ADB

Report and Recommendation of the President to the Board of Directors

Project Number: 47181-002
September 2016

Proposed Loan, Grant, and Administration of Grant and Technical Assistance Grant
Republic of Tajikistan: Water Resources Management in Pyanj River Basin Project

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 20 August 2016)

Currency unit	–	somoni (TJS)
TJS1.00	=	$0.1270
$1.00	=	TJS7.8680

ABBREVIATIONS

ADB	–	Asian Development Bank
ALRI	–	Agency of Land Reclamation and Irrigation
CIS	–	Chubek Irrigation System
EIRR	–	economic internal rate of return
ha	–	hectare
I&D	–	irrigation and drainage
JFPR	–	Japan Fund for Poverty Reduction
km^3	–	cubic kilometer
m^3	–	cubic meter
M&E	–	monitoring and evaluation
MEWR	–	Ministry of Energy and Water Resources
NGO	–	nongovernment organization
O&M	–	operation and maintenance
PAM	–	project administration manual
PRB	–	Pyanj River basin
RBM	–	river basin management
t	–	ton
TA	–	technical assistance
WRM	–	water resources management
WUA	–	water users' association

NOTE

In this report, "$" refers to US dollars.

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CONTENTS

PROJECT AT A GLANCE

1. Basic Data — **Project Number:** 47181-002

Project Name	Water Resources Management in Pyanj River Basin Project	**Department /Division**	CWRD/CWER
Country	Tajikistan	**Executing Agency**	Agency of Land Reclamation and Irrigation, Ministry of Energy and Water Resources
Borrower	Ministry of Finance		

2. Sector

	Sector	Subsector(s)	ADB Financing ($ million)
✓	**Agriculture, natural resources and rural development**	Irrigation	25.00
		Total	**25.00**

3. Strategic Agenda

Strategic Agenda	Subcomponents
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive
Environmentally sustainable growth (ESG)	Disaster risk management Global and regional transboundary environmental concerns

Climate Change Information

Adaptation ($ million)	6.25
Climate Change impact on the Project	High

4. Drivers of Change

Drivers of Change	Components
Governance and capacity development (GCD)	Institutional development
Partnerships (PAR)	Bilateral institutions (not client government) Official cofinancing

Gender Equity and Mainstreaming

Effective gender mainstreaming (EGM)	✓

5. Poverty Targeting

Project directly targets poverty	Yes
Geographic targeting (TI-G)	Yes

Location Impact

Rural	High

6. Risk Categorization: Low

7. Safeguard Categorization **Environment:** B **Involuntary Resettlement:** C **Indigenous Peoples:** C

8. Financing

Modality and Sources	Amount ($ million)
ADB	**25.00**
Sovereign Project grant: Asian Development Fund	5.85
Sovereign Project loan: Asian Development Fund	19.15
Cofinancing	**5.00**
Japan Fund for Poverty Reduction - Technical Assistance	2.00
Japan Fund for Poverty Reduction - Grant	3.00
Counterpart	**3.73**
Government	3.73
Total	**33.73**

