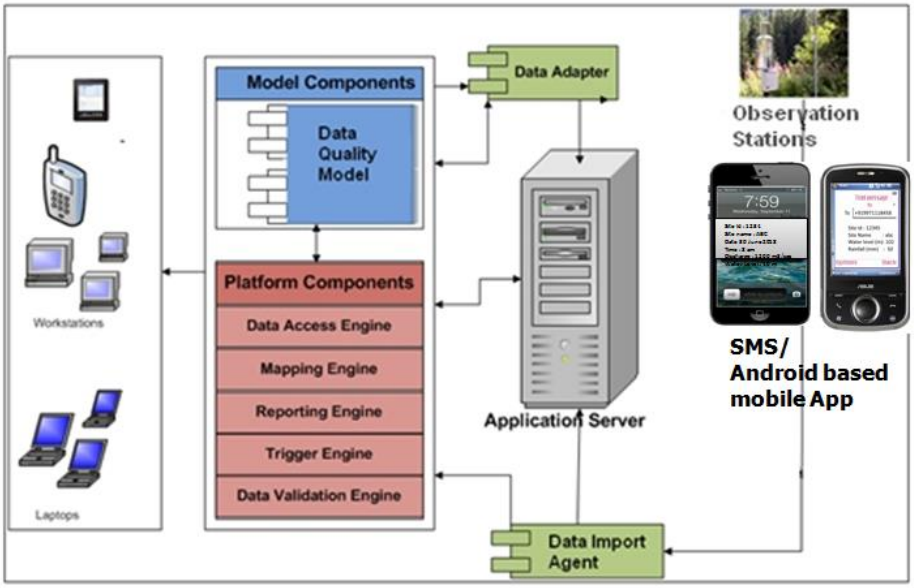
Generation of flood warning

14. As soon as data has passed through quality check, based on relationship developed between rainfall and discharge using historical data, system will search this observed rainfall/discharge value in this relationship table.

15. If this value falls in warning level based on historical data, the warning will be generated and disseminated by the system automatically through e-mail and SMS to the target users.

16. The overall process is shown in the figure below:

Figure 3: Overall process of Hydro-meteorological data collection system

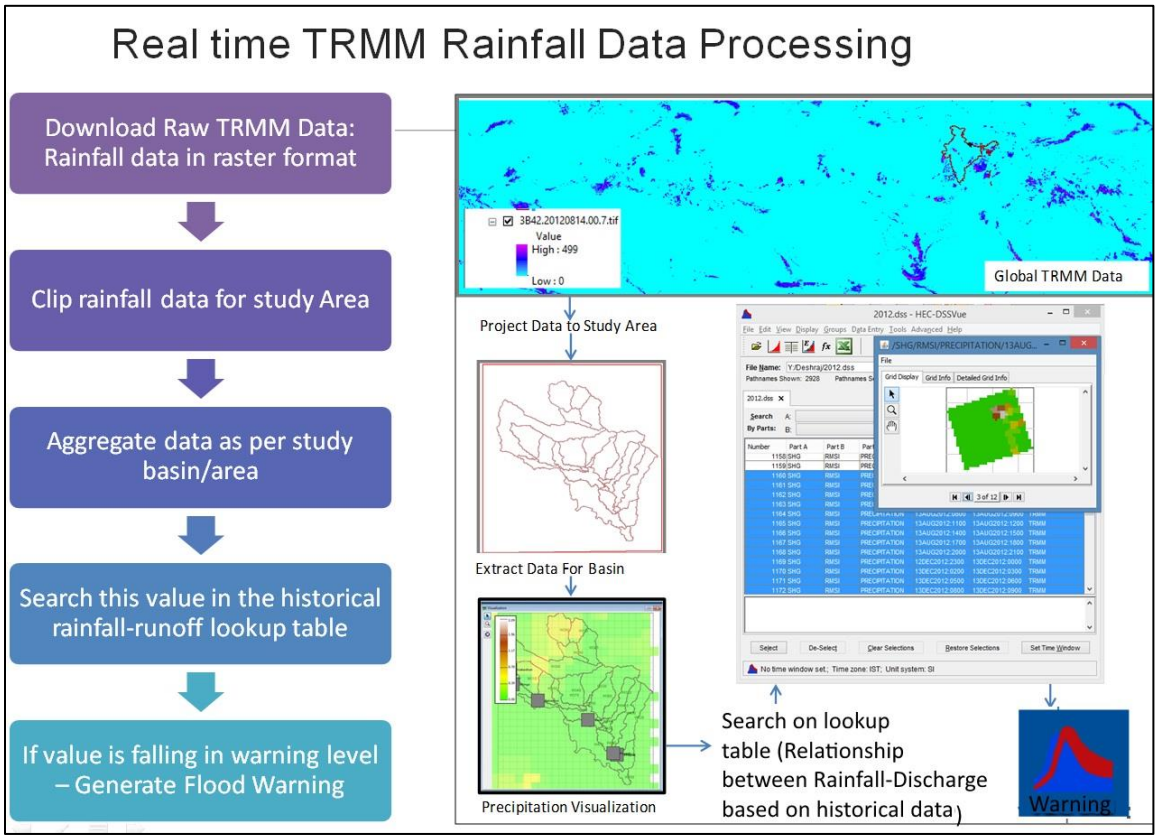


Generation of flood warning using TRMM based rainfall

17. Tropical Rainfall Measuring Mission (TRMM - https://pmm.nasa.gov/data-access/downloads/trmm) is a Multi-Satellite Precipitation Analysis product (Huffman et al., 2007, 2010; Huffman and Bolvin, 2012, 2013) developed by the Mesoscale Atmospheric Processes Laboratory at NASA Goddard Space Flight Center which provides precipitation estimates at 3-hourly and 24 hr temporal resolutions on a 0.25-degree × 0.25-degree grid available from January 1998 to present with a spatial coverage of 60°N–60°S.

The system should download TRMM data on daily basis from NASA server and generate discharge based on rainfall – runoff relationship developed using historical data.

Figure 4: TRMM rainfall-based flood warning system



Development of Inundation model for pilot basin

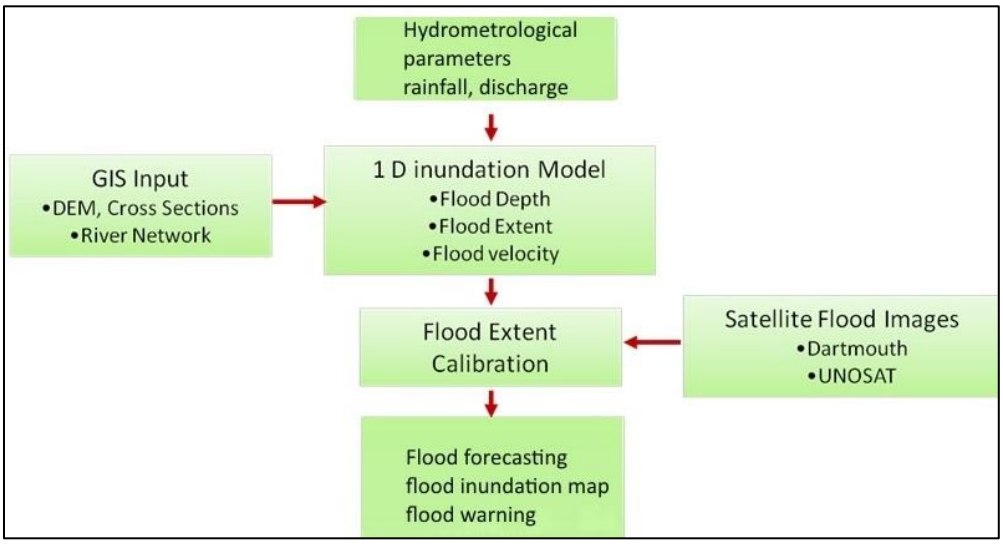
18. It is proposed to use open source GIS based hydraulic model HEC RAS (http://www.hec.usace.army.mil/software/hec-ras/) to calculate water surface profiles, flood depth and flood extent for sample river basin. This model requires the below mentioned key input datasets:

