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Report No: PAD4855

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED IDA GRANT

IN THE AMOUNT OF SDR 22.40 MILLION  
(US\$30 MILLION EQUIVALENT)

AND

A GRANT FROM THE  
WORLD BANK PARTNERSHIP PROGRAMME PART III FOR EUROPE AND CENTRAL ASIA  
SINGLE-DONOR TRUST FUND

IN THE AMOUNT OF EUR 16.19 MILLION  
(US\$17.34 MILLION EQUIVALENT)

TO THE

REPUBLIC OF TAJIKISTAN

FOR A

TAJIKISTAN STRENGTHENING WATER AND IRRIGATION MANAGEMENT PROJECT

MAY 31, 2022

Water Global Practice  
Europe and Central Asia Region

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2022)

Currency Unit = SDR

EUR 0.95 = US\$1

SDR 0.74 = US\$1

FISCAL YEAR

January 1 - December 31

## ABBREVIATIONS AND ACRONYMS

ALRI	Agency for Land Reclamation and Irrigation
BWO	Basin Water Organization
CCAP	Climate Change Action Plan
CoEP	Committee of Environmental Protection
CPF	Country Partnership Framework
CSO	Civil Society Organization
DFIL	Disbursement and Financial Information Letter
ECA	Europe and Central Asia
ESCP	Environmental and Social Commitment Plan
ESF	Environmental and Social Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
EU	European Union
FM	Financial Management
FVWRMP	Ferghana Valley WRM Project
GBAO	Gorno-Badakhshan Autonomous Region
GC	Grants Committee
GDP	Gross Domestic Product
GIS	Geographic Information System
GIZ	German Agency for International Cooperation ( <i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i> )
GM	WUA Grant Manual
GRM	Grievance Redress Mechanism
IA	Implementing Agency
IMIS	Irrigation Management Information System
IPF	Investment Project Financing
IRR	Internal Rate of Return
IWRM	Integrated Water Resources Management
KPI	Key Performance Indicator
LMP	Labor Management Procedures
M&E	Monitoring and Evaluation
MEWR	Ministry of Energy and Water Resources

MIS	Monitoring Information System
MoA	Ministry of Agriculture
NATO	North Atlantic Treaty Organization
NDS	National Development Strategy
NPV	Net Present Value
NWC	National Water Council
O&M	Operation and Maintenance
PAMP-I/II	Public Employment for Sustainable Agriculture and Water Management Project
PDO	Project Development Objective
PIU	Project Implementation Unit
PMU	Project Management Unit
POM	Project Operations Manual
PPSD	Procurement Strategy for Development
PSC	Project Steering Committee
RBC	River Basin Council
RBO	River Basin Organization
RDP	Rural Development Programme
RPF	Resettlement Policy Framework
SDGs	Sustainable Development Goals
SEP	Stakeholder Engagement Plan
ShMC	Shurabad Main Canal
STEM	Science, Technology, Engineering, and Mathematics
ToR	Terms of Reference
VMC	Vakhsh Main Canal
WBG	World Bank Group
WIS	Water Information System
WRM	Water Resources Management
WSRP	Water Sector Reform Program
WUA	Water User Association
ZIRMIP	Zarafshon Irrigation Rehabilitation and Management Improvement Project

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**TABLE OF CONTENTS**

<b>DATASHEET.....</b>	<b>1</b>
<b>I. STRATEGIC CONTEXT .....</b>	<b>7</b>
A. Country Context.....	7
B. Sectoral and Institutional Context .....	9
C. Relevance to Higher Level Objectives.....	13
<b>II. PROJECT DESCRIPTION.....</b>	<b>14</b>
A. Project Development Objective.....	14
B. Project Components .....	15
C. Project Beneficiaries .....	21
D. Theory of Change .....	21
E. Rationale for Bank Involvement and Role of Partners.....	21
F. Lessons Learned and Reflected in the Project Design .....	23
<b>III. IMPLEMENTATION ARRANGEMENTS .....</b>	<b>24</b>
A. Institutional and Implementation Arrangements .....	24
B. Results Monitoring and Evaluation Arrangements.....	25
C. Sustainability.....	25
<b>IV. PROJECT APPRAISAL SUMMARY.....</b>	<b>26</b>
A. Technical, Economic, and Financial Analysis .....	26
B. Fiduciary.....	28
C. Legal Operational Policies.....	29
D. Environmental and Social .....	30
<b>V. GRIEVANCE REDRESS SERVICES .....</b>	<b>34</b>
<b>VI. KEY RISKS.....</b>	<b>34</b>
<b>VII. RESULTS FRAMEWORK AND MONITORING.....</b>	<b>36</b>
<b>ANNEX 1: Detailed Project Description.....</b>	<b>48</b>
<b>ANNEX 2: Irrigation in Project Areas and Scheme Prioritization .....</b>	<b>58</b>
<b>ANNEX 3: Implementation Arrangements and Support Plan.....</b>	<b>67</b>
<b>ANNEX 4: Economic and Financial Analysis .....</b>	<b>74</b>
<b>ANNEX 5: Team List .....</b>	<b>77</b>
<b>ANNEX 6: Project Map .....</b>	<b>78</b>
<b>ANNEX 7: European Union Rural Development Programme II.....</b>	<b>79</b>



DATASHEET

**BASIC INFORMATION**

Country(ies)	Project Name	
Tajikistan	Tajikistan Strengthening Water and Irrigation Management Project	
Project ID	Financing Instrument	Environmental and Social Risk Classification
P175356	Investment Project Financing	Substantial

**Financing & Implementation Modalities**

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input checked="" type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	<input type="checkbox"/> Hands-on Enhanced Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
23-Jun-2022	25-Jun-2027

Bank/IFC Collaboration

No

**Proposed Development Objective(s)**

The project development objective is to: (i) strengthen capacity for water resources planning and irrigation management in Tajikistan and (ii) improve performance of selected irrigation schemes in the Vakhsh and Zarafshon river basins.



### Components

Component Name	Cost (US\$, millions)
Water Sector Reform and Institutional Strengthening	7.60
Irrigation Scheme Improvements	36.91
Project Management	2.83
CERC	0.00

### Organizations

Borrower:	Ministry of Finance (MoF)
Implementing Agency:	Agency for Land Reclamation and Irrigation (ALRI) FVWRMP PMU under the ALRI Ministry of Energy and Water Resources (MEWR)

### PROJECT FINANCING DATA (US\$, Millions)

#### SUMMARY

Total Project Cost	47.34
Total Financing	47.34
of which IBRD/IDA	30.00
Financing Gap	0.00

#### DETAILS

##### World Bank Group Financing

International Development Association (IDA)	30.00
IDA Grant	30.00

##### Non-World Bank Group Financing

Trust Funds	17.34
European Commission Development Fund - TF	17.34



IDA Resources (in US\$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
<b>Tajikistan</b>	0.00	30.00	0.00	30.00
National PBA	0.00	30.00	0.00	30.00
<b>Total</b>	<b>0.00</b>	<b>30.00</b>	<b>0.00</b>	<b>30.00</b>

Expected Disbursements (in US\$, Millions)

WB Fiscal Year	2022	2023	2024	2025	2026	2027	2028
<b>Annual</b>	0.00	3.70	8.05	9.00	7.00	2.00	0.25
<b>Cumulative</b>	0.00	3.70	11.75	20.75	27.75	29.75	30.00

INSTITUTIONAL DATA

Practice Area (Lead)

Water

Contributing Practice Areas

Agriculture and Food

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	● Moderate
2. Macroeconomic	● Substantial
3. Sector Strategies and Policies	● Moderate
4. Technical Design of Project or Program	● Moderate
5. Institutional Capacity for Implementation and Sustainability	● Moderate
6. Fiduciary	● Moderate
7. Environment and Social	● Substantial
8. Stakeholders	● Moderate



9. Other

10. Overall

● Moderate

**COMPLIANCE**

**Policy**

Does the project depart from the CPF in content or in other significant respects?

Yes  No

Does the project require any waivers of Bank policies?

Yes  No

**Environmental and Social Standards Relevance Given its Context at the Time of Appraisal**

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Not Currently Relevant
Cultural Heritage	Not Currently Relevant
Financial Intermediaries	Not Currently Relevant

**NOTE:** For further information regarding the World Bank’s due diligence assessment of the Project’s potential environmental and social risks and impacts, please refer to the Project’s Appraisal Environmental and Social Review Summary (ESRS).





**Legal Covenants**

Sections and Description

Financing Agreement, Schedule 2, Section I.A.1. The Recipient shall no later than two (2) months after the Effective Date, establish and thereafter maintain, throughout Project implementation, a Project Steering Committee with a mandate, functions, and resources satisfactory to the Association, to be responsible for overall coordination, guidance, and oversight.

Sections and Description

Financing Agreement, Schedule 2, Section I.A.2. The Recipient, through MoEWR, shall maintain, throughout Project implementation, a PIU with a mandate, functions, and resources, and staff in adequate numbers and with qualifications, experience, and terms of reference satisfactory to the Association, responsible for implementation of Parts 1.1 and 3(i) of the Project.

Sections and Description

Financing Agreement, Schedule 2, Section I.A.3. The Recipient, through MoEWR, shall no later than one (1) month after the Effective Date, recruit to the PIU, a project manager/coordinator, a financial management specialist, a procurement specialist, and a social specialist, all with qualifications, experience, and terms of reference satisfactory to the Association.

Sections and Description

Financing Agreement, Schedule 2, Section I.A.4. The Recipient, through ALRI, shall maintain, throughout Project implementation, a PMU with a mandate, functions and resources and with staff in adequate numbers and with qualifications, experience, and terms of reference satisfactory to the Association, responsible for the implementation of Parts 1.2, 2, and 3(ii) of the Project.

Sections and Description

Financing Agreement, Schedule 2, Section IV.1. The Recipient shall cause ALRI to, no later than three (3) month after the Effective Date, establish and thereafter maintain a support unit for the irrigation management information system implemented under Part 1.2 of the Project, with a composition, mandate, and resources satisfactory to the Association.

**Conditions**

Type	Financing source	Description
Effectiveness	IBRD/IDA	Financing Agreement. Article IV 4.01 (a). The Recipient has established the PIU in accordance with Section I.A.2 of Schedule 2 to this Agreement.
Effectiveness	IBRD/IDA	Financing Agreement. Article IV 4.01 (b).the Recipient, through MoEWR and ALRI, have adopted the POM in form and substance satisfactory to the Association.



Type Effectiveness	Financing source IBRD/IDA	Description Financing Agreement. Article IV 4.01 (c). The Grant Agreement has been executed and delivered and all conditions precedent to the effectiveness of said agreement, or to the right of the Recipient to make withdrawals under said agreement (other than the effectiveness of this Agreement) have been fulfilled.
Type Effectiveness	Financing source Trust Funds	Description Grant Agreement. Article IV 4.01 (b). The Financing Agreement dated the same date as this Agreement, between the Recipient and IDA, providing a grant in support of the Project, has been executed and delivered and all conditions precedent to its effectiveness or to the right of the Recipient to make withdrawals under it (other than the effectiveness of this Grant Agreement) have been fulfilled.
Type Disbursement	Financing source Trust Funds, IBRD/IDA	Description Financing Agreement and Grant Agreement Schedule 2 Section III. B (b). No withdrawals should be made for WUA Grants under Part 1.2 (iv) of the Project unless and until the WUA Grant Manual satisfactory to the Association has been adopted by ALRI.
Type Disbursement	Financing source IBRD/IDA	Description Financing Agreement Schedule 2 Section III. B (a). No withdrawals should be made for payments made prior to the Signature Date, except that withdrawals up to an aggregate amount not to exceed \$517,000 equivalent may be made for payments made on or after the date that falls 12 months prior to the Signature Date, for Eligible Expenditures under Category (3) and (4).