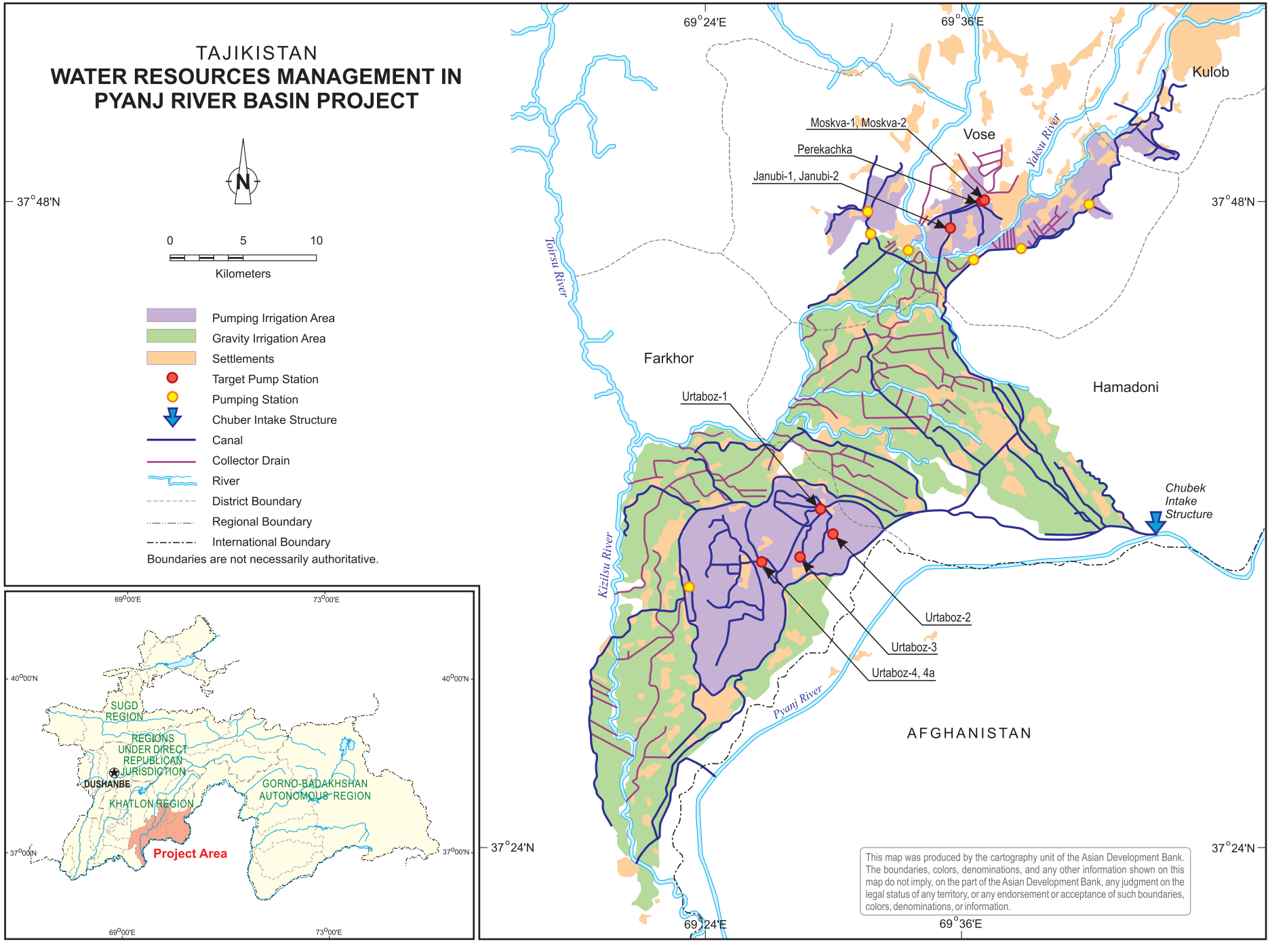
9. Effective Development Cooperation

Use of country procurement systems	No
Use of country public financial management systems	No

Source: Asian Development Bank

TAJIKISTAN

WATER RESOURCES MANAGEMENT IN PYANJ RIVER BASIN PROJECT



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I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on (i) a proposed loan, and (ii) a proposed grant, both to the Republic of Tajikistan for the Water Resources Management in Pyanj River Basin Project. The report also describes the proposed administration of a grant and technical assistance (TA) to be provided by the Japan Fund for Poverty Reduction (JFPR) for the project, and if the Board approves the proposed loan and grant, I, acting under the authority delegated to me by the Board, approve the JFPR grant and TA.[1]

2. The proposed project addresses issues of water resources management (WRM) at river basin, water supply, and water user levels in the Pyanj River basin (PRB) in southern Tajikistan. The project will improve the government's WRM capacity in the PRB, and increase agricultural production, food security, and water supply and use efficiencies in the Chubek Irrigation System (CIS).[2]

II. THE PROJECT

A. Rationale

1. Sector Overview

3. Agriculture accounts for about 25% of Tajikistan's gross domestic product and export revenues, and 39% of tax revenues. Tajikistan is the country in Central Asia most vulnerable to food insecurity, given limited productive irrigated land (which accounts for 95% of crop production) and underdeveloped agriculture,[3] as well as poor rural–urban connectivity and limited community resilience to climate-induced shocks. Agricultural land, which accounts for 25% of the country's total land area, has declined since independence in 1991. In 2010, less than 20% of agricultural land was classified as arable. Cultivated land per capita is 0.1 hectares (ha), the smallest in Central Asia. Forty five percent of the country's employment and 57% of all rural employment is still in agriculture. Forty seven percent of the population are living on less than $1.33 per day. Almost 80% of the country's working poor live in rural areas and half of the working poor are in agriculture, where they receive low wages.[4]

4. Irrigation is critical for agricultural development, food security, and economic advancement. The total area developed for irrigation is about 748,000 ha. However, the actual irrigated area including areas with poor irrigation and drainage (I&D) conditions is estimated at 700,000 ha because of deteriorating I&D infrastructure, salinization, waterlogged soils, and state authorities' limited capacities and resources, as well as low capacities of farm management and water use. The agency responsible for irrigation estimated in 2012 that all interfarm canals and more than one-third of pump stations required major rehabilitation, and there was more than 53,000 ha of land with unsatisfactory ameliorative status because of deteriorated drainage systems. Coupled with limited farm inputs, this has resulted in low agricultural productivity in Tajikistan. For example, yields of major crops (2.2 tons [t] per ha for wheat, 1.7 t/ha for cotton) are significantly lower than in Uzbekistan (4.5 t/ha for wheat, 2.3 t/ha for cotton).

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[1] The design and monitoring framework is in Appendix 1.
[2] ADB. 2014. *Technical Assistance to Tajikistan for Water Resources Management in Pyanj River Basin.* Manila.
[3] Food and Agriculture Organization of the United Nations. 2012. *Irrigation in Central Asia in Figures (AQUASTAT Survey–2012)*. Rome.
[4] World Bank. 2009. *Republic of Tajikistan Poverty Assessment.* Washington, DC.

2. Climate Change Impacts

5. Tajikistan is considered highly vulnerable to the adverse effects of climate change. Climate scenarios indicate that Tajikistan will experience temperature increase of up to 2° Celsius by 2050, which will lead to increased crop water demand. It will also lead to accelerated glacial retreat, with glacial extent expected to decline by 50% during 2010–2050.[5] Peak seasonal runoff is expected to shift from early spring to late winter.[6] These changes will also have significant consequences for food security and rural livelihoods.

6. Among Central Asian countries, Tajikistan has the second lowest level of total actual renewable water resources per capita (Uzbekistan has the lowest). From 1990 to 2004, annual diversions from surface and groundwater declined from 13.7 cubic kilometers (km^3) to 12.3 km^3 and water delivered declined from 12.0 km^3 to 9.0 km^3. This resulted in a decrease of water delivery efficiency from 88% to 75%.[7] These decreases are attributed to the deteriorating WRM infrastructure (particularly I&D, as 91% of diverted water has been used for irrigation), and the weak operation and maintenance (O&M) capacity of WRM institutions.