Table 2: Key data requirements, data sources, and data availability

No.	Data Received	Data sources	Comments on data availability/quality
1.	Danger levels for gauging sites	Hydromet	Danger level information will be used to generate flood warning
2.	Historical flood levels	Hydromet	To calibrate and validate model
3.	River center line	Hydromet/Google Earth	
4.	River bank lines		
5.	River names		
6.	Digital Elevation Model	Shuttle Radar Topography Mission (SRTM), USGS	30 m resolution; 1 Arc-second global DEM available for entire world
7.	District boundaries	Hydromet/Diva GIS	http://www.diva-gis.org/Data Data is available for any country (for any country in the world: administrative boundaries, roads, railroads, altitude, land cover, population density)
8.	Division/Oblast boundaries		
9.	Major town names		
10.	Village names		
11.	Country boundary	Diva GIS	
12.	State boundaries		
13.	Block boundaries		
14.	Land use/cover	Diva GIS	Data quality will be checked and will be replaced with client provided data, if available, after suitable checks
15.	Soil	FAO	Downloaded from Harmonic World Soil Database, FAO.
16.	Historical flood event details	Hydromet	
17.	Bridge section lines	Diva GIS/ Open street	
18.	Road lines		
19.	Railway lines		

Most of these input datasets are available in public domain. Flood inundation methodology is presented in flowchart below.

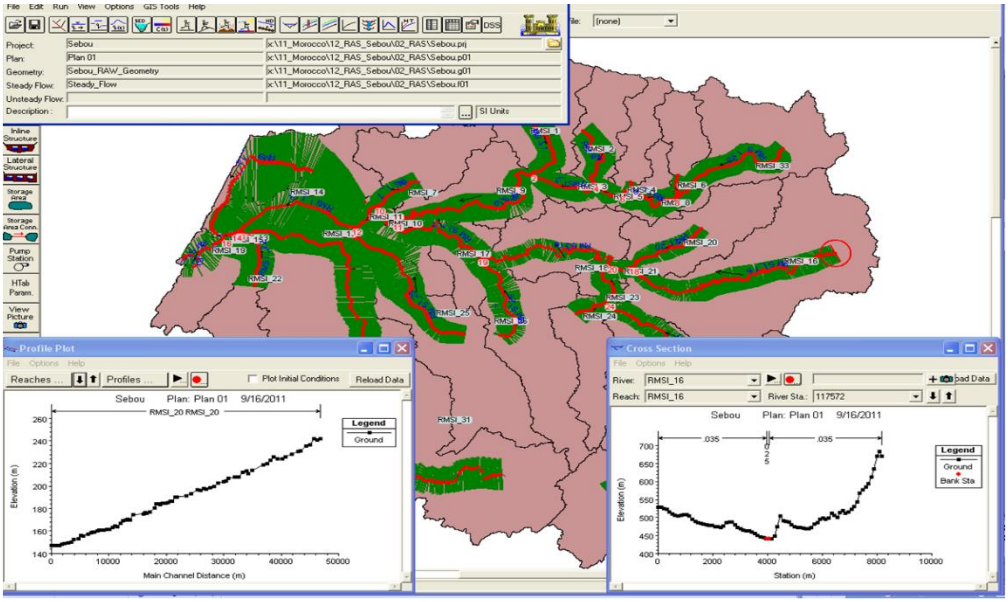
Figure 5 : Methodology for flood inundation modeling



19. We propose to use open source GIS or ESRI GIS environment to generate input file for flood inundation model containing geometric attribute data from a Digital Elevation Model (DEM) such as SRTM DEM (30 m resolution)/ World View DEM.

20. Hydraulic roughness will be estimated initially using the land use map and visual representation from Google Earth. Initial roughness values of 0.025 will adopted for the river channels and 0.035 for the floodplains but these values will be used based on channel section and discussion with the client. These will be subsequently varied during the model calibration process. Figure 6 shows a typical example of the HEC-RAS set up with a plan view of the modeled reaches, longitudinal riverbed profile, and cross-section.

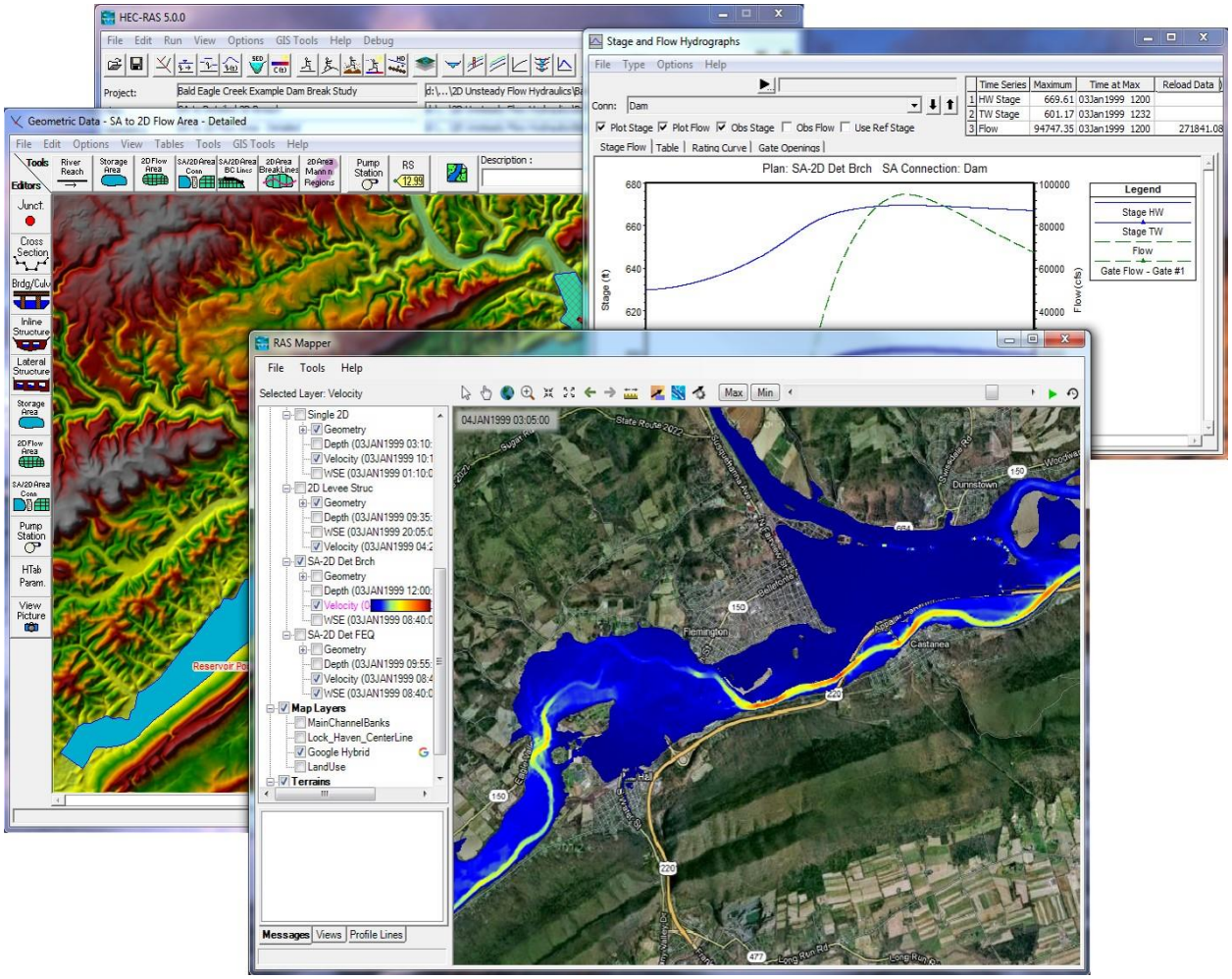
Figure 6: A typical example of open source flood inundation model
(Source: HEC RAS model)



21. Model will be calibrated with the available flood footprints from Hydromet as well as satellite images from global data. Global mapping agencies, such as the Dartmouth Flood Observatory (DFO), and government agencies record the behavior of historical flood events and provide footprints of recent floods.