## I. STRATEGIC CONTEXT

### A. Country Context

- 1. Despite two decades of poverty reduction and steady economic growth**, Tajikistan remains the poorest country in the Europe and Central Asia (ECA) region.<sup>1</sup> Officially reported real annual gross domestic product (GDP) growth averaged 6.9 percent during 2011–2021, benefiting from solid remittance inflows and externally financed public investments. Despite strong economic performance, Tajikistan struggles to achieve food security and overcome structural bottlenecks to create jobs. While poverty rates are falling overall, the urban-rural poverty gap is widening with about 2.2 million (nearly one-quarter of the national population) living below the national poverty line in rural areas.
- 2. In 2020, COVID-19 caused a major economic slowdown in Tajikistan, disproportionately affecting the poor.** Reduced foreign earnings curtailed household consumption and fiscal revenue. Despite a fiscal deficit, development finance enabled the equivalent of 2.8 percent of GDP for COVID-related expenditure. The national pandemic response included action plans for Country Preparedness and Response<sup>2</sup> and for Preventing and Reducing the National Economy's Exposure, with significant additional funding for health care, social assistance, private sector tax relief, and public sector wages and pensions, and postponed power and water tariff increases. By late 2020, two-thirds of households reported lower incomes and one-fifth were unable to buy food or essential supplies;<sup>3</sup> migrant remittances fell drastically because of travel restrictions and the economic downturn in Russia.
- 3. In 2021 the economy rebounded, growing at an annual rate of 8.7 percent in the first half of the year.** Increased remittance inflows, a stable exchange rate, and the release of pent-up demand strengthened consumer confidence and capital goods imports and enabled consolidation of the national budget. Foreign investment rose by 35 percent (year-on-year) in the first eight months of 2021. Despite this rebound, public debt remains high (43 percent of GDP) and there is a high risk of debt distress;<sup>4</sup> poverty rates are rising, reversing the previous trend.<sup>5</sup>
- 4. Since early 2022, the evolving conflicts in the region created significant new economic uncertainty for Tajikistan.** The collapse of the Russian ruble sent shock waves through Central Asian currency markets and the Tajik somoni lost 35 percent of its value against the ruble in under a week. Currency devaluation and travel restrictions to and from Russia will likely have huge impacts on remittance flows that have constituted one-third of the Tajik economy.
- 5. Tajikistan shares a long border with Afghanistan having multiple crossing points.** The withdrawal of North Atlantic Treaty Organization (NATO) forces from Afghanistan and establishment of the Taliban-led government in mid-2021 created the potential for an influx of up to 50,000 refugees into Tajikistan.<sup>6</sup> To guide preparation, the World Bank conducted a multi-sectoral needs assessment in late 2021.

<sup>1</sup> World Bank, World Development Indicators.

<sup>2</sup> Republic of Tajikistan. 2020. "Tajikistan COVID-19 Country Preparedness and Response Plan." Dushanbe, Tajikistan.

<sup>3</sup> IFC (International Finance Corporation). 2020. "COVID-19 Impact Assessment Survey: Tajikistan and Kyrgyz Republic."

<sup>4</sup> World Bank. 2021. "Tajikistan Country Economic Update." Summer 2021.

<sup>5</sup> World Bank. 2020. "Tajikistan: Economic Slowdown Amid the Pandemic." Country Economic Update Fall 2020.

<sup>6</sup> United Nations High Commissioner for Refugees 'Refugee Response Plan' Situation (September 2021). At the end of 2020, Tajikistan hosted ~6,000 Afghan refugees with ~5,000 arriving in 2021.



Interagency discussions sought to identify and prepare refugee sites across the country, including in the border areas of Khatlon region.<sup>7</sup>

6. **Tajikistan is highly vulnerable to climate extremes and projected climate change**, making climate adaptation a top priority for the country. Key climate related hazards include floods, landslides, debris flows, and droughts. Nationally, there have been significant floods in 23 of the last 30 years, with the largest in 2003 affecting over 400,000 people. Floods and mudflows in mid-2021 affected more than 2,500 households and 2,700 ha of irrigated land<sup>8</sup> in the densely populated central and southwestern parts of Tajikistan.<sup>9</sup> While widespread drought is less frequent, a major drought in 2000 affected 3 million people—more than any other recorded natural disaster, and droughts are projected to become more frequent as hydrologic variability increases with climate change. Generally, the most vulnerable areas are the glacier-dependent river basins (such as the Vakhsh) that supply water for irrigation and hydropower and their fragile mountain ecosystems that are prone to landslides and land degradation.<sup>10</sup> Rural settlements and small-scale agriculture in the upper basins are frequently affected by floods and mudflows, exacerbating poverty, and these events are expected to become more frequent and severe.<sup>11</sup> In the lower basins, inadequate infrastructure and a high dependency on agriculture and hydropower mean populations are also vulnerable to climate extremes and climate change. Water and energy demands will increase with climate warming (exacerbated by population and economic growth) and without strong adaptation will lead to disruptions to economic production and livelihoods, especially in rural areas. Both flood and drought extremes are expected to increase in frequency with climate change, and crop water demands will increase significantly, leading to greater water stress, even in irrigated areas, affecting irrigation productivity and thus rural livelihoods. Rehabilitating and modernizing irrigation infrastructure is critical to improve the resilience of these sectors and their dependent populations to future climate change.

7. **Tajikistan is also pursuing a ‘green economy’ to increase economic resilience.** The National Development Strategy (NDS) 2015–2030 prioritizes a transition to a green economy with a medium-term focus on achievement of the Sustainable Development Goals (SDGs) and on climate adaptation. Forestry and agriculture are key sectors for this transition, and efficient economic management, careful use of natural resources, and civil society engagement in monitoring, control, and use of natural resources will be critical.<sup>12</sup> The National Strategy for Adaptation to Climate Change to 2030 commits Tajikistan to reducing the impacts of climate shocks and has three goals:<sup>13</sup> (a) reducing the vulnerability of the most vulnerable populations, priority sectors, and cross-cutting areas to climate change and extreme climate events; (b) prioritizing climate adaptation investments that can be financed through sectoral investment plans and budgets, private sector investment, multilateral and bilateral development partners; and (c) designing, implementing, monitoring, and assessing climate risk management and adaptation

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<sup>7</sup> Government of Tajikistan. 2021. “Tajikistan Interagency Contingency Plan, 2021.”

<sup>8</sup> UNICEF (United Nations Children’s Fund). 2021. “Emergency WASH Assessment in Response to the May 2021 Disasters in Tajikistan.”

<sup>9</sup> World Bank. 2021. “Assessment Of Contributing Factors Of The May 2021 Disasters In Tajikistan.”

<sup>10</sup> <https://climateknowledgeportal.worldbank.org/country/tajikistan>,

<sup>11</sup> Ibid.

<sup>12</sup> National Review Towards a Green Economy in Tajikistan.

<https://sustainabledevelopment.un.org/content/documents/1021tajikistan.pdf>

<sup>13</sup> Government of the Republic of Tajikistan. 2019. “National Strategy for Adaptation to Climate Change of the Republic of Tajikistan for the Period up to 2030.” Order No. 482, Dushanbe.



measures needed to reduce current and future vulnerability to climate change and extreme weather events.

8. **Tajikistan is projected to become a hotspot for climate change driven migration** with 1.7 million (2.4 percent of the population) climate migrants by 2050 under an optimistic scenario.<sup>14</sup> Under this scenario, climate migrants would represent 20 percent of the internal migrants in the region. Southern Tajikistan (including Dushanbe) is projected to become in-migration hotspot, while the Ferghana Valley in Tajikistan is projected to become an out-migration hotspot, given decreases in water availability and crop productivity.<sup>14</sup>

## B. Sectoral and Institutional Context

9. **Water security is key to Tajikistan’s economic growth; and food security and poverty reduction are core government priorities.** Tajikistan is pursuing agricultural, energy, and water reforms and these are reflected in the pillars of the NDS 2015–2030: (a) increase agricultural efficiency and develop capacity for processing agricultural products targeting exports beyond Central Asia; (b) increase electricity generation and export to neighboring countries; and (c) increase productive human capital. Water is critical to each of these pillars, through irrigation improvement, hydropower development, and universal access to safe and secure water and sanitation services as a foundation for human capital development. The National Strategy for Adaptation to Climate Change to 2030 also commits the country to reducing the vulnerability of the population and priority sectors to climate change and extreme weather events. This builds on Tajikistan’s Third National Communication under the United Nations Framework Convention on Climate Change (UNFCCC), which identified priority measures to enhance resilience to climate change and the impacts of extreme hydrometeorological events.

10. **With improved performance, irrigated agriculture could underpin national economic growth.** Agriculture contributes 24 percent of national GDP (2020) and 45 percent of national employment (2019). About 85 percent of cultivated land is irrigated, and this delivers over 90 percent of the total value of crop production.<sup>15</sup> However, since independence, the condition and performance of irrigation infrastructure has declined because of severe underfinancing. Poor performing infrastructure includes many high-lift, high-volume pumping stations—more than 40 percent of irrigated areas in Tajikistan are dependent on pumping (the highest dependency in Central Asia). Pumping is inefficient at around 0.28 kWh/m<sup>3</sup> and this represents around 20 percent of total national electricity use.<sup>16</sup> The economic productivity of irrigation is among the lowest 5 percent of countries in the world at around US\$0.21 per meter<sup>17</sup> because of high water losses, a predominance of low value crops, and low yields. Wheat yields, while more than double the largely rainfed yields in Kazakhstan, are nearly 30 percent below irrigated yields in Uzbekistan. Irrigation is often unreliable with poor water delivery control—some areas are underirrigated while others are overirrigated. However, withdrawals are high because of high water application rates (1,200–8,000 m<sup>3</sup>/ha) and because the irrigation system is leaky overall. Aging and poorly maintained infrastructure and poor system management mean low-quality irrigation services, which contribute to low productivity, low rural incomes, food insecurity, and environmental stress. Overall, the irrigation infrastructure was not

<sup>14</sup> Clement, Viviane; Rigaud, Kanta Kumari; de Sherbinin, Alex; Jones, Bryan; Adamo, Susana; Schewe, Jacob; Sadiq, Nian; Shabahat, Elham. 2021. “Groundswell Part 2: Acting on Internal Climate Migration.” World Bank, Washington, DC.

<sup>15</sup> FAO Aquastat.

<sup>16</sup> Based on Government of Tajikistan data for irrigation water withdrawals and electricity consumption in 2017.

<sup>17</sup> Based on latest values of GDP, agriculture share of the economy, and annual irrigation withdrawals from data.worldbank.org.



designed to account for climate change. Due to low investments in drainage infrastructure, inadequate maintenance and poor water management, and harmful irrigation practices, some irrigated areas are affected by salinization and waterlogging. Population growth continues to increase food demands, with wheat imports steadily rising over recent years. In the absence of adaptation, climate change will negatively affect production. Rising temperatures will increase crop water demands and water supply reliability will decline, leading to more severe and more frequent water stress. Floods and mudflows will become more frequent, damaging infrastructure and disrupting production. In the absence of reform, investment, and adaptation, irrigation performance will further decline, with knock-on impacts on economic growth and poverty reduction.

**11. Recognizing the importance of water to its development agenda, Tajikistan has committed to comprehensive reforms.** The National Water Sector Reform Program (WSRP) 2016–2025 stresses water as a valuable resource and calls for broad adoption of Integrated Water Resources Management (IWRM) on a river basin basis. It sets out national principles for water resources management (WRM) including (a) separation of policy and operational functions, (b) aligning of WRM to hydrological boundaries, and (c) decentralization of service functions. Key recent reforms include new laws on Water User Associations (WUAs) and on Drinking Water Supply and Wastewater and the adoption of a revised National Water Code.<sup>18</sup> In 2019, Tajikistan drafted a National Water Strategy to 2030 targeting (a) full restoration of previously irrigated lands, (b) irrigation expansion of 2,000 ha/year, and (c) expansion of the area under water-efficient irrigation of 6,000 ha/year. The strategy aims to support achievement of water-related SDGs and implementation of the NDS. A focus on performance improvement and modernization rather than expansion is required, and achievement of these targets will require greatly increased investment.