7. The government has prioritized efforts to increase the effectiveness and efficiency of WRM and agriculture production. It targets the improvement of irrigated agriculture covering 320,000 ha and the creation of 1,500 ha of irrigated land to achieve an increase of 7% in the value of agricultural products by 2015 to meet national food demand. To achieve these targets, the government calls for $262 million for better WRM and $24 million for better agriculture investment.[8] Identified significant gaps against targets were restated in the strategy of the Agency of Land Reclamation and Irrigation (ALRI).[9]

8. The government is also reforming WRM.[10] The Ministry of Land Reclamation and Water Resources was abolished in 2013 and its responsibilities were reassigned to the newly formed (i) Ministry of Energy and Water Resources (MEWR), responsible for the policy and regulations on WRM; and (ii) the ALRI, responsible for the development and O&M of WRM infrastructure. Further reforms include (i) the change in WRM areas from territorial administrative areas to hydrological areas; and (ii) the establishment of (a) river basin management (RBM) plans to clarify and monitor water allocations; and (b) water governance institutes such as river basin organizations, which will draft RBM plans, and river basin councils, which will provide a participation mechanism for water users to approve RBM plans.

3. Pyanj River Basin Overview

9. The PRB is the largest river basin in the country. The mountain massifs that define the basin feature glaciers and permanent snowfields at elevations above 3,500 meters, and have high-density drainage networks of steep alpine streams delivering runoff and sediment rapidly to the alluvial fan. The PRB's WRM will affect the country's economy as it (i) covers the majority of Khatlon province, which has the largest population (2.7 million) and agriculture production (e.g., 774,000 t of cereal production) in the country, (ii) includes the most food-insecure zone among

[5] ADB. 2014. *Climate Change and Sustainable Water Management in Central Asia.* Manila.
[6] ADB. 2011. *Republic of Tajikistan: Climate Resiliency for Natural Resources Investment in Tajikistan.* Consultant's Report. Manila (TA 7599-TAJ).
[7] Scientific Information Center of Interstate Commission for Water Coordination. 2011. *Water Quality in the Amu Darya and Syr Darya River Basins* (Updated data is not available). Tashkent.
[8] Government of Tajikistan. 2012. *Living Standards Improvement Strategy of Tajikistan for 2013–2015.* Dushanbe.
[9] Government of Tajikistan, ALRI. Forthcoming. *Land Reclamation and Irrigation Development Strategy*. Dushanbe.
[10] Government of Tajikistan, MEWR. 2015. *Water Sector Reform Programme for 2016–2025.* Dushanbe.

the country's irrigated area,[11] and (iii) is the country's poorest river basin (55% of the population is poor).[12] The PRB is also vulnerable to climate change. Annual river flows are likely to increase in the glacial sub-basins between 2015 and 2065 or 2075 because of increased melt caused by higher air temperatures. The expected change in monthly flow rates due to increased rainfall and decreased snowfall may entail an increase in the magnitude and frequency of extreme flood events. Also, a gradual shift in the river flow seasonal distribution and increase in irrigation water requirements are predicted (footnote 6).

10. The Pyanj River forms the boundary of Tajikistan and Afghanistan. Given that more than 40% of the PRB comprises the territory of Afghanistan and serious flood disasters have occurred frequently, in 2010 both governments signed a bilateral agreement for joint hydrological monitoring of the Pyanj River. A plan to establish a joint PRB commission was drafted in 2013 with Asian Development Bank (ADB) assistance.[13] The government has requested ADB support to establish and implement the joint commission.

11. The project is consistent with the priorities of ADB's draft country partnership strategy for 2016–2020, which recommends the allocation of 15% of ADB's available resources to climate change adaptation, WRM, and food security. The project is included in the ADB country operations business plan for 2016–2018.[14] ADB's Midterm Review of Strategy 2020 highlighted the promotion of food security and agricultural productivity.[15] The project reflects the following lessons from a previous ADB-financed irrigation project: (i) projects dispersed over a broad geographic area have high administrative burdens, and (ii) improving on-farm agricultural productivity and ensuring sufficient funds through water use levies and/or government contributions are crucial for the project's sustainability and water users' associations (WUAs).[16]

B. Impact and Outcome

12. The project impacts, which are aligned with government strategies (footnotes 9 and 10) will be the following: (i) irrigated land in good condition and food security increased by 2021, and (ii) efficiency of water resource use increased by 2021. The outcome will be increased agricultural production in the CIS area of the PRB.

13. Among irrigation systems in the PRB, which cover about 120,000 ha, the CIS is the largest (50,160 ha). The maximum water supply of the system declined to around 80 cubic meters (m^3) per second in 2013, compared to its design capacity of 150 m^3 per second in 1950 because of system deterioration. This is attributed to sediment deposition and poor O&M (about 460,000 m^3 of sediment enters the CIS main canal from the Pyanj River every year), which has resulted in a decrease of the actual irrigated area to 43,210 ha, overall irrigation efficiency to 30%, and low crop yields (e.g., wheat yield of 2.96 t/ha and cotton yield of 2.05 t/ha). While agriculture in the CIS area is dependent on wheat and cotton which account for 39% (wheat) and 36% (cotton) of the cultivated area, profitable crops (e.g., vegetables and fruit) account for only 16%, which is less than in other regions (footnote 16).