22. The sample user interface along with output is shown below:

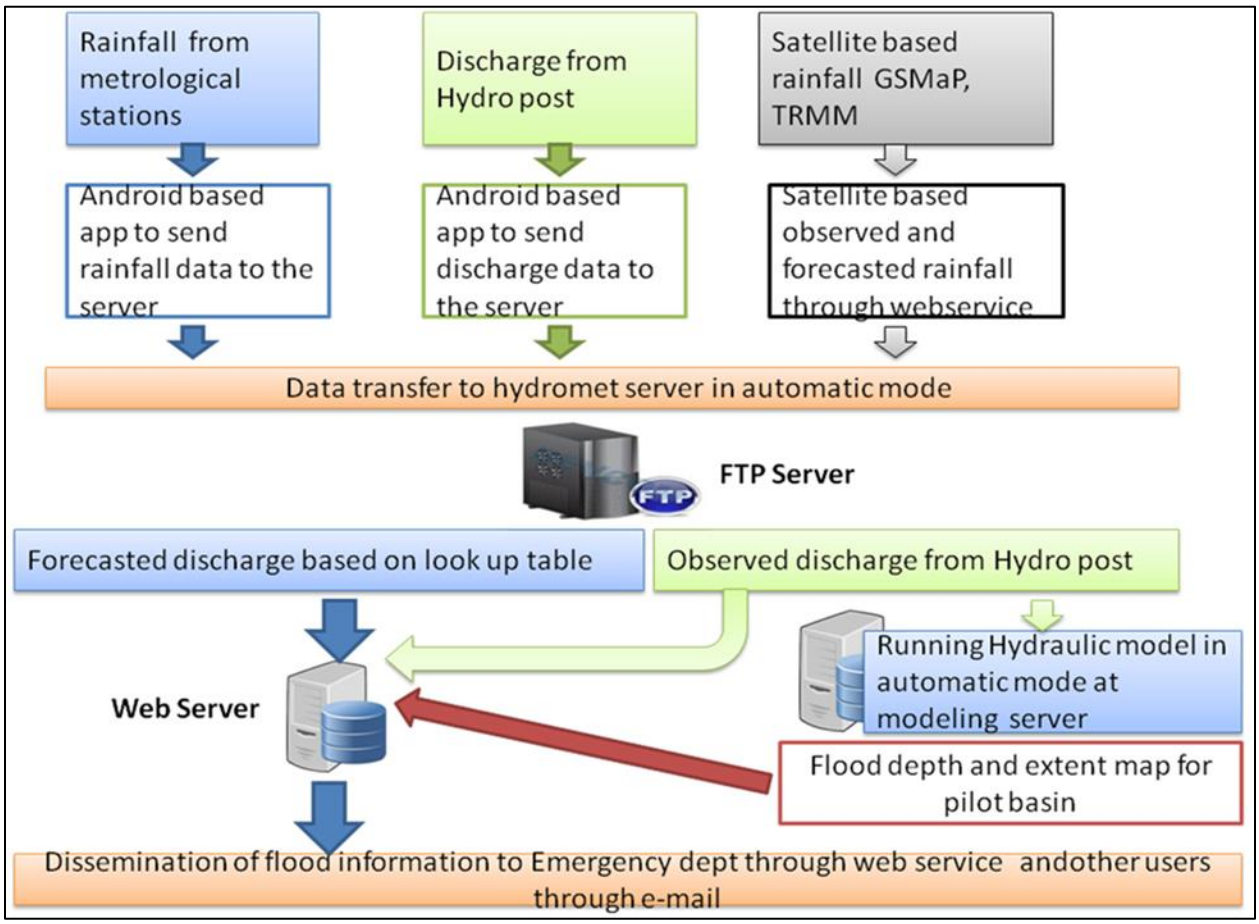
Figure 7: Sample user interface of HECRAS Model and sample flood extent map



23. These outputs will be conveyed to the user through:

- Webpage
- E-mail
- SMS

Figure 8: Layout of the proposed solution



Assumptions

(i) Data purchase cost is not included in the estimate and will be treated as reimbursable component (Historical rainfall, runoff, gauge discharge relationship, rainfall – runoff relationship etc.).
(ii) Servers and hardware will be procured by procured by Hydromet and will be installed on their data centre.

APPENDIX 3: DRAFT HEAVY MACHINERY AND SPECIAL EQUIPMENT

Note: this list is subject to review and amendment in line with project requirements and budget.

No.	Machinery requirement	Amount	Statements of work (technical purpose)	Technical specifications
SOUTHERN EMERGENCY RESPONSE CENTRE, MINISTRY OF EMERGENCY SITUATIONS OF THE KYRGYZ REPUBLIC				
1.	Crawler excavator with hydraulic (water)hammer, volume 0,9-1,1m^3	7	Exploitation and loading of crushed rock in the quarries of Southern Emergency Response Centre MoES of the KR (SERC MoES of the KR)	- Rated power of the engine – 129 kW; -Engine type –diesel; -operating weight is not less than 24 tons; -digging depth is more than 6 meters
2.	Crawler excavator with hydraulic (water)hammer, volume 1,5-1,6m^3	5	Exploitation and loading of crushed rock in the quarries of SERC MoES of the KR	- Rated power of the engine – 180 kW; -Engine type –diesel; -operating weight is not less than 32 tons; -digging depth is more than 6 meters
3.	Crawler excavator with bucket volume of 0,8m^3-1m^3	7	Exploitation and loading of soil (soil group - up to IV) and cleaning of the channels	- Rated power of the engine is not less than 129 kW; -Engine type –diesel; -operating weight is not less than 21 tons; -digging depth - 7 meters
4.	Wheeled excavator with bucket volume of 0,9-1,0m^3	8	Exploitation with loading and disposal of soil of group I-IV and cleaning of the channels	- Rated power of the engine – 129 kW; -Engine type –diesel; -operating weight is not less than 24 tons; -digging depth is not less than 7 meters
5.	Wheeled excavator with bucket volume of 0,7m^3	6	Exploitation with loading and disposal of soil of group I-IV and cleaning of the channels	- Rated power of the engine is not less than 110 kW; -Engine type –diesel; -operating weight is not less than 18 tons; -digging depth is not less than 6 meters

No.	Machinery requirement	Amount	Statements of work (technical purpose)	Technical specifications
6.	Front-end loader with bucket volume of 3m^3	5	Loading and movement of the soil, inert materials, coal, etc.	- Rated power of the engine is not less than 160 kW; -Engine type –diesel; -weight-carrying capacity - 5 tons -function of the arm – discharge (dumping)angle 45^0, dumping reach 1,185 m; -operating weight is not less than 17 tons; -digging depth – 80 mm, loading height is more than 3 m.
7.	Bulldozer with engine power from 180 hp	6	Exploitation and movement of the soil, rough dump pit/waste spreading (scraping)	- Rated power of the engine is more than 180 kW; -Engine type –diesel; -operating weight is not less than 18 tons;
8.	Cable excavator (dragline)	2	Cleaning of the channels, drainage channels	- Rated power of the engine is more than 180 kW; -Engine type –diesel; -operating weight is not less than 22 tons; -swing radius (boom length/outreach) is more than 10 m; -bucket volume - 0,8 m^3
9.	High-sided truck with manipulator	2	Loading and transportation of construction equipment, spare parts and fuel and lubricant materials	-Manipulator's weight-carrying capacity – 10 tons; --Engine type –diesel;
10.	Autocrane (weight-carrying capacity 60 tons)	1	Lifting, loading and unloading of various freights (cargoes), machinery and wheelhouses	- Rated power of the engine – 294 (400) kW h.p.; -Engine type –diesel; - weight-carrying capacity – 60 tons -number of sections - 5; -lifting height (with fly jib) – 13-43,1 (52,1 or 57,6) with autonomous heating of the cab
11.	Autocrane (weight-carrying capacity – 45 tons)	1	Lifting, loading and unloading of various freights (cargoes), wheelhouses and containers	-Engine power – 270 hp -Engine type – diesel