**12. The institutional arrangements for irrigation and water resources management are being reformed but are currently suboptimal.** In 2013, the former Ministry of Land Reclamation and Water Resources was restructured with a new Ministry of Energy and Water Resources (MEWR) responsible for water sector policy and regulation and a new Agency for Land Reclamation and Irrigation (ALRI) responsible for implementation of the state policy in the irrigation and land reclamation sector, irrigation service delivery, and system maintenance. The governance arrangements set out in the Water Code have been only partially implemented and are only partially effective, as the progress has been heavily reliant on development partner support. A National Water Council (NWC), described in the Water Code as a supervisory and coordinating body for the water sector, is yet to be established. Experience suggests strategic intersectoral thinking is required for improved water resources planning and management based on exchange of information and dialogue across energy, agriculture, environment sectors, and economy overall. The NWC could provide such a national platform. Progress was made in establishing river basin organizations (RBOs) as “structural units of authorized state body for regulation and management of water resources”. These organizations are legally mandated as coordinating bodies for the activities of River Basin Councils (RBCs). RBOs, however, are yet to become fully effective in performing their mandate given issues of low capacity, insufficient financing, and lack of empowerment. There is a serious underrepresentation of women in the current institutional arrangements for both water resources planning and irrigation management. For example, there are no women in the water wing of MEWR and only 12 percent of ALRI staff are women, and these are concentrated in administrative support roles.

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<sup>18</sup> Republic of Tajikistan (2019, 2020) Resolutions #1633, #1668, and #1688.



13. **Tajikistan lacks a national irrigation strategy**, although efforts to establish sub-basin-level irrigation service providers in the Zarafshon, Panj, and Kofarnihon basins have had partial success. ALRI lacks a medium-term investment program for the construction and rehabilitation of water management facilities and a long-term strategy aligned with the agriculture sector development vision. The minimum annual spending to operate and maintain irrigation infrastructure in Tajikistan is estimated to be US\$35 million. However, existing ALRI sub-entities have not fully embraced a service-oriented scheme-based approach to irrigation management and lack control of planning and financing for their operations and so remain reliant on the national ALRI. The new WUAs law reconfirmed respective areas of responsibility between WUAs and ALRI and made clear provision for ALRI to act as a support and coordination entity for WUAs. Since 2006, nearly 400 WUAs have been established with responsibility for maintaining state-owned on-farm irrigation and drainage infrastructure. WUAs could also become intermediaries that provide extension and advisory services for water and agricultural management. However, WUAs cannot effectively fulfil these functions without adequate state support. Some support is channeled through the WUAs Unit of ALRI, but this unit has insufficient funding and capacity.

14. **Hydrologic monitoring systems are improving but are incomplete.** Data for the major water intakes on the tributaries of transboundary rivers (Panj, Kofarnihon, Vakhsh, and Syr Darya) are collected manually by the Basin Water Organization (BWO) 'Amudarya' and BWO 'Syrdarya' and reported to MEWR and the regional BWOs twice daily. Flow measurements are made at major irrigation headworks and WUA boundaries in the Zarafshon and Lower Kofarnihon basins to determine water delivery volumes to WUAs as the basis of irrigation service fees paid by WUAs to ALRI. Data from irrigation headworks are automatically transmitted to an Irrigation Management Information System (IMIS). Establishment of this system in the Zarafshon and Lower Kofarnihon basins has been partially successful, but equipment failures and interference undermined reliability. River flow monitoring is conducted by the Hydromet agency but is not routinely provided to MEWR and RBOs. The database of withdrawal permits maintained by the Committee for Environmental Protection is not digitalized or linked to the Water Information System (WIS), making effective water allocation planning difficult.

15. **Irrigation is heavily subsidized and underfunded leading to fiscal constraints and perverse incentives.** Irrigation is financed by direct transfers for electricity bills, government subsidies for pumping station staff costs, revenue from irrigation service fees, WUA membership fees (for on-farm operation and maintenance [O&M]), and donor investments. More than 60 percent of irrigation capital expenditure (including flood protection) is donor financed, and low O&M spending is eroding the economic value of irrigation assets and increasing long-term costs. A Public Expenditure Review for the sector, financed under the Central Asia Water and Energy Program, commenced in 2021. It will provide comprehensive analysis of budget efficiency. Water sector reforms include introduction of volumetric billing of irrigation water to improve cost recovery of irrigation services. However, volumetric billing is not yet widespread, and even where adopted, collection rates are only around 60 percent. The historical area-based tariff system had led to some resistance to the introduction of volumetric billing. The target for ALRI to be financially self-sufficient by 2019 was not achieved and remains difficult because of minimal efforts to determine the actual cost of irrigation and initiate a discussion on raising water tariffs. Staff capacity is a constraint for the whole water sector, as it is rapidly losing its expertise. The average age of the irrigation engineers hired at district-level water management departments is above 50, and ALRI needs more capable young staff, especially water resources and irrigation specialists.



16. **Electricity costs are a large fraction of ALRI's budget.** While debts to the national electricity utility have been written off on several occasions (most recently in 2014), they had accumulated to US\$25 million by 2020<sup>19</sup> despite tariff payment levels increasing from ~10 percent (2014–2017) to more than 30 percent (2018–2020). Since 2018, ALRI has not received direct electricity subsidies, but electricity bills have been paid through direct transfers from the Ministry of Finance to ALRI. This has reduced the incentive to improve irrigation energy efficiency. While the annual cost of irrigation inefficiency has been estimated at US\$11 million (US\$44 per hectare),<sup>20</sup> there has been no sector audit of energy use and there is no realistic roadmap to transition to financial sustainability.

17. **The WSRP has been supported by multiple development partners, and continued assistance to furthering the process is critical.** The state budget resources are limited to fund policy and legislative reform or capacity building of water resources and irrigation institutions. Past and ongoing support from development partners has thus been critical to the WSRP implementation and has been largely delivered on a river basin basis. World Bank support pre-dates the WSRP and commenced with emergency projects focused on irrigation expansion for rural livelihoods—first, Ferghana Valley WRM Project (FVWRMP) in the Ferghana Valley of Syr Darya basin, then the first Public Employment for Sustainable Agriculture and Water Management Project (PAMP-I, P119690) in the Lower Kofarnihon basin. Subsequently, the focus shifted toward institutional strengthening and sector reforms under PAMP-II (P133327) also in the Lower Kofarnihon and under the Zarafshon Irrigation Rehabilitation and Management Improvement Project (ZIRMIP, P158576) in the Zarafshon basin. PAMP-II retained the PAMP-I design but tackled a larger geographic area over a longer implementation period. Less emphasis was put on temporary employment and more on infrastructure rehabilitation. ZIRMIP shifted the focus toward reforms and institutional strengthening but continued with rehabilitation of critical infrastructure.

18. **Coordination of activities with other development partners occurs through project focus on target river basins and national synergies across four pillars:** (i) Water Governance, (ii) Information and Knowledge Sharing, (iii) Capacity Building, and (iv) Infrastructure Investment. The new project responds to a government request to accelerate national reforms and to improve both water resources policy and planning and irrigation management, especially in the Vakhsh basin, which is the heartland of irrigation in Tajikistan. Vakhsh is a large basin with multiple and complex water sector challenges. In 2020, the World Bank completed a sector needs assessment for the Lower Vakhsh basin, which informed design of the infrastructure aspects of new project. In addition to supporting the ongoing reform process both nationally and in the Vakhsh and Zarafshon basins, the new project adopts a more strategic approach to infrastructure investments. First, the project will move the national irrigation infrastructure agenda from 'rehabilitation' to 'modernization' and service delivery for large schemes. This will improve not just the condition of irrigation systems but the performance of selected systems in terms of efficiency, productivity, and environmental and financial sustainability. It will help break the build-neglect-rehabilitate cycle. Second, the project will improve the resilience of smaller irrigation systems that are frequently affected by floods and mudflows—disruptions that will become more frequent with climate change in the absence of adaptation. This approach is fully consistent with the World Bank's Green, Resilient, Inclusive Development approach. Figure 1 shows the evolution of World Bank sector support.

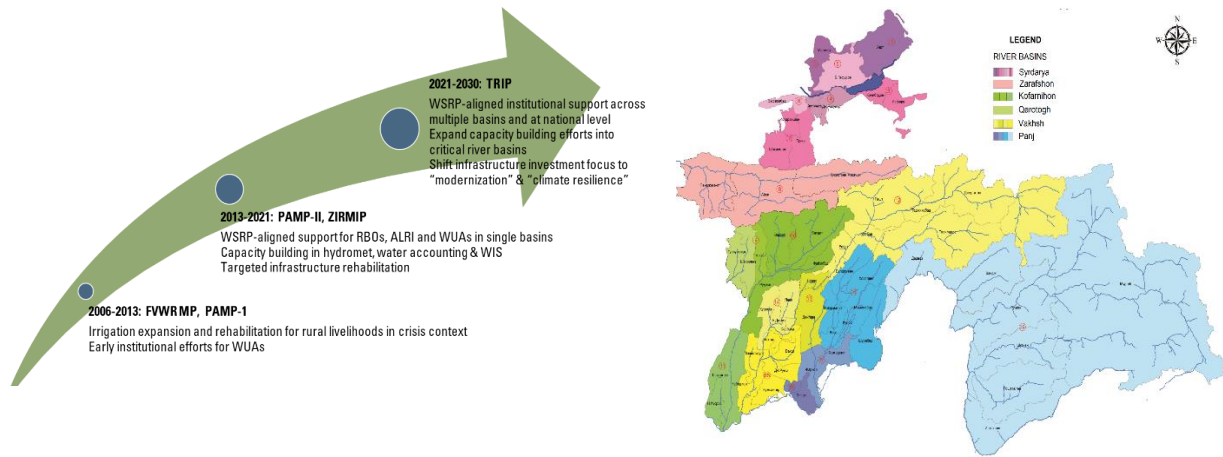
<sup>19</sup> OECD (Organisation for Economic Co-operation and Development). 2018. "Policy Perspectives for irrigation Sector Reform in Tajikistan - A Paper for Decision Makers."

<sup>20</sup> World Bank. 2017. "The Costs of Irrigation Inefficiency in Tajikistan." World Bank, Washington, DC.





Figure 1. Evolution of World Bank WRM and Irrigation Support in Tajikistan (left) and the River Basins of the Country (right; source: MEWR)



### C. Relevance to Higher Level Objectives

19. **The project is strongly aligned with the Country Partnership Framework (CPF)**<sup>21</sup>. It contributes to CPF Focus Area 1 ‘Building Human Capital and Strengthening Social Resilience’ and Focus Area 2 ‘Improving Public Institutions and Fiscal and Environmental Sustainability’.<sup>21</sup> Objective 3 of Focus Area 1 is to ‘Improve the Resilience of Residents in Local Communities’. The project will increase climate resilience by (a) reducing the vulnerability of small irrigation schemes in the mountain upper basins to floods and mudflows and (b) improving water management large irrigation schemes to enable them to better withstand climate change induced increases in water stress. Objective 4 of Focus Area 2 is to ‘Improve Financial Viability of Public Electricity and Water Utilities’. The project will contribute by providing institutional support and capacity building to ALRI at national, regional, and district levels. The CPF stresses that integrated approaches in the water sector are critical to ensure access and affordability of water and to improve the ability to negotiate long-term agreements with neighboring countries. The CPF notes the importance of citizen engagement (highlighting best practices from the PAMP-II in civil society partnerships in project monitoring) and cross-cutting priorities (for example, gender, women’s empowerment, and climate resilience) in water use and management. The project fully embraces all these approaches and priorities.

20. **The project is aligned with the World Bank COVID-19 response and the ECA Green Transition framework.** The project is aligned with Pillar 4 of the World Bank COVID-19 Crisis Approach Paper: ‘Strengthening policies, institutions, and investment for rebuilding better’.<sup>22</sup> It will build irrigation sector resilience and strongly contribute to a green recovery, including by improving the energy efficiency of irrigation. The project is aligned with the ECA Green Transition framework that calls for a shift toward a green, resilient, and inclusive development, while supporting the ongoing transition of Central Asian countries from centrally planned to market-based economies. The project addresses Green Transition Priority 3 (disaster and climate resilience) by strengthening resilience to climate extremes and Priority 4

<sup>21</sup> World Bank. 2019. “Tajikistan - Country Partnership Framework for FY19-FY23.” Report No. 135875 World Bank, Washington, DC. Discussed at Board 2019-05-09.