[11] World Food Programme. 2013. *Food Security Classification Overview–June 2013*. Dushanbe.
[12] World Bank. 2013. *Tajikistan–Reinvigorating Growth in the Khatlon Oblast*. Washington, DC.
[13] ADB. 2008. *Technical Assistance for Improved Management of Water Resources in Central Asia*. Manila.
[14] ADB. 2015. *Country Operations Business Plan: Tajikistan, 2016–2018*. Manila. The project name was updated to specify the target river basin.
[15] ADB. 2014. *Midterm Review of Strategy 2020: Meeting the Challenges of a Transforming Asia and Pacific*. Manila.
[16] ADB. 2012. *Completion Report: Irrigation Rehabilitation Project in Tajikistan*. Manila.

C. Outputs

14. **Output 1: Water resources in Pyanj River basin better managed.** This output under the JFPR TA includes improving the WRM system in the Tajikistan portion, and effective joint regional management of the PRB. The first component is in line with the ongoing water sector reform and will (i) establish and manage river basin organizations, (ii) help river basin organizations draft an RBM plan, and (iii) facilitate the forming of river basin councils. In addition, the capacity of MEWR's local staff and staff of river basin organizations will be strengthened for accurate measurement and recording of diverted water flows at key sections along the Pyanj River (at present, the actual flow of the CIS main canal is 63% of recorded flow) and for appropriate data processing. The second component will help (i) draft the agreement to form the joint PRB commission, its institutional structure and implementation plan, and regulations on administrative and technical operational procedures; (ii) establish a working group to review the draft agreement; (iii) facilitate consultations with the Government of Afghanistan; and (iv) strengthen the commission's capacity to implement the agreement.[17] The strengthening capacity of hydro-meteorological monitoring and forecasting will also contribute to the output, and it may be added subject to fund availability.

15. **Output 2: Modernized and climate-proofed Chubek Irrigation System water resources management infrastructure fully operational.** This includes (i) modernization and rehabilitation of I&D infrastructure and its climate proofing, (ii) construction of a sediment-excluding basin, (iii) modernization and rehabilitation of pumping units, and (iv) capacity development of ALRI staff. The first component will cover the Chubek main canal including head regulator, escape structure, cross regulators, offtake structures, and interfarm and on-farm I&D canals and associated structures. The sediments along the main and interfarm canals will be removed by ALRI using machinery to be procured under the project, while WUAs and farmers will remove the sediment along on-farm I&D canals. The capacities of canals have been checked against the climate change risks anticipated during the next 50 years and augmented where required. With modernization and rehabilitation, irrigation conveyance efficiency will increase from the present 60% to 66% for gravity-fed systems and 82% for pump-fed systems.

16. The second component will reduce the CIS O&M requirements by hydraulically flushing around 70% of total sediment entering the main canal and mechanically removing around 15%. Under the third component, two cascade pump systems (Urtaboz covering 5,700 ha and Janubi covering 2,600 ha) out of four systems covering 14,344 ha will be modernized and rehabilitated. Energy efficiency of target pump units will increase from less than 50% at present to more than 75%. In addition, a feasibility study will explore alternative cost-efficient water supply methods for the irrigated area under nontargeted pump systems. Under the fourth component, the capacities of local ALRI offices, including the WUA support unit, will improve to perform their duties (e.g., water and sediment flow monitoring and recording, monitoring and evaluation [M&E] of irrigation performance, O&M of CIS main infrastructure) efficiently and effectively with provision of necessary equipment, training, and an M&E system to operate it. ALRI central staff will also be trained to operate the M&E system.

17. **Output 3: Farm management capacity and water use skill improved.** This output under the JFPR grant includes (i) demonstration to promote profitable farm management and efficient water use, (ii) production of high-quality seeds, and (iii) establishment and possible reorganization of WUAs and capacity development of WUAs and beneficiaries. Experienced

[17] The same approach is expected from the Afghanistan side under the investment project (Project number 48042-001, Proposed Grant and Administration of Grant for Pyanj–Amu Basin Project) currently being prepared by ADB.

international nongovernment organizations (NGOs) will be recruited for required activities. Under the first component, 300 ha of demonstration plots will promote more profitable farm management using improved agronomic techniques (e.g., drill sowing without plowing, zero or minimum tillage) conducive for higher productivity and profitability per unit of farmland and more efficient water use techniques, and NGOs will disseminate demonstrated activities among CIS farmers by conducting workshops and other efficient methods.

18. The second component will (i) supply foundation seed to seed growers and facilitate the reproduction of the seeds, and also supply a large number of smaller farmers; (ii) diversify seed production for vegetable, fruit, and other crops in addition to production of wheat and cotton seeds; (iii) develop capacity of the seed growers in seed production; and (iv) reestablish field seed laboratories at district offices of the department of agriculture and develop their capacity to certify the seeds. The third component will (i) strengthen WUAs' institutional, management, and technical capacities; (ii) support WUAs' possible reorganization along hydrological boundaries for efficient water management; and (iii) facilitate formation of new WUAs in the remaining project area. At present there are only 20 WUAs covering about 83% of the CIS area, and they are not adequately equipped and trained to undertake their tasks efficiently, which has resulted in the low collection rate of the irrigation service fee (average 46% in project districts in 2012–2014). Activities of NGOs will be coordinated with WUA support unit, whose capacity will be strengthened under output 2.

19. During project preparation, an M&E system using satellite remote sensing technology was developed and it estimated the water consumption and average water use ratio (i.e., field application efficiency) of CIS farmland at 50%. Output 3 will increase the ratio to 60%. Coupled with monitoring water withdrawal for the CIS, the system could also estimate CIS conveyance efficiency (para. 15). The M&E system will be further improved under output 3 and used during project implementation to assess irrigation efficiencies.