No.	Machinery requirement	Amount	Statements of work (technical purpose)	Technical specifications
				-load lifting with maximum length – 30,5 km - swing radius (boom length/outreach) – 43,6 m -carrying capacity -25 tons, with autonomous heating of the cab
TOTAL		**50**		
NORTHERN EMERGENCY RESPONSE CENTRE, MINISTRY OF EMERGENCY SITUATIONS OF THE KYRGYZ REPUBLIC				
1.	Crawler excavator with hydraulic (water)hammer, for the work in rock quarries	4	Exploitation and loading of crushed rock and soil (group of the soil up to IV)	- Rated power of the engine – 252-266 h.p. (196 kW); -Engine type –diesel with water-cooled and turbo-charging with engine heating; -digging depth is more than 6 meters -bucket volume of 1,5 m^3
2.	Wheel excavator	6	Exploitation and loading of the soil (group of the soil up to IV)	- Rated power of the engine – 180 h.p.; -Engine type –diesel with water-cooled and turbo-charging with engine heating six-cylinder single-row quadruple; -digging depth – 6 meters -bucket volume of 0,9 m^3
3.	Front-end automatic loader	3	Loading, grabbing and transportation of various materials and for excavation and quarry works	- Rated power of the engine- 162 hp; -Engine type –diesel; -cargo-carrying capacity - 10 tons; - digging depth is not less than 8 meters; -unloading height - more than 3 m
4.	Autocrane	1	Lifting, loading and unloading of various cargoes (freight), equipment and wheelhouses	- Rated power of the engine – 294 (400) kW (hp); -Engine type –diesel; - cargo-carrying capacity - 60 tons; -number of section – 5 -lifting height (with fly jib) – 13-43,1 (52,1 or 57,6) with autonomous heating of the cab
5.	Autocrane	1	Lifting, loading and unloading of various cargoes (freight), containers and wheelhouses	- Engine power – 270 (hp); -Engine type –diesel;

No.	Machinery requirement	Amount	Statements of work (technical purpose)	Technical specifications
				- cargo lifting with maximum length – 30,5 km; - swing radius (boom length/outreach) – 43,6 m -carrying capacity – 25 tons with autonomous heating of the cab
6.	Autograder (land leveler)	2	For various excavation works, drainage equipment and for withdrawal of groundwater and for grading the area	- Engine power – 215 hp; -Engine type –diesel maximum cutting depth – 0,56 m; -maximum productivity – 17500 cubic m/h
7.	Tip lorry (dump truck)	10	Movement of goods, crushed rock, loose goods (cargo)	-Engine power – 375 hp -Engine type – diesel, unit of turbo-charging and intercooler -Board – Tonar -tire type – 12.00 R20 -actuator type – 8x4 - total weight – 31 tons
8.	Tip lorry (dump truck)	4	Movement of goods, crushed rock, loose goods (cargo)	- Engine power – 336 hp -Engine type – diesel, with turbo-charging and intercooler with conditioner -Board –Tonar -tire type – 11.00 R20 (20PR layer) -wheel dimensions – 6x4
9.	Bulldozer	3	Exploitation and soil movement, rough scraping (leveling) of quarries and dump pit/wastes, area grading	-Engine power – 190 hp -Engine type – diesel -volume of the blade – $5m^3$ -operating weight – not less than 20 tons with autonomous heating of the engine
10.	Semi-trailer truck “Tral”	2	Transportation of special and engineering equipment (machinery)	-Engine power – 375 hp -Engine type – diesel with turbo charger and autonomous heating, triple-bridge

No.	Machinery requirement	Amount	Statements of work (technical purpose)	Technical specifications
				-carrying capacity of low-bed truck trailer (lowboy) – 40 tons -tire type – 8,25 R20 (PR 20 layer)
11.	Vibratory roller quarry	2	Tamping of the banks and area grading	-Operating weight – not less than 14 tons with standard seal width -1676 mm Full area – 75kW -Engine type – diesel -road clearance- 411mm
12.	Manipulator	2	Loading, unloading and delivery ,mobile apartment buildings	-maximum carrying capacity up to 15 tons -arm/jib/boom - up to 12 m -maximum load on load platform (load bed) up to 15 tons -engine type - diesel
13.	Flusher truck	1	Watering, flushing and cleaning, removal of territory's dirt	-working capacity – 11000 L. -engine power -230 hp -engine type – diesel
14.	Mobile workshop (wheeled workshop)	2	Repair and maintenance of automotive and engineering equipment	-engine power – 180 hp -engine type – diesel equipped with turning, welding, and drilling machines -air-pressure compressor – P250-330 -diesel generator power – 7,5 kW -tractive power (drawbar power) on automobile winch car(vehicle-supported winch) – 3,5 tons
15.	Fuel truck	1	Transportation and delivery of fuel and lubricant materials	-engine power – 260 hp -engine type – diesel -tank capacity – 10 tons -3 axes With autonomous engine heating
16.	Fuel truck	1	Transportation and delivery of fuel and lubricant materials	-engine power – 130 hp -engine type – diesel -tank capacity – 5 tons -3 axis With autonomous engine heating

No.	Machinery requirement	Amount	Statements of work (technical purpose)	Technical specifications
17.	Fork-lift truck	2	Loading, unloading, and transportation of various cargoes(freight) and mobile apartment buildings	-engine power – 110 hp -engine type – diesel -carrying capacity – 5 tons Maximum lifting height – 3000 mm
18.	Dragline excavator	3	Drainage and channel cleaning	-engine power – more than 180 hp -engine type – diesel - swing radius (boom length/outreach) – more than 10 m -bucket volume – 1,5 m^3
TOTAL:		**50**		
SUM:		**100**		

APPENDIX 4: DRAFT TERMS OF REFERENCE FOR PROJECT IMPLEMENTATION CONSULTANTS

I. INTRODUCTION

1. These Terms of Reference (TOR) provide specific details of the project which are relevant to the assignment, implementation arrangements, and objectives of the consultancy. The TOR also provide specific details on the scope of the consultancy and the composition, roles and responsibilities of the consulting team.

A. BACKGROUND

2. The project will strengthen climate change and disaster resilience in the water sector through modernized and well-maintained infrastructure; enhanced agricultural and on-farm water management; and improved data collection and analysis. The project interventions will be both structural (including civil works and equipment) and non-structural (including capacity building, planning, and training). The interventions will be focused in agriculturally-productive areas in the in the Ferghana Valley in the south of the country (centered around Osh) and in Chui River Basin in the north (centered around Bishkek) which are vulnerable to flood, landslide and drought risks that are likely to be exacerbated by future climatic risks.

3. ADB's value addition will be two-fold. The project will take an inclusive participatory approach for irrigation system modernization, involving both government and community stakeholders, to support more productive and sustainable long-term management. The project will incorporate high-level technologies in asset management as a means of supporting more effective and sustainable preventative and recovery works. In doing so, the project will aim to develop a comprehensive package of climate change and disaster resilience investment in a model that may be replicated and scaled up elsewhere in subsequent projects.

4. The project executing agencies (EA) are: (i) the Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration (DWR) responsible for output 1; and (ii) Ministry of Emergency Situations (MOES) responsible for output 3. A single project implementation unit (PIU) will be established within DWR, delegated to implement the entire project on behalf of DWR and MOES.

B. OBJECTIVES AND SCOPE OF THE PROJECT

5. The project outcome will be climate change and disaster resilience of infrastructure and water security improved. The project will be aligned with the following impact: losses from climate change-related disasters reduced in the water resources and agriculture sectors.[44]

6. **Output 1: Irrigation infrastructure protected and modernized.** The project will protect and modernize irrigation systems to improve the water productivity of approximately 20,000 ha irrigated land through upgrading and construction of main (primary and secondary) canals, lower-level (intra-farm and on-farm) canals, and associated infrastructure such as protective mudflow crossing structures, and cross-regulators, and offtakes. A participatory planning, design, and management process involving the DWR, WUAs, and other key stakeholders will be mobilized to ensure equitable and sustainable outcomes. WUA and sub-WUA groups will be reorganized and strengthened. One representative subproject has been selected and developed during project

[44] Kyrgyz Republic. 2015. *Intended Nationally Determined Contribution to the UNFCCC Paris Agreement.* Bishkek; and Kyrgyz Republic. 2018. *Development Program of the Kyrgyz Republic for 2018-2022*, *Unity, Trust, Creation*. Bishkek.

preparation and the project will select a further 2-3 subprojects for investment during implementation. Community-based contracting will be piloted for lower-level canal modernization in the representative subproject, to be expanded to further subprojects if shown to be successful.