<sup>22</sup> World Bank. 2020. “COVID-19 Crisis Response Approach Paper: Saving Lives, Scaling-up Impact and Getting Back on Track.” Unpublished paper. Washington, DC.



(inclusive infrastructure service delivery) by ensuring equitable access to quality services and reforming inefficient state-run enterprises. The project will contribute to SDG6 (clean water and sanitation for all), specifically through advancing IWRM at all levels (SDG6.5.1),<sup>23</sup> and SDG2 (food security) by helping stabilize food production in the face of climatic shocks through improved irrigation performance.

21. **The project is fully consistent with the World Bank Group (WBG) Climate Change Action Plan (CCAP, 2021–2025) resilience.**<sup>24</sup> It will finance adaptation and mainstreaming of systematic climate risk management at country and sector levels. Aligned with CCAP investment priorities, the project increases the availability and use of climate information in water resources planning, protects irrigation infrastructure from climate extremes, and improves irrigation performance to mitigate the impacts of increased future water stress. The project is also fully consistent with the WBG ECA Climate Roadmap (2021–2025) and the priorities therein for food-landscapes-water systems. It will explicitly address two major climate risks for Tajikistan. First, it will help address the country’s medium-high drought risk. A component of drought risk is extreme temperatures that increase evaporation and crop water demands. Tajikistan regularly faces high maximum temperatures, with most lowland regions with irrigated agriculture experiencing multiple days exceeding 35°C every year. The annual probability of heatwaves is currently around 3 percent, but is projected to increase under all emissions pathways to 7–23 percent by the 2090s.<sup>25</sup> Drought severity is expected to increase, leading to significantly greater irrigation water demand.<sup>26</sup> Studies suggest that irrigation demand may no longer be satisfied by available runoff during even low-intensity, high-frequency drought events by 2070–2099.<sup>27</sup> Drought impacts will be mitigated by improved irrigation service delivery and performance. Second, the project will address flood (and associated debris flow) risk. Floods damage irrigation infrastructure (especially in the upper basins) and clog irrigation delivery networks with sediment (especially in the lower basins), reducing their performance. Flood risks are increasing in Tajikistan because of climate change, and the next few decades of rapid glacier melting are expected to be a particular risk period. In the upper river basins, the project will increase the resilience of irrigation to flood damage by construction of protection works. In the lower basins, the project will improve routine and post-flood maintenance of irrigation networks to reduce the impact of sedimentation on irrigation service delivery and performance.

## II. PROJECT DESCRIPTION

### A. Project Development Objective

22. **The Project Development Objective (PDO) is to:** (i) strengthen capacity for water resources planning and irrigation management in Tajikistan and (ii) improve performance of selected irrigation schemes in the Vakhsh and Zarafshon river basins. The project has assessed medium and large irrigation schemes using metrics of *need* and *impact* relating to rehabilitation and modernization and uses these assessments to prioritize scheme. Indicators of scheme performance will be monitored during

<sup>23</sup><https://sdgs.un.org/goals/goal6>

<sup>24</sup><https://openknowledge.worldbank.org/handle/10986/35799>

<sup>25</sup> WBG Climate Change Knowledge Portal. 2021. “Tajikistan, Climate Data, Projections.” <https://climatedata.worldbank.org/CRMePortal/web/water/land-use/-/watershed-management?country=TJK&period=2080-2099>

<sup>26</sup> Nikanorova, A.D, Milanova, E.V., Dronin, N.M., and Telnova N.O. 2016. “Estimation of Water Deficit under Climate Change and Irrigation Conditions in the Fergana Valley of Central Asia.” *Arid Ecosystems* 6 (4): 260–267. doi.org/10.1134/S2079096116040053.

<sup>27</sup> White, Christopher; Tanton, Trevor; and Rycroft, David. 2014. “The Impact of Climate Change on the Water Resources of the Amu Darya Basin in Central Asia.” *Water Resources Management* 28 (15): 5267–5281. doi.org/10.1007/s11269-014-0716-x.



implementation to track improvement. Performance of schemes will be considered in terms of water delivery, energy efficiency, and economic productivity.

23. **Indicators for the two PDO outcomes** are as follows: Outcome 1 (*Strengthen capacity...*) (a) national and basin-level water planning institutions established and resourced, (b) ALRI and WUAs strengthened to enable effective management of targeted major schemes; Outcome 2 (*Improve performance...*) (a) area with improved water delivery in targeted large schemes, (b) energy intensity of water delivered in targeted large schemes, (c) value of production in targeted large schemes.

## B. Project Components

24. **The project will accelerate national water reforms, strengthen capacity for water resources planning, improve irrigation management including through building climate resilience, and contribute to enhancing rural livelihoods and food security.** It will combine support for improved water resources policy and planning and irrigation management at national and basin levels, with modernization of infrastructure at irrigation scheme level for enhanced performance of selected irrigation schemes. Institutional components will restructure and strengthen water resource and irrigation management institutions (including national agencies, basin organizations, district irrigation agencies, and WUAs) and develop sector strategies and the systems for setting, tracking, and reporting on sector performance targets. These institutional aspects are fundamental to enable the sector to successfully navigate projected future climate change. Infrastructure components will enhance climate resilience by reducing the energy intensity of irrigation, increasing the efficiency of water delivery (thus improving drought resilience), and reducing the vulnerability of irrigation schemes to floods and mudflows.

25. **The project has four components:** (1) Water Sector Reform and Institutional Strengthening, (2) Irrigation Scheme Improvements, (3) Project Management, and (4) Contingent Emergency Response Component. This aligns with the structure of the WSRP action plan, with WSRP actions on 'Legislative and Regulatory Frameworks' and 'Institutional Development' progressed under Component 1, and WSRP actions on 'Infrastructure Rehabilitation' addressed under Component 2. Component 1 is subdivided into (a) strengthening national and basin-level water resources policy and planning and (b) improving irrigation planning and management. Component 2 is subdivided into (a) improving large-scale irrigation schemes and (b) improving small- and medium-scale irrigation schemes.

### **Component 1: Water Sector Reform and Institutional Strengthening (US\$7.60 million)**

26. **Subcomponent 1.1: Strengthening national and basin-level water resources policy and planning (US\$1.80 million).** This subcomponent will support establishment of an NWC (with functions and responsibilities set out in the National Water Code) through drafting bylaws and regulatory documents, facilitating dialogues, and conducting study tours. NWC staff will be trained in approaches to formulating water resources policy and regulations. The subcomponent will build the capacity of MEWR and the Vakhsh RBO and RBC for water resources monitoring, management, and planning, at national and river basin levels. River basin planning will be critical for enabling an adaptive approach to addressing projected climate change impacts on water resources. At least three full non-duplicative training modules for MEWR, RBO staff, and RBC members will be designed and delivered. Training delivery will be phased from the second year of the project implementation, with a target of at least 10 percent women participants. At least two intra-basin study tours for knowledge and experience exchanges will be conducted. The subcomponent will strengthen MEWR capacity for implementation of the national WIS in support of water



resources planning. Prior support for the WIS focused on system design and development and on the coding of hydrological 'objects'. Under this project, the focus will shift toward (a) digitalizing all historical relevant meteorological, hydrological, and water resources data sets; (b) developing technical and user documentation; (c) enhancing/developing arrangements for interagency data exchange; (d) ensuring use of remote monitoring tools such as drone applications and remote sensing; (e) expanding the data visualization functionalities of the WIS; and (f) developing and disseminating information products. Specifically, MEWR will be supported to institutionalize preparation and publication of an annual national water assessment report (or water cadaster report), indicating the status and use of all water resources, including through links to the Department of Geology (for groundwater data) and the Committee for Environmental Protection (for permitting data). Support will be provided for building the physical, technical, and human capacity of the RBO and RBC in the Vakhsh river basin, including (a) design, supply, installation, and commissioning of water flow measurement devices for identified key gauging stations; (b) construction of Vakhsh RBO office in Bokhtar and rehabilitation of the Rasht suboffice; (c) provision of office furniture, IT equipment, laboratory equipment, and vehicles; (d) development of the WIS and the basin plan for the Vakhsh; and (e) development and delivery of tailored trainings to the water sector professionals, including on climate change-informed decision tools for river basin planning. Expected outcomes from the subcomponent are established and sustainably resourced institutions appropriate for national and basin-level water resources planning and regulation. The subcomponent will be implemented by a Project Implementation Unit (PIU) to be established in MEWR.

27. **Subcomponent 1.2: Improving irrigation planning and management (US\$5.80 million).** This subcomponent will strengthen the capacity for irrigation management at agency (national and 'sub-basin' ALRI) and WUA levels. At the national ALRI level, the subcomponent will draw on international expertise to inform development of a national irrigation strategy that provides a 10–15-year roadmap for sector reforms and investment in the context of climate change and national economic development. The overarching objective is to guide the transition of the sector toward financial and environmental sustainability and to far higher level of economic productivity in the context of significant anticipated climate change. Two important foundation studies for the national irrigation strategy will be undertaken under this subcomponent: (a) a sector-wide assessment of energy use and energy efficiency and (b) a systematic review of irrigation tariffs and subsidies. These will be critical to reducing irrigation costs and increasing revenue for services, and together will be critical for improving financial sustainability. Approval of the national irrigation strategy will be an NWC responsibility. The subcomponent will support the ongoing restructuring of ALRI to transition irrigation management from administrative boundaries (for example, districts) to hydraulic boundaries (for example, schemes or groupings of schemes), enabling ALRI to adopt a scheme-based approach to service delivery. New financially autonomous ALRI units will be established in the Lower Vakhsh and the Upper Kofarnihon. Financial autonomy will incentivize cost reductions and tariff collection rate improvements. In the Upper Kofarnihon, the scope will be limited to the service area of the Big Hissar Canal. The choice of groupings of irrigation schemes to be allocated to new ALRI units will consider economies of scale and the constraints and synergies of irrigation scheme configurations to ensure new units are optimal for scheme-level management and service delivery to WUAs (including improved scheme maintenance and water delivery). Capacity development for the new ALRI units will include support for developing asset management plans (underpinned by geographic information system [GIS] inventories of hydraulic infrastructure) and training in financial and operational management and monitoring. The new ALRI units will have responsibility for the improved management and performance of targeted large irrigation schemes. A key management tool for ALRI will be an IMIS, developed and maintained by a new dedicated central IMIS Support Unit within ALRI. The IMIS will be a