D. Investment and Financing Plans

20. The project is estimated to cost $31.61 million (Table 1).

Table 1: Project Investment Plan
($ million)

Item	Amount[a]
A. Base Cost[b]	
Output 2: Modernized and climate-proofed CIS WRM infrastructure fully operational[c]	25.49
Output 3: Farm management and water use capacities improved	3.05
Subtotal (A)	**28.54**
B. Contingencies[d]	2.37
C. Financing charges during implementation[e]	0.70
Total (A+B+C)	**31.61**

ADB = Asian Development Bank, CIS = Chubek Irrigation System, WRM = water resources management.

[a] Includes taxes and duties of $3.41 million to be financed from government resources through exemptions, and social taxes of $0.20 million to be financed from government resources through cash contribution. ADB will finance taxes and duties for small expenditures.

[b] In end-2015 prices.

[c] The cost for output 1 ($2.12 million) is listed in section III of the report and recommendation of the President.

[d] Physical contingencies computed at 5% for all expenditure accounts given the detailed technical due diligence. Price contingencies computed at 1.1% on foreign exchange costs and 5.0% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

[e] Includes interest during construction. Interest during construction for the ADB loan has been computed at the rate of 1% per annum.

Source: Asian Development Bank estimates.

21. The government has requested a loan in various currencies equivalent to SDR13,758,000 ($19.15 million) from ADB's Special Funds resources to help finance the project.[18] The loan will have a 32-year term, including a grace period of 8 years, an interest rate of 1.0% per annum during the grace period and 1.5% per annum thereafter, and such other terms and conditions as are set forth in the draft financing agreement. The government has requested a grant not exceeding $5.85 million from ADB's Special Funds resources to help finance the project. A JFPR will provide a grant not exceeding the equivalent of $3 million, to be administered by ADB, for output 3. The government will contribute $3.61 million by way of taxes and duties foregone. The financing plan is in Table 2 and further detailed in the project administration manual (PAM).[19]

Table 2: Financing Plan

Source	**Amount** ($ million)	**Share of Total** (%)
Asian Development Bank		
Special Funds resources (loan)	19.15	60.6
Special Funds resources (grant)	5.85	18.5
Japan Fund for Poverty Reduction (grant)[a]	3.00	9.5
Government	3.61	11.4
Total	**31.61**	**100.0**

[a] Administered by the Asian Development Bank. In addition, the technical assistance will be provided, with estimated cost of $2.12 million, of which $2.00 million will be financed on a grant basis by the Japan Fund for Poverty Reduction and administered by the Asian Development Bank.

Source: Asian Development Bank estimates.

E. Implementation Arrangements

22. The implementation arrangements are summarized in Table 3 and detailed in the PAM.

Table 3: Implementation Arrangements

Aspects	**Arrangements**		
Implementation period	January 2017–December 2021		
Estimated completion date	December 2021 (physical completion) (Closing date of the ADF loan and grant and JFPR grant and TA grant of June 2022)		
Management			
Oversight body	Project steering committee Deputy prime minister (chair) Director of the ALRI; chairs of the COEP, Committee for State Investment and State Property Management, and Committee for Women and Family Affairs; deputy ministers of the ministries of agriculture, economic development and trade, energy and water resources, foreign affairs, and finance (members)		
Executing agencies	MEWR for output 1 and ALRI for outputs 2 and 3		
Project management office[a]	In MEWR, seven staff; in ALRI, 11 staff		
Project implementation office	In three ALRI district offices (Hamadoni, Farkhor, Vose), four staff each		
Procurement	ICB (Works)	4 contracts	$18.57 million
	ICB (Goods)	2 contracts	$2.87 million
	NCB	2 contracts	$0.20 million
	Shopping	10 contracts	$0.90 million
Consulting services	QCBS (for output 1) under the TA	23 person-months international 279 person-months national	$2.00 million
	QCBS (for output 2)	35 person-months international 246 person-months national	$1.66 million
	QCBS (for output 3)	18 person-months international 129 person-months national	$0.98 million

[18] A country's eligibility for Asian Development Fund grants under the revised grant framework is determined by its risk of debt distress. The latest debt sustainability analysis determined that Tajikistan had a moderate risk of debt distress and was therefore eligible to receive 50% of its Asian Development Fund allocation as grants.

[19] Project Administration Manual (accessible from the list of linked documents in Appendix 2).

Aspects	Arrangements
Advance contracting	Advance contracting has been approved to recruit three consultant firms.
Disbursement	The loan, grant, and TA grant proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2015, as amended from time to time), and detailed arrangements agreed between the government and ADB.

ADB = Asian Development Bank, ADF = Asian Development Fund, ALRI = Agency of Land Reclamation and Irrigation, COEP = Committee of Environmental Protection, ICB = international competitive bidding, JFPR = Japan Fund for Poverty Reduction, MEWR = Ministry of Energy and Water Resources, NCB = national competitive bidding, QCBS = quality- and cost-based selection, TA = technical assistance.

The government has agreed that the project management office (PMO) set up under the ongoing ADB-financed Building Climate Resilience in the Pyanj River Basin Project will also serve as PMO to support ALRI to implement outputs 2 and 3. To this end, the government will either (i) amend the existing government resolution for setting up the existing PMO, or (ii) issue a new government resolution. In both cases, the resolution shall specify that the project implementation will be enhanced by adding more PMO staff, and staff of three project implementation offices. Disbursement of the proceeds of the ADB loan and grant and JFPR grant will be conditional upon the government's issuance of the resolution.

Source: Asian Development Bank estimates.