7. **Output 2: Irrigation system and agricultural land management enhanced.** The project will strengthen management and operation and maintenance (O&M) of target irrigation systems including practical drought and climate risk management. In conjunction with output 1, the participatory planning process will develop and implement joint DWR-WUA irrigation system management plans including water delivery scheduling and O&M financing and planning. WUA on-farm water management and agricultural management plans with gender elements will be developed, including irrigation scheduling, cropping patterns, and cultural methods, and will be supported with capacity building for farmers and community members (including women) such as comparative field trials and farmer field days.

8. **Output 3: National disaster risk management capacity improved.** The project will support capacity building and upgrade equipment for national disaster risk management in the water resources sector. Heavy machinery and associated equipment for preventative and rehabilitation works will be purchased and installed in the Northern and Southern Emergency Response Centers of the MOES. This will be accompanied by enhancement of the Centers' asset management and capacity building on disaster risk management including project planning, to more efficiently undertake preventative and rehabilitation works in the water resources sector. Hydrological posts for KyrgyzHydromet will be installed in approximately 20 sites in the project's target areas and an information system for enhanced data collection, processing, and flood warning will be piloted for improved efficiency and accuracy.

9. The project is implemented under the sector loan modality. Under project preparation the feasibility study was prepared for only one "core" representative subproject for output 1 and 2: the Pravaya Vetka Irrigation System in Jalal-Abad district. It is expected that during implementation, additional subprojects (approximately 2 to 3, covering roughly 20,000 ha of irrigated area) will be selected from a long-list in line with the project eligibility criteria and feasibility study, due diligence, detailed design undertaken. In addition, roughly 20 sites for hydrological monitoring station construction or rehabilitation have been identified during project preparation, and for which feasibility study, due diligence, and detailed design will be conducted during implementation.

II. SCOPE OF SERVICES

10. The project implementation consultant (PIC) will support DWR, MOES, and the newly established project implementation unit (PIU) to manage project implementation. The scope of services and detailed tasks of the PIC are given in the following paragraphs. For indicative purposes only, this package of consulting services is estimated at 58 person-months of international consultants and 121 person-months of national consultants.

11. For outputs 1 and 2, the PIC will support the efficient and timely implementation by the PIU of the design and implementation of a participatory design and management approach for irrigation system modernization and protection to improve productivity of water in the target areas. The services will cover: overall project management, oversight, and coordination; procurement support; monitoring and evaluation; construction supervision: and capacity building for system management (O&M).

12. For output 3, the PIC will support the efficient and timely implementation by the PIU of the procurement and installation of equipment and accompanying capacity building activities for

MOES and KyrgyzHydromet. The services will cover: overall project management, oversight, and coordination; procurement support; monitoring and evaluation; and construction supervision.

III. KEY EXPERTISE REQUIRED

13. The consultant team will be led by an international firm with preferably 10 years' experience in designing and preparing similar externally financed projects in the water resources and related sectors, preferably with ADB and in the Central Asia region. It may be advantageous for the lead firm to partner with a local firm or NGO with experience in community mobilization and WUA capacity development activities for outputs 1 and 2.

14. The terms of references are prepared on a performance (output) basis, and thus proposing firms will in their proposal determine the number and the nature of experts they will require to achieve assignment tasks and deliverables, in accordance with their proposed approach and methodology. However, DWR and MOES requires a minimum number of key experts, including a Team Leader, as tabulated in Table 1 below. A time-based contract will be awarded to the winning firm with provisional sums for (i) workshops, and training ($60,000), (ii) studies, surveys, and design ($500,000), and (iii) community mobilization and development ($500,000). The contingency under the contract are provided in the amount of $235,000.

15. In addition to the required key experts, the proposing entities should also include in their technical proposal, in the personnel work plan, and in their financial proposal all other "non-key experts" required in accordance with their proposed approach and methodology. The proposing entity must also determine and indicate the number of person-months for which each key or non-key expert will be required. For indicative purposes only, the non-key experts might include: environment specialist, financial management specialist, and procurement specialist. Administrative and support roles (e.g. firm's own financial and contract management) should not be included as non-key experts, and such costs should instead be factored into the overall bid price. Note: in their proposal of non-key experts, firms should not duplicate the national consultant positions already appearing in the PIU.

Table 1: Required Key Experts

Position	Specialist	
	International	National
Irrigation System Management Specialist[1]	✓	
Agriculture and Marketing Specialist	✓	
Community Development Specialist	✓	
Disaster Risk Management Specialist	✓	
Hydromet Specialist	✓	
Financial Management Specialist	✓	
Gender and Social Development Specialist		✓

[1]Irrigation System Management Specialist international specialist is expected to be Team Leader. Firms may if they wish indicate alternate key expert to serve as team leader with adequate team leader experience against the qualification requirements.

IV. DETAILED TASKS

A. Project Management and Coordination

(i) For planning of project activities, review and familiarize with project documents including project administration manual (PAM), report and recommendation of the president (RRP)

and all RRP linked and supplementary documents, particularly the sector assessment and water balance.

(ii) Assist in coordinating all matters related to project implementation with relevant authorities of the government, the local administration, ADB, and other organizations;

(iii) Develop and provide on-the-job training for the PIU on implementing ADB guidelines and procedures including those on gender mainstreaming, and efficient project implementation and scheduling techniques;

(iv) Assist in programming project activities, periodically estimating the financial requirements for these activities and the release of funds on time;

(v) Review the feasibility level studies and designs (including structural audits) prepared under project preparation and a support preparation of feasibility studies for additional subproject and civil works identified during implementation; where necessary revise or elaborate to incorporate any newly introduced operational procedures, changes in the design of the project works and additional data that may have become available after the preparation of the original documents;

(vi) Support the PIU in selection of additional subprojects and civil works sites in line with eligibility criteria and safeguards considerations;

(vii) Assist in coordination with other agencies concerned to ensure that procurement of works, goods, and services follow ADB's guidelines and procedures, and that all steps are taken expeditiously and in a transparent manner;

(viii) Familiarize and train PIU staff on project financial management requirements, including ADB guidelines and procedures on disbursement;

(ix) Assist in ensuring that the financial management and accounting standards for the project meet ADB's requirements and that the withdrawal applications sent to ADB are complete, accurate and are sent on a timely basis;

(x) Ensure that PIU's financial, procurement, and contract management are fit for purpose, including for piloting and subsequent expansion of community contracting;

(xi) Ensure that all periodic reports are prepared systematically, submitted on time, reflect the real picture of project implementation; that major issues relating to project implementation are brought to the attention of the concerned parties and the necessary remedial measures are implemented; and

(xii) Assist in maintaining detailed financial accounts and other project records and prepare other documentation as may be required by the EA, PIU Director or ADB.

B. Monitoring and Evaluation of Project Progress and Safeguards

(i) In coordination with MOES, DWR, WUAs, and the PIU develop a project monitoring and evaluation (M&E) system covering but not limited to the project design and monitoring framework (DMF), summary poverty reduction and social strategy (SPRSS) and the gender action plan (GAP) targets as described in the project documents. This is expected to include but not be limited to: (i) quantifiable indicators to monitor and measure improvements in agricultural and water productivity; (ii) quantifiable indicators to monitor and measure improvements in institutional performance; (iii) gender indicators for sex-disaggregated data monitoring; and (iv) responsibilities and mechanisms for periodic project reporting.