national system based on coding of all irrigation schemes and their configuration of individual ‘objects’ (for example, canals, pump station, headworks) within schemes and a national WUA database. The focus of the IMIS design, however, will be on providing the functionality to improve scheme-level irrigation performance management. Key modules to support scheme management are (a) an asset management module based on a GIS-referenced inventory; (b) a financial and commercial management module tracking revenue (including from tariffs) and expenditure; (c) an irrigation management and service delivery module tracking water delivery, contracting, and scheme performance; and (d) a WUA module to support WUA functions within schemes. The IMIS will incorporate remotely sensed data for the Vakhsh basin focused on (a) supporting regular data exchange with ALRI and the Ministry of Agriculture (MoA) to guide agricultural land use/planting decisions, (b) assessing climate impacts on irrigation delivery and agricultural production, and (c) building irrigation management capacity at scheme and WUA level for improved irrigation planning and service delivery. Introduction of the IMIS will significantly strengthen ALRI’s ability to identify and prepare for droughts or floods and their impact on irrigation and drainage infrastructure, by providing data-driven information on infrastructure condition and flood exposure and on reliability of water delivery down to WUA level. This subcomponent will also support the ongoing strengthening of WUAs. At the national level, support to WUAs will include capacity development for the ALRI WUA Support Unit. This capacity development will enable the WUA Support Unit to develop, facilitate, and administer a program for improving the performance of the 45 WUAs in targeted large schemes. This program will include (a) WUA training to enable provision of agronomic and irrigation advisory services to WUA members, covering not less than 30 percent of female participants (training modules to be developed in coordination with the research institutes of the MoA); (b) demonstration pilots of innovative irrigation techniques (managed by WUAs and monitored by ALRI and MoA), including on the territory of three demonstration plots under the jurisdiction of the MoA research institutes and TajikNigim; (c) grants to WUAs; and (d) development of feasibility studies and asset management plans. The training will enable WUAs to engage at the farm level, to promote climate-smart irrigation practices and resource utilization through adoption of improved water management, deep ripping, and laser levelling. These practices will help address the climate change impacts of increasing droughts, high temperatures, and extreme heat on crop production. The training will prioritize developing the technical, leadership, and communication skills of female farmers to build their confidence and increase their voice and role in WUA decision-making. WUAs will receive training on performance-based indicators and will work within their service areas to introduce citizen engagement surveys. These surveys will be integrated in the IMIS to track satisfaction of WUAs and WUA members with the irrigation delivery. WUAs will also be supported in the introduction of accounting and commercial software to facilitate and track tariff collection, linked to the volumetric measurement of water delivery to WUAs that will be established in the targeted large schemes. Grants will be provided to WUAs in the targeted large schemes to assist with improvement of on-farm water delivery infrastructure, through cleaning (removal of sediment and weeds) and repair. This will require WUAs to assess the need for such work and to supervise implementation of the work. The grants will thus indirectly also help strengthen WUA capacity. The grants to WUAs will help improve on-farm water management and distribution and thus ultimately enhance irrigation productivity. Administration of the grants will follow a WUA Grant Manual (GM) that will be developed by the Project Management Unit (PMU). An incentive-based approach will be developed for the grants program that rewards relative improvement in WUA performance. This approach will be co-developed with WUAs during project implementation but is likely to involve a less competitive first round of small grants, with second round of grants to be awarded to WUAs demonstrating significant performance improvement and significant continued need. A Grants Committee (GC) and Project Steering Committee (PSC) will assess grant proposals and award grants. WUA grants will be capped at US\$8,000 and will require a 5 percent



beneficiary cash contribution or 10 percent in-kind contribution. Support to WUAs in other selected irrigation schemes in the Upper Kofarnihon, Zarafshon, the Vakhsh basins will be primarily through customized training. National (sectoral) and project-level grievance redress mechanisms (GRMs) will be established under this subcomponent. The expected outcomes from this subcomponent are a stronger irrigation sector guided by a robust national strategy, an ALRI structure better suited to irrigation scheme management, new tools, and enhanced capacity for scheme-level irrigation performance management, together with stronger and more sustainable WUAs within targeted large schemes. This subcomponent will be implemented by the ALRI PMU.

## **Component 2. Irrigation Scheme Improvements (US\$36.94 million)**

28. **Subcomponent 2.1: Improving large-scale irrigation schemes (US\$31.94 million).** This subcomponent will focus on improving the large Vakhsh and Shurabad schemes that span six districts of the southern Khatlon region in the Lower Vakhsh basin. These schemes are commonly referenced by their main canals: the Vakhsh Main Canal (VMC) and the Shurabad Main Canal (ShMC). These two schemes were selected based on assessments described under *Technical Analysis* and in annex 2, which used indicators of *need* and *impact* relating to rehabilitation and modernization. These two schemes cover 128,000 ha and are supported by 45 WUAs and seven district-level ALRI units. There is currently a separate state management department for the VMC and three pump irrigation management units under the Khatlon regional ALRI unit (ALRI arrangements will be restructured under Subcomponent 1.2). The subcomponent will finance rehabilitation and reconstruction of key infrastructure within these schemes, adopting a ‘build back better’ approach that strengthens climate resilience. Key to this will be improving the capacity to mitigate the impacts of projected increases in irrigated crop water stress. The subcomponent will finance rehabilitation of irrigation headworks and primary and secondary canals. Performance indicators and pre-feasibility studies have identified intake structures, headworks, control gates, main canals, collector and drainage networks, and pump stations to be repaired or modernized. These works will improve hydraulic efficiency and water delivery control and reduce the energy intensity of irrigation (annex 1). Final selection of modernization works will be based on detailed feasibility studies for each of these two schemes, considering the relative value of different options to support an increase in the area under effective irrigation and the area under double cropping. Pump station modernization will include replacing or rehabilitating pumps and electric motors and equipping workshops for routine maintenance of pumps and motors. Selection of pump stations for modernization will consider the potential for energy efficiency improvements. Pump stations that cannot be cost-effectively converted to gravity irrigation will be prioritized for modernization. Heavy machinery for maintenance of these schemes will be procured for ALRI. The subcomponent will also finance emergency works for the Dangara diversion tunnel and the Beshkent distribution point in Kofarnihon basin (annex 2). These rehabilitation and modernization works are expected to reduce the average energy intensity of water delivered to fields across the two large schemes, increase the area with adequate water delivery, and increase the value of irrigation production from these two schemes.

29. **Subcomponent 2.2: Improving small- and medium-scale irrigation schemes (US\$5.00 million).** Under this subcomponent, rehabilitation or replacement of selected works will be undertaken for priority schemes in the Zarafshon and Lower Vakhsh (see *Technical Analysis* and annex 2). Pre-feasibility studies for irrigation schemes in the Upper Vakhsh basin have been completed, and feasibility studies will be conducted early during project implementation. For priority districts in the Upper Vakhsh (Rasht, Tojkobod, and Lahsh), small-scale investments will be identified early during implementation based on



consultations with local communities, local ALRI, and the Vakhsh RBO. In these districts, consideration of flood/debris flow exposure (including under future climate change), cost-benefit analysis, and number of beneficiaries will guide investment selection. Investments will be coordinated with other concurrent development projects and will be implemented using local/community labor. The subcomponent will finance the design, reinforcement, replacement, and protection of critical infrastructure at significant risk from extreme climate events. Civil works will focus on ensuring climate-resilient infrastructure to increase resilience to floods and debris flows. Works may include slope protection and riverbank stabilization adjacent to intake structures, canals, and pumping stations. The subcomponent will target off-farm infrastructure that is primarily the responsibility of ALRI. Capacity building for ALRI and TajikGiprovdhoz (design institute) will be undertaken at national and district levels for the design, construction, and maintenance of such works and for conducting climate risk assessments and hazard reduction planning. Specialized machinery will be procured for the Upper Vakhsh to improve emergency response and infrastructure maintenance.

### **Component 3: Project Management (US\$2.83 million)**

30. **The project will be implemented by MEWR and ALRI with separate responsibilities defined in the Project Operations Manual (POM).** This component will support incremental operating costs for project execution, including project management, management of social and environmental issues, financial management (FM), procurement, contract administration, project reporting, and monitoring and evaluation (M&E). It will finance consultancy services (individual and firm) hired to complement capacity of the implementation units (MEWR PIU and ALRI PMU) including for coordination with other activities under the European Union (EU)-financed program, baseline and project completion surveys, preparation of assessments and data collection, and annual project audits. A Project Coordination Unit will be established in Bokhtar to support the scope of activities in the Lower Vakhsh. Additionally, project implementation support consultants will be hired for day-to-day coordination of project activities in Upper Vakhsh and Zarafshon. The component will cover retroactive finance payments for work on feasibility studies, detailed designs, and project preparation from September 24, 2021, until signing of the Financing Agreement, limited to eligible expenditures approved by the World Bank on December 4, 2021. Finally, this component includes professional development and other interventions to promote gender diversity in MEWR and ALRI. For example, the project will support a review of human resources policies on recruitment, promotion, and retention in water sector entities and development of guidelines for a safe and comfortable work environment including sexual harassment reporting mechanism.

### **Component 4: Contingent Emergency Response Component (US\$0 million)**

31. **To compensate for the absence of a fast-disbursing instrument in IDA countries, the World Bank encourages inclusion of a CERC in IDA operations.** A CERC is a mechanism to strengthen a borrower's country response and recovery capacity by allowing project IDA funds to be quickly reallocated to emergency recovery activities after an eligible emergency has occurred. Eligible emergencies include pandemics, floods, droughts, and landslides. The CERC allows the Government to request the World Bank to recategorize and reallocate uncommitted financing to cover emergency response and recovery costs or channel additional funds to fully or partially replenish funds reallocated to the CERC following an eligible emergency. If the requirements for activation are met, uncommitted project IDA funds are reallocated to the CERC for crisis or emergency response. To facilitate a rapid response, a formal project restructuring is deferred to within six months after CERC activation. The CERC will be established and managed in



accordance with the World Bank Policy and the World Bank Directive on Investment Project Financing. If activated, the CERC will finance eligible activities listed in the POM’s dedicated CERC annex.

### Project Financing

32. **The project will be financed by a US\$30 million IDA grant and a EUR 16.19 million grant from the World Bank Partnership Programme Part III for Europe and Central Asia (Single-Donor Trust Fund) - EEPP Part III**, financed by the EU under the EU Rural Development Programme II (RDP-II) (annex 7). Annex 7 summarizes RDP-II objectives, structure, and implementation modalities. Total RDP-II financing for the project is EUR17.5 million and includes a World Bank-executed grant for project preparation, implementation support, additional assessments, M&E, preparation of the implementation completion report, and an administration fee. The EEPP Part III structure allows each Trust Fund to receive its own trustee account and administrative agreement, with tailored end disbursement dates specific to each Trust Fund. The Administrative Agreement for the project TF was signed on May 13, 2022, with the Recipient Executed Trust Fund in the amount of Euro 16.19 million.

33. **The lending instrument is an Investment Project Financing (IPF) to be implemented over a five-year period.** Project costs and financing are in table 1. The EU grant amounts are shown in US dollar using the EUR-US\$ exchange rate at the time of budget finalization. The actual US dollar amounts from the EU grant will be subject to currency exchange rate fluctuations. The budget allocations in table 1 are based on a 50 percent EU contribution to Component 1 and a 32 percent contribution to Component 2. Overall, the EU grant will finance around 36 percent of project costs.

**Table 1. Project financing in US\$M**

	IDA Grant	EU Grant	Total
<b>Component 1: Water sector reform and institutional strengthening</b>			
1.1: Strengthening national and basin-level water resources policy and planning	0.80	1.00	1.80
1.2: Improving irrigation planning and management	2.60	3.20	5.70
<b>Subtotal</b>	<b>3.40</b>	<b>4.20</b>	<b>7.60</b>
<b>Component 2: Irrigation scheme improvements</b>			
2.1: Improving large-scale irrigation schemes	21.70	10.21	31.91
2.2: Improving small- and medium-scale irrigation schemes	3.40	1.60	5.00
<b>Subtotal</b>	<b>25.10</b>	<b>11.81</b>	<b>36.91</b>
<b>Component 3: Project management</b>			
<b>Subtotal</b>	<b>1.50</b>	<b>1.33</b>	<b>2.83</b>
<b>Component 4: Contingent Emergency Response Component</b>	—	—	—
<b>Total</b>	<b>30.00</b>	<b>17.34</b>	<b>47.34</b>

### C. Project Beneficiaries

34. **Project beneficiaries include** (a) ALRI and MEWR; (b) RBO and RBC for Vakhsh river basin; (c) regional and district irrigation authorities; (d) community institutions including WUAs; and (e) farmers and rural households, including female-headed households. The project will benefit 38 WUAs in the Vakhsh schemes area, 6 in the Shurabad scheme area, 14 in the Zarafshon basin, and 7 in the targeted area of Big Hissar Canal in the Upper Kofarnihon basin through a set of differentiated activities. Most of the project focus and investments will be channeled to the two major schemes in Lower Vakhsh basin. There are