III. TECHNICAL ASSISTANCE

23. The capacity development JFPR TA will be provided to help the MEWR, the TA executing agency, implement output 1. Major TA outputs and activities correspond to the two respective components and activities in each component as provided in para. 14. The financing plan, detailed activities, cost estimates, and implementation arrangements are in the attached TA.[20] The TA is estimated to cost $2.12 million, of which $2.00 million will be financed on a grant basis by the JFPR and administered by ADB. The government will provide counterpart support in the form of office accommodation, counterpart staff, and other in-kind contributions. Consultants will be engaged in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). The disbursements will be made directly by ADB in accordance with its *Loan Disbursement Handbook* (2015, as amended from time to time). The TA will be implemented over a period of five years with estimated commencement in January 2017 and completion in December 2021.

IV. DUE DILIGENCE

A. Technical

24. The project was designed in the light of sustainable CIS O&M. The sediment-excluding basin will substantially reduce O&M requirements not only at the main, interfarm, and on-farm canals but also at the basin itself by hydraulically flushing around 70% of the sediment that enters. The target pump units were selected using carefully developed criteria, which included required pumping head. The project was found to be at high risk of being impacted by climate change. Climate risk and vulnerability was assessed based on a study undertaken by previous ADB TA in the PRB (footnote 6). Adaptation measures were incorporated in the project design to reduce the risks resulting from increased demand in irrigation water, and sedimentation.

B. Economic and Financial

25. The project is expected to be economically viable in that the overall calculated economic internal rate of return (EIRR) is 16.3% and the economic net present value of the investment is TJS105.7 million at a discount rate of 12%. This strong economic result is due to the substantial size of the economic benefit stream resulting from carefully designed least-cost engineering

[20] Attached Technical Assistance (accessible from the list of linked documents in Appendix 2).

options.[21] A number of risk variables have been used to conduct a sensitivity analysis. Based on the sensitivity analysis, the project viability is observed to be most sensitive to benefits being delayed by 2 years, which causes the EIRR to fall to 13.6%—just marginally above the benchmark of 12.0%—and the level of decrease at which the EIRR would fall below the acceptable 12.0% level is only 3 years. Therefore, it is essential that the project be implemented as scheduled and technical and extension support be provided to project beneficiaries as proposed under output 3 in order to ensure project benefits are realized on schedule. It is also important to stress that system O&M needs to be carried out appropriately to ensure the benefits can materialize as estimated. [22]

C. Governance

26. Weaknesses and risks were identified in using the country's public financial management system in internal control, procurement management, financial reporting, and external auditing. The existing project management office under ALRI for the ongoing ADB-financed project has gained enough experience in implementing projects financed by ADB and thus will comfortably implement outputs 2 and 3.[23] Additional project management office staff will be recruited for the additional workload. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government, the MEWR, and ALRI. The specific policy requirements and supplementary measures are described in the PAM.

D. Poverty and Social

27. **Poverty.** The project will address the problems of low agricultural yields, low income, and food insecurity in the target areas. Establishing river basin organizations and councils will result in improved WRM. Modernizing and rehabilitating I&D systems will address water shortages, while organizing demonstration plots, producing high-quality seeds, and strengthening WUAs' capacities will improve water use and farmers' agricultural skills. This, in turn, will lead to increased agricultural yields and improved farmers' incomes, and address long-term food insecurity.

28. **Social and gender.** The project will directly benefit farmers, including women farmers, and poor households. Specifically, the project will improve WRM through WUAs and improve farmers' capacity for water use and their agricultural practices. Categorized as effective gender mainstreaming, the project will narrow gender gaps in women's limited representation in WUAs, river basin organizations, and councils. It will ensure that women farmers are not left out in the development of demonstration farms, production of high-quality seeds, and other training programs aimed at building women's capacities to take on more active roles in WUAs and improve their farming practices. The project will also ease women's water-fetching chores as it will install 12 water points for householder use along the main canal and three in each target interfarm canal.

E. Safeguards

29. **Environment (category B).** The initial environmental examination and environmental management plan were prepared by ALRI in accordance with ADB's Safeguard Policy

[21] Economic and Financial Analysis (accessible from the list of linked documents in Appendix 2).
[22] Preliminary Asset Management and O&M Plan of CIS (supplementary linked document) was developed.
[23] ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Administration of Grant to the Republic of Tajikistan for Building Climate Resilience in the Pyanj River Basin Project.* Manila.

Statement (2009). Anticipated major adverse environmental impacts of the project are site specific and are related to clogging of canals and irrigation structures with sediment during operation; and physical disturbance, noise, and road safety during transportation of construction materials for the sediment-excluding basin. Adequate mitigation measures will be incorporated into the project design and will be implemented through the environmental management plan. The initial environmental examination includes provisions for improving the safeguards capacity of the project management office. Public consultation (a total of 117 people including WUAs, village leaders, farmer beneficiaries, local authorities, and ALRI local offices) and information disclosure was undertaken in March 2015 covering all four districts. The draft initial environmental examination covering the environmental management plan was disclosed on the ADB website on 16 February 2016.

30. **Indigenous peoples (category C).** The project will not involve or affect any ethnic minority or indigenous peoples, as defined by ADB's Safeguard Policy Statement. The poverty and social assessment study showed that no ethnic minority or indigenous peoples were present in the project area.

31. **Involuntary resettlement (category C).** The project will not require land acquisition. The sediment-excluding basin will be constructed within the border area, which is strictly controlled. These areas have been fenced since 1994. Since the project is within the existing facilities, the resettlement due diligence report confirmed that no land will be acquired for the project with no past and present claims on the land for these existing facilities. The due diligence report was disclosed on the ADB website in February 2016.

F. Risks and Mitigating Measures

32. Major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[24] The integrated benefits and impacts of the project are expected to outweigh the costs.