(ii) Ensure that such an evaluation system will be compatible with or improve MOES's, DWR's, and WUAs' existing systems to monitor performance so that the independent monitoring of the project impact can be performed effectively after project completion;

(iii) Develop in coordination with PIU a standard format for project reports that can be used on a periodic basis (quarterly, annually) to reflect project progress;

(iv) Assist the PIU in preparing periodic progress reports (quarterly and annual);

(v) Prepare manuals and conduct training for the EA and PIU staff who will be responsible for project M&E to conduct regular monitoring of the project activities and prepare project progress reports;
(vi) Assist the PIU to establish and implement Grievance Redress Mechanism;
(vii) Assist PIU to (i) update as necessary the environmental monitoring plans (EMPs) including cost provided in the prepared initial environmental examinations (IEEs); (ii) include the EMP in bidding documents; (iii) monitor and review the EMP in line with ADB's SPS and as provided in the bidding document; (iv) effectively implement and carry out activities related to implementation of the EMPs; and (v) assist PIU in preparing the environmental monitoring report on a bi-annual basis for submission to ADB. In this respect, the consultant will ensure that all project components are implemented as required by the environmental laws of the Government of Kyrgyz Republic and ADB's SPS;
(viii) Assist the PIU to monitor and assess the environmental impacts of all required works under the project, and as necessary prepare IEE/EMP for additional subprojects and civil works identified during the project;
(ix) Assist the PIU to identify environmental, land acquisition, and resettlement sensitivities in the project area requiring further investigations and prepare plan on mitigation measures;
(x) Assist the PIU to evaluate the requirements for environmental monitoring and prepare a long-term environmental monitoring program;
(xi) Assist in preparing Environment Health Safety Plan, Change Management Statement if required and Resettlement Plans for all locations where project civil works will involve land acquisition and/or livelihood disruption on rights of way.
(xii) If required in line with ADB's SPS, assist PIU in reviewing, preparing, implementing, and disclosing the Land Acquisition and Resettlement Plans (LARP) for all subprojects and civil works (including those identified during implementation) and in the conduct of due diligence and formulation of corrective actions for activities or land acquisition assessment not covered in the project preparation in accordance with the ADB's SPS;
(xiii) If applicable, support PIU in monitoring and carrying out activities related to implementation of the LARP in line with relevant ADB guidelines;
(xiv) Implement the GAP and/or other actions integrated in the project design that address the gender issues identified in the social and gender analysis, which includes, among other things, actions that promote women's involvement in the project implementation and receipt of project benefits; and
(xv) Prepare the project completion report at the end of project implementation for finalization by the PIU, DWR, and MOES.

C. Procurement support

(i) Familiarize and train PIU staff on project procurement requirements, including ADB guidelines and procedures on procurement and use of consultants;
(ii) Enhance contracting capacity at DWR and MOES, paying particular attention to on-the-job transfer of knowledge, as well as organizational and management considerations;
(iii) Assist PIU in preparing and periodically updating detailed procurement plans and packages, and determine realistic time-bound schedules for procurement, including parallel and sequential steps for completing procurement activities from initial planning to delivery of goods and services;
(iv) Prepare bidding documents for procurement of works, goods and services, in consultation and coordination with the PIU;
(v) Assist PIU procurement specialist conduct of prequalification (as required), issuance, bid opening, and evaluation of bids, leading to the award of contracts, in line with relevant ADB guidelines and project procedures; and

(vi) Assist the PIU procurement specialist in preparing: high quality bid evaluation reports in line with ADB guidelines, discussions during pre-contract award meetings, and finalization of the contract for ADB's approval.

D. Construction Supervision

16. The PIC will administer the civil works and equipment installation contracts and ensure that the project is constructed in accordance with the provision and intention of these contracts. Works will be executed under the International Federation of Consulting Engineers (FIDIC) Conditions of Contract for Works of Civil Engineering Construction. For the core subproject (Pravaya Vetka), the project will pilot community contracting for the lower-level canal works in line with ADB project administration instructions 5.10.[45] This will be applied to other subprojects unless it is found to be inefficient or unsuccessful. Accordingly, DWR/MOES (as applicable) will be the Employer and the PIC will function as the Engineer. The PIC will be nominated supervision representative(s) who will be a full-time resident near the works areas. The responsibility of the PIC includes, but is not limited to, the following tasks:

(i) Give the order to commence works. If applicable this should only take place upon ADB's approval of validation report of LARP execution;
(ii) Review and approve proposed personnel for positions nominated in the Contract;
(iii) Inspect and approve all material sources identified by the Contractor;
(iv) Review and approve the Contractor's implementation schedule and supervise the progress of construction works. The Consultant will keep the Employer informed of any delay or potential delays in the work schedule of the Contract, and will take all necessary actions to prevent potential delays;
(v) Review, approve and monitor the construction plan to ensure the un-interrupted flow of traffic during construction, and to ensure that construction activities do not endanger safety of the public;
(vi) Regularly monitor and inspect the contractor's quality control and assurance program to ensure that quality of the finished works meet the contract standards and specifications. This includes regular checking of the materials testing program;
(vii) Advise and assist the Employer with respect to arbitration or litigation relating to the works, whenever required;
(viii) Monitor progress of the construction works through computer- aided project management techniques;
(ix) Convene regular site meetings with the Contractor to discuss issues and problems affecting the progress, and brief the Employer;
(x) Coordinate with the relevant local government authorities / agencies to minimize disruption to the works program, as required by the Contractor;
(xi) Review the contractor's insurance cover to ensure that the contractor has provided all the insurance required by the contract and such insurance are maintained throughout the contract period;
(xii) Prepare any required variation orders requested by the Employer and review any variation order proposed by the contractor and provide their advice to the Employer in accordance with the contract;
(xiii) Review all claims submitted by the Contractor and provide advice to the Employer of the validity of the claim, the effect of such claim on the construction schedule and the cost of the project;

[45] http://www.adb.org/documents/project-administration-instructions

(xiv) Review and comment on the monthly progress reports submitted by the contractor detailing the work undertaken during the previous month, the progress of the work against the approved schedule, the problems and difficulties encountered by the contractor and other issues requested by the Employer;
(xv) Issue completion certificate after satisfactory completion of the works in accordance with the contract provisions;
(xvi) Prepare detailed social screening and mitigation plans, if necessary, and develop poverty monitoring impact monitoring systems;
(xvii) Ensure that the construction methods as proposed by the contractor for carrying out the works are satisfactory, with particular references to the technical requirements of (a) the EMP, (b) inspection of contractor's construction equipment, (c) safety of the works, property, personnel, and general public;
(xviii) Assess and check the laboratory and field tests carried out by the contractor and carry out independents tests.
(xix) Issue orders to the Contractor to remove or improve any works that are not in accordance with the drawings and/or specifications;
(xx) Maintain records of all testing work, including cross-referencing of items of work to which each test refers and location from which any samples were obtained for testing;
(xxi) At the completion of the contract, verify the contractor's "as-built drawings" as a true record of the works as constructed;
(xxii) Measure the completed works and keep detailed records, including the measurement books;
(xxiii) Prepare quarterly cash flow projections for the Employer in an acceptable format, in which cash flow should identify budget estimates for all outstanding works;
(xxiv) Maintain records of all plant, labor and materials used in the construction of the works;
(xxv) Process interim and final payments to the Contractor (interim monthly payment shall be based on interim payment certificate processed by the Consultant following claims filed by the Contractor);
(xxvi) The Consultant will be responsible for checking and monitoring the performance requirements in the Contract and ensuring the criteria and limits are met;
(xxvii) Maintain a day-to-day diary, which shall record all events pertaining to the administration of the contract, request forms, and order given to the contractor, and any other information which may at a later date be of assistance in resolving queries which may arise connecting execution of the works; and
(xxviii) Develop and implement training programs for DWR and MOES staff at the site on project management including quality assurance and contract administration.

E. Capacity Building and Implementation of Project Components

Outputs 1 and 2

17. The PIC, with oversight from PIU, will design and implement the phased subproject approach described in the project documents including Appendix 1 of the PAM, and ensure delivery of associated deliverables for DWR, WUA, and ADB review and approval. The phases are expected to comprise: advance action, mobilization, design and procurement, construction, and management. As per the project documents, this includes but is not limited to, the following activities for each subproject:

Advanced action

(i) Design, and periodically update as required, the detailed implementation plan including subproject scheduling and phasing as well as community mobilization resources requirements;
(ii) Undertake through subcontracting topographic surveys and calculation of productivity of water of target areas;
(iii) Prepare information announcements for local media;
(iv) Prepare initial irrigation system diagnostics based on surveys and initial field work; and
(v) Recruit and manage community development teams (CDTs) through sub-contract under community mobilization provisional sum, and plan resources and mobilization requirements.