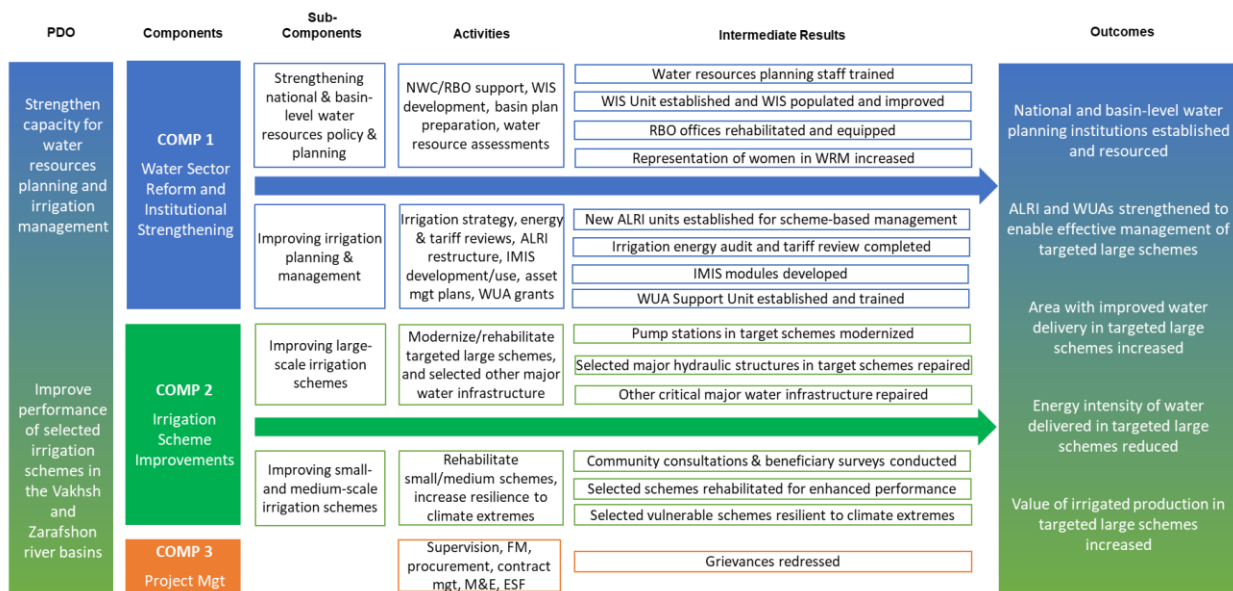


around 16,000 farmers within the command area of these two schemes who are expected to benefit from improved irrigation services. About 40 percent of farmers in the project area will additionally benefit from extension and training services on modern irrigation techniques and support services for agriculture production. Component 2 activities are designed to ensure proactive engagement of women and women’s group, ensuring equal benefit.

D. Theory of Change

35. The project’s theory of change links project components, subcomponents, and key activities, through to intermediate results and project outcomes (figure 2).

Figure 2. Project Theory of Change



E. Rationale for Bank Involvement and Role of Partners

36. Rationale for World Bank involvement. Public financing in Tajikistan for WRM and irrigation was equivalent to 0.1 percent of GDP in 2019. The WSRP envisages increasing financing from 2022 to 2030 that would support an economic transition based on sustainable water management and enhanced rural livelihoods. The high capital cost of irrigation infrastructure relative to the low income of smallholders in Tajikistan justifies World Bank involvement in the sector. In recent decades, the World Bank has supported irrigation development and modernization worldwide, and many of the experiences and lessons from those investments are relevant to Tajikistan. World Bank’s support will (a) facilitate integrated project planning, design, implementation, and operational management; (b) strengthen inclusive and sustainable development; (c) ensure the quality of project studies, designs, and construction, and (d) ensure efficient and management of environmental and social impacts. There is a high expectation from the Government of Tajikistan regarding World Bank support for institutional development to ensure sustainability of the investment in the sector. The World Bank has a long-standing engagement in Tajikistan and is perceived as a key strategic partner in the water sector, and the proposed project is a natural continuation of World Bank support in the country, spanning institutions, infrastructure, and information. The project will drive development of a basin plan for Tajikistan’s most complex river basin, providing a platform for synergies



between multiple World Bank-financed projects including the Nurek Hydropower Plant Rehabilitation Project (and its Additional Financing), the Rural Water Supply and Sanitation Project, and the proposed Tajikistan Water Supply and Sanitation Project-1, all targeting specific investments within the Vakhsh basin.

37. **Role of partners.** The project will collaborate with international donors active in natural resource management, rural development, environment, and climate change-related sectors. Coordination with the Asian Development Bank Project for the Yavan irrigation scheme in the Lower Vakhsh and the Swiss Agency for Development and Cooperation WRM in Syr Darya River Basin Project will be pursued. Coordination with development partners will be ensured through the Water Cluster of the Donors Coordination Council to be co-chaired by the World Bank. There are strong synergies with German Agency for International Cooperation (*Deutsche Gesellschaft für Internationale Zusammenarbeit, GIZ*) implementing activities under the EU-financed Integrated Rural Development Project (IRDP)/Towards Rural Inclusive Growth and Economic Resilience (TRIGGER) Project. The project would also work closely with other activities under EU RDP-II as outlined in the Annex 7.

Table 2. Areas of Synergy with the EU-financed IRDP/TRIGGER

Component	TRIGGER	Tajikistan Strengthening Water and Irrigation Management
National WIS	Financing of the WIS Unit for the first 2 years of implementation, with terms of references (ToRs) to be agreed with MEWR and acceptable to the Association. Support to focus on WIS databases for basin planning and water balances.	Support to the WIS Unit in MEWR for developing tools and products to inform basin planning, generate water assessment report (water cadaster report), enhance arrangements for interagency data exchange, adopt remote monitoring tools, expand WIS data visualization, and develop information products.
IMIS	Integration of IMIS water accounting module with WIS water balance database for the Zarafshon basin.	Development of the national IMIS concept, establishment of the IMIS Unit in ALRI, and development of national IMIS and IMIS implementation in target schemes in Lower Vakhsh.
RBO/RBC support	Establishment of RBC and support for RBC meetings. Assess and establish governance arrangements between ALRI and RBO in the Vakhsh and Zarafshon basins.	Consideration of gender issues in RBC discussions, development of WIS river basin planning database and Vakhsh river basin plan.
WUAs	Assessment of WUAs in Zarafshon basin and development of recommendations to ensure WUA sustainability.	Development of national WUAs database (in IMIS) and development of WUA sustainability concept with TRIGGER input.
Capacity development	Development/delivery of practical trainings for RBO staff, MEWR, ALRI and its subordinate units, and WUAs. Content of trainings and training materials to be agreed between partners through a consultative process.	

F. Lessons Learned and Reflected in the Project Design

38. **Coordination among stakeholders is critical for the success of complex reforms.** Based on the experience of predecessor projects, and the World Bank’s long-standing support to the Tajikistan reform agenda, the project will elevate MEWR together with ALRI to coordinate institutional work across WRM and irrigation. Implementation of reforms should be underpinned by the strong stakeholder and cross-



sector dialogue. The project will benefit from high-level oversight from the Steering Committee chaired by the Deputy Prime Minister responsible for water, agriculture, and land. Coordination with development partners will be ensured through the Water Cluster of the Donors Coordination Council, co-chaired by the World Bank and SDC.

39. **Incentives help improve performance and cultivate behavior change.** While many projects provide training and technical assistance to strengthen institutions, not many assess the impacts on the quality of planning and decision-making or on behavioral change of policy makers and service providers.<sup>28</sup> This project will adopt self-reporting by beneficiaries against a set of defined key indicators for its performance-focused grants program, thus monitoring the impacts of project activities beyond the Results Framework M&E. This will support a shift toward self-assessment, monitoring, and reporting. A national WUA database will be established to track performance across the country.

40. **Implementation of institutional activities requires engagement of best international expertise.** While local capacity of contractors may be sufficient for implementation of civil works and local-level institutional activities, international expertise is required for development of strategic policy instruments and for engineering solutions for the next generation of irrigation sector investments.

41. **Strengthening WUAs requires substantial long-term effort.** This is a long-term process that requires substantial nurturing. First, it is important to institutionalize support for, and monitoring of WUAs, to have these functions to be carried out beyond separate investment projects. Second, support to WUAs beyond the initial set of activities on delineation of WUA boundaries, basic training on water measurement, development of water management plans, FM and governance arrangements, establishment of the initial registry of assets, and irrigation water users should be based on WUAs performance.

42. **Capacity-building activities for water sector institutions should be institutionalized and sustained beyond the projects.** The project shall aim to support activities that will be streamlined within the mandate of water sector institutions. The M&E framework of the project will be mainstreamed with the sectoral monitoring activities to instill the focus on performance improvement.

43. **Packaging of investments should focus on expected results.** Implementation of previous projects was restricted by short time frames (ZIRMIP, PAMP-II AF) and relied on a large number of small-value contracts to be implemented to accelerate disbursements and utilize the short construction window. The new project will adopt a different approach focused on a complete set of interventions by irrigation sub-schemes.

44. **Irrigation investments should target farmers' needs to ensure positive, sustainable impact.** The project recognizes the tight connection between water and agriculture and promotes an integrated approach to agricultural development. It focuses on farmers as customers of irrigation services and links irrigation interventions to agricultural support services. WUAs will be trained to provide extension services to farmers and demonstrations of innovative irrigation techniques will be established to drive adoption and scale-up.

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<sup>28</sup> [https://ieg.worldbankgroup.org/sites/default/files/Data/Evaluation/files/Irrigation\\_Service\\_Delivery.pdf#page=22](https://ieg.worldbankgroup.org/sites/default/files/Data/Evaluation/files/Irrigation_Service_Delivery.pdf#page=22).



### III. IMPLEMENTATION ARRANGEMENTS

#### A. Institutional and Implementation Arrangements

45. **Implementing agencies (IAs).** The project will be implemented by ALRI and MEWR. ALRI is the central government authority responsible for development and implementation of the national irrigation and drainage policy, O&M of irrigation and drainage infrastructure, and flood protection planning and works. ALRI has more than 40 staff (including management) at the central level and more than 800 staff across the regional offices in Zarafshon basin, management areas of the target irrigation schemes within the Upper Kofarnihon and Lower Vakhsh basins.<sup>29</sup> MEWR is the central government authority responsible for development, management, and regulation of water resources. In 2020, RBOs (with 7–13 staff each) were established under the Water Resources Department of MEWR for each of the five basins of the country (Syr Darya, Zarafshon, Panj, Kofarnihon, and Vakhsh). MEWR has about 88 technical staff centrally, (but 14 assigned to the ministry’s water wing) and about 40 staff across RBOs.<sup>30</sup>

46. **Implementation arrangements.** The ALRI PMU will implement most of the project including Subcomponent 1.2 and all of Component 2 (see annex 3). A MEWR PIU will implement Subcomponent 1.1. Although the PMU Director reports to the head of ALRI, he is appointed by the Government of Tajikistan and is financed out of the project proceeds. All the PMU staff, including the PMU Director, will be hired against the approved organizational structure and ToRs endorsed by the World Bank, as a financier. Project staffing within ALRI will include nominated staff of the WUA Support Unit (at central and scheme levels) and the IMIS Unit. These units will be supported by the project-financed consultants and specialists. The MEWR PIU will manage a separate project Designated Account in a financial institution acceptable to the Association and will be responsible for reporting to the World Bank. The PIU will be headed by a Project Director nominated from top MEWR management and will include an externally hired Project Coordinator/Technical Adviser, nominated by MEWR staff (from departments for Energy and Water Policy, Water Resources, Investments, Accounting), the (externally funded) WIS Unit, as well as a field coordinator, engineer, and staff of the Vakhsh RBO. The PIU will include procurement, FM, M&E, technical, environmental, and social/communication, and gender specialists. The PIU will engage TajikNigim staff and external partners to deliver training. PMU and PIU staffing is detailed in annex 3.

47. **PSC and GC.** A PSC has been established by MEWR for project preparation that includes representatives of ALRI, Ministry of Finance, State Investments and State Property Management Committee, Anti-Monopoly Agency, Agency on Construction and Architecture, Ministry of Economic Development and Trade, and MoA. For project implementation, the PSC will be upgraded and chaired by the Deputy Prime Minister responsible for water, agriculture, and land use issues to ensure cross-sectoral oversight, coordination, and guidance to the project. The committee will be a forum for (a) reviewing PIU annual work plans, (b) providing strategic and policy guidance, (c) reviewing progress against performance indicators, and (d) ensuring there is a continued policy dialogue among the involved entities. A GC will be established no later than six months after effectiveness, with representatives of relevant ministries, agencies, and local government (including RBOs and RBCs). The GC will assess WUA grant proposals and award grants, which will be managed by the WUA Support Unit, following procedures documented in a GM. Details of GC arrangements will be documented in the POM.