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
Supreme audit institution not yet established; external audit not in place	The project will be audited annually by independent private auditors in accordance with the International Standards on Auditing.
Delays in construction schedule	Using advance contracting, the consultant for detailed design, bid preparation, and construction supervision will be fielded from January 2017 to enable the PMO to initiate bid process for the major contract in the second quarter of 2017. The bidding document will include performance incentives and penalties to avoid delays in the construction schedule. ADB is improving its efficiency in project management and has shortened the disbursement time lag. A time monitoring sheet for each project implementation milestone will be available and updated by the consultant.
Insufficient available funds for system O&M may threaten CIS sustainability	Required O&M will be substantially reduced by constructing the sediment removal structure and replacing degraded pump and motor units with energy efficient ones in target pump stations. The government agreed that CIS asset management and an O&M plan including the increases in the irrigation service fees and budget allocation will be developed by ALRI and approved by the government for full cost-recovery in the CIS after completion of modernization and rehabilitation works, but before project completion. The main system operators and WUAs will be trained for efficient CIS O&M.

ADB = Asian Development Bank, ALRI = Agency of Land Reclamation and Irrigation, CIS = Chubek Irrigation System, O&M = operation and maintenance, PAM = project administration manual, PMO = project management office, WUA = water users' association.
Source: Asian Development Bank.

[24] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

V. ASSURANCES AND CONDITIONS

33. The government, the MEWR, and ALRI have assured ADB that implementation of the project shall conform to all applicable ADB policies including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents.

34. The government, MEWR, and ALRI have agreed with ADB on certain covenants for the project, which are set forth in the financing and grant agreements.

35. The government has agreed that (i) ALRI will develop a CIS asset management and O&M plan covering the plan to increase irrigation service fees and government budget allocations to ensure full cost recovery, and ALRI will present the plan for ADB's review and confirmation at least 1 year before the project completion (footnote 22); (ii) it will approve the plan by project completion; and (iii) the collected irrigation service fees will be exclusively used for O&M of the CIS including expenses for the services provided for the CIS service area by WUA support unit local district offices.

36. The government has assured ADB that the implementation of the project does not affect, or be affected by, any of obligations and commitments of the government under the international treaties entered into with regard to the Amu Darya River and the Pyanj River.

37. The government has assured ADB that the government will fully finance the staff of the PRB organization and its sub-office from January 2019 till the end of the project.

VI. RECOMMENDATION

38. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve

(i) the loan in various currencies equivalent to SDR13,758,000 to the Republic of Tajikistan for the Water Resources Management in Pyanj River Basin Project, from ADB's Special Funds resources, with an interest charge at the rate of 1.0% per annum during the grace period and 1.5% per annum thereafter; for a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft financing agreement presented to the Board; and

(ii) the grant not exceeding $5,850,000 to the Republic of Tajikistan, from ADB's Special Funds resources, for the Water Resources Management in Pyanj River Basin Project, on terms and conditions that are substantially in accordance with those set forth in the draft grant agreement presented to the Board.

Takehiko Nakao
President

6 September 2016

DESIGN AND MONITORING FRAMEWORK

Impacts the Project is Aligned with Irrigated land in good condition and food security increased by 2021[a] The efficiency of water resource use increased by 2021[b]			
Results Chain	**Performance Indicators with Targets and Baselines**	**Data Sources and Reporting Mechanisms**	**Risks**
Outcome Increased agricultural production in CIS area of PRB	By December 2022, a. Cultivated irrigated areas served by CIS increased to originally designed 50,163 ha (2014 baseline: 43,210 ha) b. Cropping intensities increased by 10% for gravity irrigation and by 50% for pump irrigation (2014 baselines cropping intensities: 118% for gravity irrigation and 106% for pump irrigation) c. Crop yield increased by 8% (2014 baseline:[c])	a. ALRI reports b–c. Provincial and district agricultural statistics, and NGOs' report through ALRI	Extreme climate events hamper agricultural production.
Outputs 1. Water resources in PRB better managed	1a. Joint Afghanistan–Tajikistan PRB committee commences monitoring the Pyanj River water by Q2 2018 (2014 baseline: None) 1b. PRBMP including drought management plan submitted to PRB council by Q1 2019 (2014 baseline: None) 1c. Water discharge monitored at key sections of Pyanj River matches the actual diversions by Q2 2021 (2014 baseline: actual diversion to Chubek main canal is 63% of the monitored discharge) 1d. PRBO and PRBC management structures each include at least one woman by Q4 2017 (2014 baseline: 0) 1e. At least 30% of the participants in stakeholder meetings in PRB council are women by Q2 2018 (2014 baseline: 0)	1a–e. MEWR reports	The formation of the PRB committee on the Afghanistan side is delayed or not implemented because of security issues. Government does not effectively support national water sector reforms. Farmers' unwillingness to participate in on-farm irrigation and drainage rehabilitation. Increased security concerns near Afghanistan border hamper engagement of competent contractors. Weak security hinders engagement of capable NGOs to provide services. Supreme audit institution has not yet been established; external audit not yet in place.
2. Modernized and climate-proofed CIS WRM infrastructure fully operational	By June 2021, 2a. Irrigation conveyance efficiency for on-farm canal in CIS increased to 66% for gravity-fed system and 82% for pump-fed system (2014 baseline: 60% for both systems) 2b. Pump efficiency of target pump stations in CIS increased to 75% (2014 baseline: less than 50%)[d]	2a–d. ALRI and consultant reports	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
	2c. Sediment entering CIS canal reduced to 112,500 m^3/year (2014 baseline: 460,000 m^3/year) 2d. Access to water for household use provided by installation of 12 water points along main canal and three water points along each target interfarm canal (2015 baseline: 0)		Low governance and public management on procurement may allow misconduct regarding project funds. Delays in construction schedule.
3. Farm management capacity and water use skill improved	By December 2021, 3a. WUAs coverage of CIS area increased to 100% (2014 baseline: 83%) 3b. The average collection rate of irrigation service fee in terms of the amount among all WUAs increased to 80% (2014 baseline: 46%) 3c. Women's membership in WUAs increased to 30% (2014 baseline: 13%) 3d.The average water use ratio (i.e., field application efficiency) in CIS area increased to 60% (2014 baseline: 50%) 3e. At least 30% of women lead demonstration plot activities (2014 baseline: 0)	3a–c. NGO reports through ALRI 3d. ALRI reports 3e. NGOs reports through ALRI	