Mobilization

(i) With support from CDTs, mobilize farmers and WUAs and WUA sub-groups (WUGs) including undertaking reorganization, establishing and ensuring eligibility, undertaking capacity assessment, providing training on accounting and irrigation service fee calculation and collection, and capacity building for community contracting;
(ii) Plan, recruit, and mobilize community mobilization teams;
(iii) Facilitate joint system management process with support of community mobilization teams; and
(iv) Prepare civil works packages including conducting feasibility study incorporating climate proofing considerations, gender, environmental and social safeguards due diligence, and economic analysis.

Design and Procurement

(i) Assist preparation and initiation of community contracts; and
(ii) Sub-contract and review detailed design of main canal works and initiate tendering process.

Construction

See above section on construction supervision.

Management

(i) Design and implement a participatory process with the DWR representatives, WUA and WUGs, and farmers to develop and implement: (i) a joint DWR-WUA irrigation system management (O&M) plan to be endorsed by respective parties; (ii) agriculture and on-farm water management plan for targeted WUA to be endorsed by WUA Board; and (iii) capacity building for farmers including demonstration activities comprising comparative field trials and farmer field days.

Output 3

18. The PIC, with oversight from PIU, will design and implement the equipment design, procurement, installation and associated capacity building for MOES and KyrgyzHydromet. As described in the project documents including PAM this comprises (i) heavy equipment for Northern and Southern Emergency Response Centers (ERCs) of MOES and capacity building for disaster risk management including asset management and project planning; and (ii) installation or rehabilitation of hydrological monitoring stations for KyrgyzHydromet and enhancements to data collection, processing, and flood risk warning. Bidding documents have already been drafted for the heavy machinery by the project preparation consultant. The PIC tasks are expected to

include, but not be limited to, the following activities, undertaken with oversight of PIU and collaboration with MOES and/or Kyrgyz Republic representatives:

ERC Equipment and Capacity Building

(i) Design, and periodically update as required, the detailed implementation plan for equipment installation and capacity building;
(ii) Support the PIU in the procurement process including review of bidding documents and bid evaluation;
(iii) Monitor secure and efficient handover and use of equipment in line with project documents including grant and loan agreements, and identify and report necessary remedial measures in periodic project reports;
(iv) Develop and mobilize training for disaster risk management in ERCs and MOES including project planning and tracking, equipment management and tracking for optimal and sustainable O&M, and asset management of protective infrastructure; and
(v) Develop sustainable O&M plan for ERCs and guidance document as manual to accompany training and support effective long-term retention of capacity.

KyrgyzHydromet Equipment and Capacity Building

(i) Design, and periodically update as required, the detailed implementation plan for equipment installation and capacity building;
(ii) Support the PIU in the procurement of necessary works, goods, and services;
(iii) Undertake detailed design, environmental and social safeguards due diligence as necessary, and support tendering of hydrological monitoring stations for installation and connection to existing monitoring stations, including review of proposed station location and proposal (if necessary) of alternate locations;
(iv) Develop detailed terms of reference for improved enhancement to data collection, processing, and warning based on framework in PAM Appendix 4 support recruitment of supplier to implement the delivery of goods and services; and
(v) Manage the implementation of enhancements including testing, seeking and incorporating feedback from stakeholders, and providing necessary training for handover and sustainable operation.

I. Key (Required) Experts

19. The expected detailed tasks of the key experts are presented below. It should be stressed, however, that these reflect the broad area of activities and are not exhaustive. In its proposal, the firm is expected to present how the scope of activities detailed tasks presented above have been mapped to their proposed key and non-key experts.

20. In addition to the technical inputs specified below, each expert will support the team leader in (i) identifying relevant developments in government strategy, policy, and legislation; (ii) identifying best-practice techniques and lessons learned from previous and ongoing studies and projects[46] of the relevant sectors as well as options to improve the project design; (iii) identifying capacity building requirements specific to his/her field of expertise; and (iv) preparing relevant sections in the reports.

[46] Documentation from recent ADB studies and projects is available on request.

1. Irrigation System Management Specialist/Team Leader (International)

a. Key Responsibilities

The Irrigation System Management Specialist will act as the Team Leader for the Project and will report to the Project Director in DWR and MOES and PIU Director. The specific tasks of the specialist are expected to include but not be limited to:

Team Leadership

(i) Coordinate and lead the activities of the international and domestic consultants as part of the team leadership group and ensure the consultants achieve their respective deliverables;
(ii) Cooperate with other international consultants to ensure that appropriate project management systems are established for financial management (budgeting, withdrawals, disbursement and reporting), procurement, monitoring and evaluation (including environmental and social) and reporting in accordance with ADB guidelines;
(iii) Coordinate closely with other agencies and international donors in the strategic and day to day activities of the Project;
(iv) Provide on the job training for the National Irrigation System Management Specialist;
(v) Prepare regular progress and final reports in English and Russian;

Irrigation System and Land Management

(vi) Provide technical advice to facilitate: (a) informed collective decision-making, by DWR and all WUA members, and (b) achievement of the project outcome agricultural productivity of water (PoW) and net value of production (NVP) performance indicators;
(vii) Lead preparation and review of technical and institutional diagnostics of irrigation system, feasibility study, and detailed design for irrigation system modernization and rehabilitation incorporating environmental, social safeguards, and climate change considerations;
(viii) With Community Development Specialist, lead preparation, implementation, and monitoring of phased participatory process for design, construction, and irrigation system management (O&M) of subprojects;
(ix) Help train and support community development teams;
(x) Lead preparation and mobilization of consultation and capacity building activities for improved irrigation system operation and maintenance including preparation and implementation of joint management plans and additional training materials.

b. Qualifications

(i) A graduate degree (preferably post graduate degree) in irrigation engineering, water resources engineering, civil engineering, or related field;
(ii) Minimum of 12 years' experience in implementing similar development projects, ideally including agricultural productivity of water (PoW) and net value of production (NVP);
(iii) Regional experience is preferred, as well as experience in participatory development approaches;
(iv) At least 5 and preferably 7 years' experience as Team Leader.
(v) Experience in transitional economies such as Central Asian region preferred.

2. Agriculture and Marketing Specialist (International)

a. Key Responsibilities

The Agriculture and Marketing Specialist will report to the Team Leader and will work closely with the project team. The specific responsibilities of the specialist are expected to include but not be limited to:

(i) Lead all agriculture-related aspects of outputs 1 and 2, particularly for mobilization and management and capacity building components therein;
(ii) Support planning and monitoring of overall phased approach to subprojects;
(iii) Support diagnostic, feasibility study, and detailed design activities for irrigation system design;
(iv) Help train and support community development teams;
(v) Lead preparation and mobilization of consultation and capacity building activities for improved agricultural management including preparation and implementation of agricultural management plans and additional training materials; and
(vi) Support monitoring of project progress and report preparation.

b. Qualifications

(i) A graduate degree (preferably post graduate degree) in agronomy or related fields;
(ii) At least 7 and preferably 10 years' experience in similar development projects for agricultural development and / or extension; and
(iii) Experience in transitional economies such as Central Asia region preferred.

3. Community Development Specialist (International)

a. Key Responsibilities

The Community Mobilization Specialist will report to the Team Leader and will work closely with the project team. The specific responsibilities of the specialist are expected to include but not be limited to:

(i) With Team Leader, lead preparation, implementation, and monitoring of phased participatory process for design, construction, and irrigation system management (O&M) of subprojects;
(ii) Lead and coordinate: (a) development of a simple Process Implementation Manual, and (b) planning, recruitment, training and deployment of community development teams;
(iii) Lead preparation and mobilization of consultation and capacity building activities improved system management and operation including training materials; and
(iv) Support monitoring of project progress and report preparation.

b. Qualifications

(i) A relevant graduate degree (preferably post graduate) in humanities, international development, anthropology, institutional development, agricultural studies or related fields and/or substantial practical experience and proven track record in developing and facilitating widespread replication, or scaled-up implementation, of participatory community development processes;
(ii) At least 7 and preferably 10 years' experience in similar development projects with participatory community-driven development approaches; and
(iii) Experience in transitional economies such as Central Asia region preferred.