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<sup>29</sup> ALRI data (2021).

<sup>30</sup> MEWR data (2021).



## B. Results Monitoring and Evaluation Arrangements

48. **M&E** will be the responsibility of the two IAs including establishment of indicator baselines, biannual assessment of intermediate results indicators, and annual assessment of PDO indicators. To the extent appropriate, project monitoring will use the GIS-based national WIS applications (including the IMIS) to collate data and evaluate indicators. M&E specialist will be hired in the PMU and also supported by a short-term M&E consultant to be hired in the PIU, to facilitate a GIS-based project M&E dashboard to improve the efficiency and rigor of M&E and reporting. The M&E framework is designed to support capacity development within ALRI and MEWR to facilitate ongoing tracking of water reform progress and irrigation system management and performance. The PMU will conduct midterm and completion assessments that will commence in the third year of the project and will use remote sensing data for verification of changes in irrigation delivery and analysis of land use and cropping patterns. Quantitative surveys will track changes in the monetary value of agriculture production in the areas benefiting from project interventions. Consolidated biannual M&E reports will be prepared by the MEWR PIU, in line with the agreed outline and structure of the reports.

49. **The M&E plan will facilitate learning and feedback through planning and implementation stages.** The project's Results Framework will guide M&E as well as evaluation analysis and reporting at midterm and completion. An integrated monitoring information system (MIS) will be linked to existing GIS-based applications and made publicly accessible to communicate results to project stakeholders online. Technical assistance will be provided by the project for the MIS design and training. Results monitoring will be based on the Results Framework and annual performance objectives, which will be used to track implementation progress. The project will adopt remote sensing Kobo toolbox technology to support monitoring and strive to integrate participatory monitoring methods using digital tools for data collection. This will support WUAs in timely decision making, wider results sharing, and greater ownership of investments. All surveys, services funded by the project, progress reports, and consultants' and contractors' reports will be made available on the project website.

## C. Sustainability

50. **Social sustainability.** The project will have positive social benefits as the interventions will contribute to poverty alleviation and improved food security, by stabilizing food production in the face of climate shocks through more reliable irrigation services. The project will encourage adoption of innovative irrigation techniques and improved irrigation water management practices, leading to improved agricultural productivity and overall income and well-being of farms and rural households. These will help enhance social and economic development of rural communities. Through WUAs, farmers and villagers will be key decision-makers on the investments on smaller irrigation systems and how financial resources are distributed, thus building ownership. Beneficiary contributions are important to generate ownership and ensure the sustainability of investments, which have been set at a minimum of 5 percent in cash or 10 percent in-kind for each minor investment. By combining resilient investments, enhanced capacity, evidence-based knowledge sharing, and institutional strengthening, the project will help build long-term sustainable development pathways and leverage future investment.

51. **Institutional sustainability.** The project is designed to address institutional sustainability at both the policy and operational level. At the policy level, this includes the preparation of the first national irrigation sector strategy for Tajikistan with a horizon up to 2050 to support sector institutions in building



a medium- and long-term vision for the irrigation sector beyond project closure. At the operational level, capacity building and institutional strengthening activities are designed to support ALRI operational units as well as WUAs to gradually transition toward a performance-based culture with greater accountability to its customers (farmers) and the wider public through regular monitoring and reporting of key indicators and results. Institutional activities under Component 1 will be implemented by both the sector's policy (MEWR) and operational (ALRI) arms to strengthen collaboration between sector institutions and ensure coordination and embedding of project activities into the broader water sector reform agenda of Tajikistan.

52. **Technical sustainability.** A more data-driven prioritization process has been adopted for this project than for prior irrigation projects in Tajikistan, and the prioritization has included aspects of energy footprint as well as climate resilience, enhancing the technical sustainability of the project design. Additionally, no significant infrastructure investments will proceed without completion of feasibility studies that will be reviewed by the World Bank. Finally, all major works will be based on detailed engineering designs that conform to national standards. Ongoing supervision of works by the PMU with periodic inspections by the World Bank team and consultants will ensure the technical soundness and sustainability of the project. Building client capacity for robust asset management will underpin the longer-term technical sustainability of project investments.

#### IV. PROJECT APPRAISAL SUMMARY

##### A. Technical, Economic, and Financial Analysis

53. **Technical analyses were conducted to identify and prioritize infrastructure investments** under project Component 2. This was a three-stage process. First, all schemes across the project area were mapped using remotely sensed data and named. Second, schemes were prioritized for investment, and third, investments within schemes were identified and prioritized. A full description of the first two stages—scheme mapping and prioritization—is provided in annex 2. The mapping identified 79 individual schemes or groupings of geographically proximate small irrigation areas. About 21 percent of the area irrigated in 2020 was spread across 70 small (<1,000 ha) and medium (1,000–10,000 ha) schemes. An additional 7 percent of the 2020 irrigation area was across four large aggregations of irrigated areas (each exceeding 10,000 ha) in the mountainous Upper Vakhsh, each of which comprises many small, fragmented but proximate irrigated areas. The prioritization process involved first defining categories of scheme size to compare similar size schemes, followed by evaluation of a series of *need* and *impact* indicators for each scheme to score and rank their relative attractiveness for investment. Additional qualitative information was considered to reach a final ranking. Additional information for the large schemes included details on ongoing investments by other development partners and for the small and medium schemes included knowledge of investments under recently completed World Bank projects on individual schemes.

54. **Prioritization identified 21 small and medium schemes for investment** in the Zarafshon and Lower Vakhsh basins. Given recent investments in the Zarafshon under ZIRMIP were not captured by the data-driven prioritization, Zarafshon priorities were reviewed leading to adjusted priorities but the same number of top priority schemes—see annex 2 for details. For the aggregated scheme areas in the Upper Vakhsh, figures were not available for a data-driven prioritization. However, scheme mapping and pre-feasibility assessments by ALRI for some districts enabled three of the ten districts in the Upper Vakhsh to be prioritized for investment—Rasht, Tojkobod, and Lahsh. Specific small-scale investments in these districts will be determined during implementation and informed by consultations with local communities



and district ALRI. Consideration of flood/mudflow exposure, simple cost-benefit analysis, and numbers of beneficiaries will inform selection. Prioritized investments will be coordinated with other development projects occurring in these basins and all will be implemented using local/community labor. Around 72 percent of the area irrigated in 2020 across the Zarafshon and Vakhsh basins was in just six large schemes in the Lower Vakhsh; over 42 percent was the large Vakhsh scheme. Of these six schemes, two (Yavan/Obikiik and Dangara) are the focus of irrigation investment by other development banks. Dangara is geographically outside the Vakhsh basin but is irrigated with water from the Vakhsh river through the tunnel structure below the Nurek Dam. Consultations with ALRI and assessment of *need* and *impact* indicators (annex 2) identified two from the four large schemes (Vakhsh and Shurabad) for investment under the project.

55. **The third stage of the analysis** considered pre-feasibility studies conducted by the Government as well as baseline performance indicators derived from available data. For canal cleaning and rehabilitation works, two performance metrics were evaluated—the irrigation area serviced per kilometer of canal (as an indicator of cost-effectiveness) and the proportional reduction in canal capacity (as an indicator of both need and potential impact). Spatial analyses at canal command area level of the historical pattern of crop water consumption provided further information on performance to help prioritize investments (the data for these spatial analyses have been extracted from ongoing regional analytical work being undertaken by the World Bank). These analyses identified priorities that will be explored further through more detailed feasibility studies before final investment decisions.

56. **For infrastructure works under Component 2, readiness is high**, given that priority schemes have been identified and preliminary studies and surveys have been completed. A feasibility study and the preparation of detailed engineering designs for the VMC and ShMC are progressing under retroactive financing and will be completed by the end of the 2023 irrigation season, enabling civil works to commence in late 2023. Procurement of civil works, goods, and consultancies has been identified, and the Procurement Plan for the first 18 months of implementation has been agreed during appraisal. Detailed engineering designs and bidding documents will be prepared before effectiveness. The IAs have made good progress on Environmental and Social Management Framework (ESMF) instruments, with the Resettlement Policy Framework (RPF), Environmental and Social Commitment Plan (ESCP), Stakeholder Engagement Plan (SEP), and Labor Management Procedures (LMP) disclosed in country on January 20, 2022. Stakeholder consultations were conducted in Dushanbe on February 5, 2022.

57. **An economic and financial analysis of the project costs and benefits was conducted.** The expected direct project benefits include expansion of the effectively irrigated area (within existing scheme boundaries)—enabling higher value crops and higher crop yields—and an expansion of the area under double cropping. These benefits will accrue from irrigation modernization and improved irrigation service delivery. Importantly, an overall energy saving is not assumed in the economic analysis. While the sector energy audit undertaken by the project will support a fuller analysis, at appraisal it is assumed that the planned increase in the area under irrigation will require enhanced energy use that could fully offset the reductions in energy use (through efficiency improvements) in currently irrigated areas. Energy costs per unit of water delivered will reduce. Additional indirect benefits include reduced agriculture production losses and higher sector financing from increased rates of tariff collection. Project costs include investment costs to be determined by feasibility studies conducted during project preparation. The value addition of World Bank support, building on a decade of experience in Tajikistan, is to guide sector reform including for (a) design and piloting of a national irrigation sector strategy (to 2030), (b) design and



establishment of a mechanism for centralized support for WUAs, and (c) deployment of the WIS to provide information services to key stakeholder groups.

58. **Economic analysis indicates the project should generate significant total net incremental benefits.** Incremental benefit calculations (annex 4) were conducted assuming a 10 percent increase in crop production across 100,000 ha of improved irrigation and an additional 15,000 ha returned to irrigation. The analysis shows a net present value (NPV) of the of the direct benefits in the two major schemes to be around US\$45 million or US\$391 per irrigated hectare. Applying a 10 percent discount rate over 15 years shows a benefit-cost ratio of 2.5 and an internal rate of return (IRR) of 26.3 percent. Farmers benefit from higher annual gross margins, which increase by US\$318/ha of improved irrigated land. Sensitivity analyses show project benefits are robust to adverse changes, for example, a 20 percent reduction in benefits only reduces the IRR to 21.4 percent. Nevertheless, the project is sensitive to the prices of agriculture production—a decrease of only 16.6 percent in output prices would switch both the IRR and the total net economic benefit. A demand-oriented approach to production will be promoted among farmers to mitigate this risk.

## B. Fiduciary

59. **Procurement will be governed by the World Bank’s Procurement Regulations for IPF Borrowers** (November 24, 2020) and will also be subject to the World Bank’s Anti-Corruption Guidelines (July 2016). The borrower, with the support of the World Bank team, has prepared the Project Procurement Strategy for Development (PPSD).

60. **The residual procurement risk under the project is Moderate.** The residual risk rating reflects IA experience and capacity from implementation of other donor-funded projects and the relatively small-scale and standard overall project procurement scope. Key procurement issues and risks include (a) limited procurement experience under applicable procurement regulations; (b) procurement and implementation delays due to insufficient capacity for developing technical components of procurement documents, for providing quality reviews, and for making timely procurement decisions; (c) quality issues during execution of works; and (d) limited skills in contract monitoring and management. The following mitigation measures are proposed to address these risks throughout the project implementation: (a) procurement packages for civil works to be structured along the boundaries of the identified irrigation sub-schemes to optimize packaging of investments; (b) capacity of the MEWR PIU and MEWR PMU to be strengthened through hiring of individual procurement specialists; (c) relevant trainings offered for the hired PMU and PIU staff, not limited to procurement staff, but also including engineers, FM, and M&E staff; and (d) thorough technical and procurement review of the first five civil works packages and five consulting services packages to be conducted by the World Bank team.