Key Activities with Milestones

Output 1: Water resources in PRB better managed

1.1 Facilities of PRB organization available and equipped by Q1 2018.
1.2 Establish PRB organization by Q4 2017.
1.3 Establish PRB council by Q2 2018.
1.4 PRB organization prepares PRBMP (Q4 2017–Q4 2018).
1.5 PRB council reviews PRBMP (Q1–Q2 2019).
1.6 Establish joint PRB committee with the Government of Afghanistan by Q2 2018.
1.7 Joint PRB committee prepares PRB WRM monitoring system (Q2 2018–Q1 2019).
1.8 Joint PRB committee approves PRB WRM monitoring system by Q2 2019.
1.9 Train local MEWR staff by Q2 2021.

Output 2: Modernized and climate-proofed CIS WRM infrastructure fully operational

2.1 Complete modernization of main and interfarm irrigation structures (Q2 2021).
2.2 Complete modernization of pump stations (Q2 2021).
2.3 Complete construction of sediment-excluding basin (Q3 2020).
2.4 Equipment of O&M of main CIS including sediment-excluding basin available (Q3 2020).
2.5 Start operation of SCADA system (Q3 2020).
2.6 Conduct capacity development program for ALRI staff and WUA support units (Q1 2018–Q4 2020).
2.7 Complete deposited sediment cleaning work along CIS by ALRI (Q2 2021).
2.8 Adopt O&M plan and water management system of CIS by Q2 2020.
2.9 Complete feasibility study for alternate irrigation method for nontarget pump-fed areas (Q2 2019).

Output 3: Farm management capacity and water use skill improved

3.1 Engage NGOs to implement the output (Q4 2016).
3.2 Conduct capacity development program for improved farm management (Q1 2018–Q4 2021).
3.3 Select demonstration plots (Q1 2018–Q2 2020).

Key Activities with Milestones
3.4 Conduct WUA training program (Q1 2018–Q4 2021). 3.5 Clean up deposited sediments along CIS on-farm drains by WUAs and water users (Q1 2018–Q2 2021). 3.6 Record and publish experience of women's full participation in water use trainings as example of best practices (Q2 2020). **Procurement Management** 4.1 PMO's initiation of recruitment process of the consultant in each output (Q2 2016). 4.2 Recruitment of consultants (Q4 2016). 4.3 Initiation of the bid process of the major contract (i.e., pump stations and sediment-excluding basin) (Q2 2017). 4.4 Initiation of the bid process of the heavy machinery equipment (Q2 2017). 4.5 Contracts for the heavy machinery equipment (Q4 2017). 4.6 Contract for the major contract (Q1 2018).
Inputs ADB: $19.15 million equivalent (ADF loan) $5.85 million (ADF grant) Government: $3.61 million JFPR: $5.00 million ($2.00 million for TA, $3.00 million for grant)
Assumptions for Partner Financing Not applicable.

ADB = Asian Development Bank, ALRI = Agency for Land Reclamation and Irrigation, CIS = Chubek Irrigation System, ha = hectare, JFPR = Japan Fund for Poverty Reduction, m^3 = cubic meter, MEWR = Ministry of Energy and Water Resources, NGO = nongovernment organization, O&M = operation and maintenance, PRB = Pyanj River basin, PRBC = Pyanj River basin council, PRBO = Pyanj River basin organization, PRBMP = Pyanj River Basin Management Plan, SCADA = supervisory control and data acquisition, t = ton, WRM = water resources management, WUA = water users' association.

[a] Government of Tajikistan, ALRI. Forthcoming. *Land Reclamation and Irrigation Development Strategy*. Dushanbe.

[b] Government of Tajikistan, MEWR. 2015. *Water Sector Reform Programme for 2016–2025.* Dushanbe.

[c] wheat (2.96 t/ha), cotton (2.05 t/ha), vegetables (21.00 t/ha), orchard (8.93 t/ha), fodder maize (18.00 t/ha).

[d] Pump efficiency is defined as "pumped water volume divided by consumed energy."

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=47181-002-2

1. Financing Agreement
2. Grant Agreement
3. Sector Assessment (Summary): Agriculture, Natural Resources, and Rural Development
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Attached Technical Assistance
8. Economic and Financial Analysis
9. Country Economic Indicators
10. Summary Poverty Reduction and Social Strategy
11. Gender Action Plan
12. Initial Environmental Examination
13. Risk Assessment and Risk Management Plan

Supplementary Documents

14. Financial Management Assessment
15. Procurement Capacity Assessment
16. Project Climate Risk Assessment and Management Report
17. Detailed Economic and Financial Analysis
18. Preliminary Asset Management and Operation and Maintenance Plan of Chubek Irrigation System
19. Social Safeguard Due Diligence Report