4. Disaster Risk Management Specialist (International)

a. Key Responsibilities

The Disaster Risk Management Specialist will report to the Team Leader and will work closely with the project team. The specific responsibilities of the specialist are expected to include but not be limited to:

(i) Lead the preparation, management, monitoring, and implementation of equipment and capacity building activities for Northern and Southern Emergency Response Centers;
(ii) Provide technical review of procurement of goods and works;
(iii) Lead preparation of disaster risk management plans (sustainable O&M plans) for Northern and Southern Response Centers including improved asset management and project preparation and implementation.
(iv) Prepare and mobilize capacity building program for disaster risk management of Northern and Southern Response Centers and other MOES staff including training materials;
(v) Support monitoring of project progress and report preparation.

b. Qualifications

(i) A graduate degree (preferably post graduate degree) in disaster risk management, civil engineering, or related fields;
(ii) At least 7 and preferably 10 years' experience in similar development projects; and
(iii) Experience in transitional economies such as Central Asia region preferred.

5. Hydromet Specialist (International)

a. Key Responsibilities

The Hydromet Specialist will report to the Team Leader and will work closely with the project team. The specific responsibilities of the specialist are expected to include but not be limited to:

(i) Lead the preparation, management, monitoring, and implementation of equipment installation and capacity building activities for KyrgyzHydromet;
(ii) Lead preparation of terms of reference for disaster risk and water resources information system pilot including flood forecasting;
(iii) Lead preparation and mobilization of consultation and capacity building activities for system integration and operation including training materials; and
(iv) Support monitoring of project progress and report preparation.

b. Qualifications

(i) A graduate degree (preferably post graduate degree) in hydrology, meteorology, or related fields;
(ii) At least 7 and preferably 10 years' experience in similar development projects with flood hydrological monitoring and flood forecasting components; and
(iii) Experience in transitional economies such as Central Asia preferred.

6. Financial Management Specialist (International)

a. Key Responsibilities

The Financial Management Specialist will report to the Team Leader and will work closely with the project team. The specific responsibilities of the specialist are expected to include but not be limited to:

(i) Lead the establishment, monitoring, and implementation of the financial management system for the project within the EAs and PIU;
(ii) Provide on-the-job training for EA and PIU staff on financial management matters, monitor internal control implementation to meet requirements of project objectives and covenants, ADB policies and guidelines, and local laws;
(iii) Establish Financial Policies and Procedures Manual (if not yet available) and used for project financial management requirements. Prepare financial management guidelines and training materials for PIU staff; and
(iv) Support monitoring of project progress and report preparation.

b. Qualifications

(i) A graduate degree (preferably post graduate degree) in accounting, business administration, economics, or related field;
(ii) The specialist should be a chartered accountant with at least 7 and preferably 10 years' experience in similar development projects; and
(iii) Experience in transitional economies such as Central Asia region preferred.

7. Gender and Social Development Specialist (National)

a. Responsibilities

The Gender and Social Development Specialist will report to the Team Leader and will work closely with the project team to ensure that gender is mainstreamed all throughout project implementation. The specialist will oversee the quality implementation of the gender action plan whose responsibilities include, but are not limited to:

(i) Conduct gender orientation/training of the project staff to ensure sensitivity to, and incorporation of, gender considerations in every phase of project/subproject design, implementation, and monitoring;
(ii) Work with relevant project experts to incorporate gender fair messages, in the development of manuals, awareness campaign materials, contracts, and training modules, and ensure equitable gender representation in project consultations, project grievance mechanisms, coordination committees, and other bodies, as well as in farmers and other community trainings on DRM, climate resilient OFWM and improved agricultural practices, among others;
(iii) Conduct gender orientations and trainings for WUAs and other relevant community groups;
(iv) Lead the incorporation of gender indicators in the project monitoring system, and ensure regular collection of sex-disaggregated information; and
(v) Lead the monitoring of GAP implementation, ensuring accurate data collection and proper documentation, and lead the report preparation on gender equality results at every project progress review.

b. Qualifications

(i) A graduate degree (preferably post graduate degree) in Gender and Development, Sociology, Anthropology, Economics, or any related field with short gender courses;
(ii) At least 5 years' experience in gender mainstreaming in internationally-funded and/or government-managed development projects;
(iii) With at least 3 years' experience in developing and conducting gender trainings for government staff and community groups in the country;
(iv) Can speak and prepare reports in English; and
(v) Regional experience outside of Kyrgyz Republic is an advantage.

V. PREPARATION OF PROPOSAL

21. Shortlisted entities are requested to prepare a proposal. The proposal should include a detailed description of how they propose to deliver on the outputs of the contract in the section of their proposal called "Approach and Methodology". In this narrative, entities should be explicit in explaining (i) how they will achieve the outputs and include any information on their existing activities upon which they may eventually build; (ii) the details of what experts will comprise the project team; and (iii) the mapping of the detailed assignment tasks (Section IV) against the identified key and non-key experts.

22. Entities must also describe their experience in Kyrgyz and Central Asia, and their ability to operate in Russian language.

23. Only one curriculum vitae (CV) must be submitted for each key and non-key expert included in the proposal. Only the CVs of key experts will be scored as part of the technical evaluation of proposals. The CVs of non-key experts will not be scored, however ADB will review and individually approve or reject each CV for each non-key expert position in the proposal.

24. All positions under the contract, both key and non-key experts, must be included and budgeted for in the financial proposal in accordance with the person-month allocation required for each as defined by the proposing organization.

VI. TRAINING

25. The consultants will work very closely with the PIU, DWR, and MOES and provide them with hands-on training in their work. The consultants will interact frequently with the project beneficiaries. The consulting team will organize and participate in meetings and workshops with ADB, the government counterparts, local community organizations and other stakeholders, and development partners in order to foster quality project outputs and stakeholder ownership.

VII. DATA, LOCAL SERVICES, PERSONNEL, AND FACILITIES TO BE PROVIDED BY THE CLIENT

26. The Government of Kyrgyz Republic via the EA/PIU will provide the consultants with: (i) adequate office accommodation in Bishkek and Osh with basic facilities; (ii) will assist with coordination with other government agencies and with obtaining all data.

VIII. DURATION

27. Experts will mainly be based in Bishkek for the duration of the assignment. The expected duration of the assignment is 72 months from the start date, expected to be in April 2019, and the assignment of experts is intermittent in nature. The terms will be revised based on consultations between the parties involved in the assignment per changes and/or additional requirements identified during implementation.

IX. REPORTING

28. In the course of assignment, International consultant must submit the following reports and materials, incorporating in the final versions comments made by stakeholders, including Asian Development Bank, DWR, MOES, and PIU:

- *Initial report* must be submitted within 6 weeks after commencement of assignment.
- *Progress reports* must be submitted at the end of each month of the assignment.
- *Interim report* must be submitted in the middle of the assignment which shall include preliminary outcomes and results achieved within the project, shortages and proposals to address them.
- *Draft final report* must be submitted at the end of the assignment which shall cover analysis of the achievements and progress made under the project, project impact on beneficiaries etc. Draft final report shall be submitted to all stakeholders for comments and notes.
- *Final report* must be submitted after incorporation of all comments made by stakeholders.
- All consultants will prepare separate reports at the end of each input.

29. All reports to ADB shall be produced in English. Reports shall be provided in both printed and electronic form. The consulting firm shall provide to each the two project implementing agencies 3 copies of each report in Russian and 1 copy in English. The consulting firm shall provide to ADB with electronic versions of the reports and associated outputs/deliverables/analysis. All handouts slide presentations, and related material for meetings and workshops must be in both English and Russian. The consulting firm will be expected to procure all interpretation and translation services.