61. **FM arrangements within both IAs are adequate for the project implementation and to meet the minimum requirements** of the World Bank’s Policy and Directive on Investment Project Financing. The PMU has the required capacity for implementing donor-funded projects in the sector, is adequately staffed, and has appropriate controls and procedures in place. It recently completed successful implementation of the US\$15.6 million ZIRMIP and is implementing a US\$50 million World Bank-financed Disaster Risk Management Project. There are no pending audits for the active projects implemented by the PMU, and auditors issued unmodified (clean) opinion on the closing ZIRMIP financial statements with no critical recommendations in the Management Letter. MEWR has not been directly involved in





implementation of World Bank projects to date and will require additional support and capacity building. Actions required to strengthen FM are in annex 3.

62. **Regarding FM covenants to be included in the Disbursement and Financial Information Letter (DFIL)**, the following should be noted: (a) Adoption of the GM for WUA grants as a separate category of expenses under Subcomponent 1.2; (b) interim financial report formats have been agreed with the IAs, and they will be submitted to the World Bank within 45 days after the end of the calendar quarter by each IA; and (c) the project’s combined annual audited financial statements are submitted to the World Bank within six months after the end of the audit period. The scope of the project audit will be extended to include a sample review of the WUA grants.

63. **The FM residual risk for the project is Moderate**, reflecting the existing experience and capacity of the IAs and assuming commitment to implementation of the identified FM actions and covenants.

### C. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	Yes
Projects in Disputed Areas OP 7.60	No

64. **Projects on International Waterways (OP/BP 7.50)**. Operational Policy 7.50 (OP 7.50) covering projects on international waterways is triggered because the project finances rehabilitation and modernization of irrigation systems in international waterways (the Vakhsh and Zarafshon river basins) and development of a Vakhsh river basin plan. It was assessed that the project will not adversely change the quantity or quality of water flows to other riparians and will not be adversely affected by other riparian’s possible water use. Any potential changes in water quality during the construction works will be mitigated through implementation of the Environmental Management Plan. The ToRs for development of the Vakhsh river basin plan will include examination of any potential riparian issues for the investment program to be developed for the basin. Preparation of a basin plan will include assessing the current availability and use of water resources; the likely future availability of water given expected climate change; options for changed water allocations and use across different sectors; and options to balance irrigation supply, hydropower production, and flood mitigation through dam operations. On the basis of these assessments, an exception to the riparian notification requirement (under paragraphs 7(a) and 7(b) of OP 7.50) was approved by the Regional Vice President on March 17, 2022.

### D. Environmental and Social

65. **The environmental risk rating is Substantial and the social risk is assessed as Moderate**, making the overall risk rating Substantial. Project activities are expected to generate integrated economic, environmental, and social benefits through rehabilitation of irrigation and drainage systems. Rehabilitation will reduce energy and water losses, soil erosion, and land salinization and improve agricultural productivity and overall farms and rural household incomes. However, project activities also involve environmental and social risks covered by Environmental and Social Standards (ESS) 1, ESS 2, ESS 3, ESS 4, ESS 5, ESS 6, and ESS 10. The environmental risk rating is based on (a) the wide project footprint including across remote areas of Tajikistan, (b) the risks associated with infrastructure rehabilitation



including waste management, (c) the risks associated with indirect disturbance of natural habitats and the potential for water and soil pollution, (d) pest management risks associated with expansion of irrigated areas, and (e) the risks associated with limited ESF experience within IAs. Despite the rating, these risks are all temporary and can be easily mitigated; none are likely to lead to significant environmental impacts. Low probability social risks could arise from (a) responses to reforms and institutional changes that cause water tariff increases; (b) social exclusion if vulnerable groups (remote communities or those lacking skills and knowledge) are excluded from project benefits; (c) small-scale involuntary resettlement related to construction of RBO/WUA offices or minor changes to canal alignments to increase the water conveyance efficiency; (d) misuse or inappropriate storing and handling of pesticides and fertilizers; or (e) sexual exploitation or abuse associated with labor influx, or inequity in employment and terms and conditions, and challenges in organizing a favorable working environment. To address these risks, ESS instruments have been prepared in a consultative manner and have been publicly disclosed. These include (a) an Environmental and Social Management Framework, (b) an SEP, (c) an RPF, (d) LMP, and (e) an ESCP. The ESCP integrates the Government's commitments and sets out measures and actions, documents and plans, the timing for monitoring and reporting, grievance management, and environmental and social assessments and instruments. Overall ESF responsibility is with the PMU. To strengthen PMU capacity, environmental and social development specialists will be hired with responsibility for ESF compliance, including assessments, preparation of site-specific Environmental and Social Management Plans (ESMPs), and monitoring and reporting.

**66. Climate and disaster risk screening of the project highlighted that project areas are exposed to high climatic and geophysical hazards.** To mitigate impacts on physical infrastructure and assets, climate resilience will be considered in the selection of investments and in their technical design. The project will strengthen the institutional capacity to respond to projected climate change impacts. The overall risk to project outcomes is therefore Moderate. The project will have primarily adaptation co-benefits that include (a) improved irrigation services to mitigate projected increases in water stress, (b) investments to protect irrigation schemes in mountain areas from floods and mudflows, and (c) river basin planning and irrigation planning to factor in climate projections on water availability and water demands.

**67. Gender gaps and targeted actions under the project.** To inform project design, the World Bank's Tajikistan country gender assessment;<sup>31</sup> Asian Development Bank's study of women's role in irrigated agriculture in Tajikistan (focused on Lower Vakhsh river basin);<sup>32</sup> Asian Development Bank's Tajikistan country gender assessment;<sup>33</sup> Gender Assessment in the Pyanj River Basin;<sup>34</sup> and other literature examining national policies, strategies, sectoral plans, and programs were reviewed during project preparation. The World Bank country gender assessment recognizes gender inequalities in terms of equal access to (a) human endowments, (b) economic opportunities, and (c) voice and agency. Key government measures to address gender gaps include the policy 'On State Guarantees of Equal Rights and Opportunities for Men and Women' (2005), the National Strategy for Activization of the Role of Women in the Republic of Tajikistan for 2011–2020 (2010), and the approved Presidential Grants for Women Entrepreneurs (2008–2011). The National Gender Strategy has been extended beyond 2020 and a new five-year plan of activities developed, including indicators to monitor gender equality nationwide, including within ALRI and MEWR. The project will narrow three gender gaps. First, the gap in

<sup>31</sup> World Bank. 2021. "Tajikistan Country Gender Assessment." Washington, DC.

<sup>32</sup> Asian Development Bank. 2021. "Tajikistan: Women's Role Irrigated Agriculture (Lower Vakhsh Basin)." Manila, Philippines.

<sup>33</sup> Asian Development Bank. 2016. "Tajikistan Country Gender Assessment." Manila, Philippines.

<sup>34</sup> MEWR. 2020. "Pyanj River Basin Gender Assessment."



representation of women in technical and decision-making roles in the water sector. Second, the gap in access to necessary resources for women working in irrigated agriculture. And third, the gap in gender-disaggregated data to guide irrigation management. These gaps are described below and are summarized in table 3 along with project actions, indicators, and targets. To guide implementation, a project-specific gender action plan will be developed by the IAs before effectiveness, as part of the POM. This will ensure that the project provides financial and technical support to encourage women beneficiaries. The cultural roles of women in Tajikistan influence their participation in rural livelihood strategies but this varies widely between regions. Even within the Vakhsh basin, there are important differences between the upper and lower areas. To address the gender gap, partner organizations working with water institutions will be required to have expertise in gender mainstreaming and social inclusion. Mobilization will use mechanisms that help ensure participation, for example, women-only sessions, appropriate scheduling, and local dialect communication. Regarding the first gap, women decision-makers are in the minority in water institutions, including RBCs, RBOs, ALRI (and its sub-structures), and MEWR. Across all basins, women are absent in leadership positions in the basin water management institutions and key service delivery institutions at both national and local levels. In late 2019, 12 percent of ALRI staff were women—but two-thirds of these were support staff (for example, secretaries, cleaning staff) and one-quarter were technical specialists, while just 6 percent were chief specialists or division heads.<sup>32</sup> There are no female staff in the water wing of MEWR. A survey of 30 WUAs indicated all but one were headed by males.<sup>32</sup> A key driver of this underrepresentation is cultural norms that generally assume the water sector and engineering roles are male domains. Women are not always accepted in managerial positions though they are equally eligible and capable. Women are less likely to study science, technology, engineering, and mathematics (STEM) fields or to transition into STEM jobs. To narrow this gap, the project will ensure female representation in water management organizations and project IAs, including in senior positions. The Equal Aqua survey<sup>35</sup> will be conducted in MEWR and ALRI to assess gender balances, diagnose barriers to female employment and advancement to leadership roles, and fine-tune proposed project interventions. Gender quotas will be established, including for decision-making positions, for those agencies or divisions/wings/units of agencies where the project is engaged and has influence. Technical and managerial training will be provided for women, including to facilitate access to information and networks and to raise awareness about the value of women in senior water sector roles. Regarding the second gap, women in irrigated agriculture (as farmers or WUA leaders) have poorer access to technology, finance, and extension services than men.<sup>32</sup> While agriculture is one of the two largest employers in Tajikistan and employs the majority of female and male full-time workforce, the number of women-headed dekhan farms is significantly lower than those headed by men. Recent studies reveal key drivers, including the high level of male labor migration which means women take on additional agricultural tasks but lack adequate access to land, finance, knowledge, and production inputs. Even though 69 percent of women work in agriculture compared to 41 percent of men, women constitute only 8 percent of dekhan (family farm enterprise) members of WUAs, and the current representation by women in WUAs is low.<sup>32</sup> The National Strategy calls for these institutions to address female understaffing in management by establishing quotas, sensitizing staff on gender issues, promoting gender-sensitive staffing, and educating more female hydrotechnical specialists. The project will include activities targeting women's access to knowledge on irrigation technologies, agricultural water management, and climate-smart agricultural practices. WUA staffing will be adjusted through targeted hiring of women, and women-led WUAs will be prioritized in the allocation of WUA grants to facilitate their access to finance. Women-led platforms will be established to guide RBO efforts on gender issues in water planning. Training needs assessments will

<sup>35</sup> See <https://www.worldbank.org/en/topic/water/brief/inclusive-water-institutions-platform>.



be conducted to determine specific needs/delivery preferences for female/male farmers, and women will be targeted for WUA training-of-trainers efforts on irrigation technologies, agricultural water management, and climate-smart agricultural practices. The third gap is the paucity of gender-disaggregated data on women’s involvement in irrigation management. This data gap limits our understanding of gender issues in irrigation management and weakens efforts to ensure effective and inclusive service delivery, since access to services and resources is linked to WUA membership. Systematic collection and analysis of gender-disaggregated data through institutional frameworks and systems is critical for improving service delivery and for designing gender-sensitive policies and programs. The stakeholder consultations and data collected for the project preparation revealed that while women are involved in agriculture activities and irrigation management, they are not registered as WUA members and do not hold land titles. Previous projects have demonstrated that women’s participation in WUAs leads to better enforcement of rules, better conflict management, more orderly and disciplined meetings, and better water measurement and accounting. The project aims to ensure that at least 30 percent of training participants (on sustainable irrigation management, agricultural productivity) are women. The project will actively involve women in activity design for the Upper Vakhsh, considering the disproportionate effect natural disasters have on women and female-headed households. The national WUA database will include information that decouples land ownership from participation in irrigation management and from de facto WUA membership. The database will recognize gaps in the current definition of female-led WUAs, farms, landowners, and their actual role in on-farm irrigation management, as there are many cases where women are acting as de facto WUA members due to male out-migration. The project will prepare a Gender Action Plan that identifies specific measures for mainstreaming gender gaps under the project, consistent with those in table 3.

Table 3. Closing Gender Gaps through Targeted Action

Gender Gap	Project Actions	Indicators
Women are underrepresented in national/basin level WRM institutions and in irrigation agencies.	<ol style="list-style-type: none"> <li>1. Conduct Equal Aqua survey in MEWR and ALRI to acquire gender data and identify barriers to female employment.</li> <li>2. Set gender targets for sector institutions and conduct gender balance awareness training.</li> <li>3. Establish water sector networks and mentoring initiatives to increase women’s participation as leaders and decision-makers in WUAs, ALRI, RBOs/RBC.</li> <li>4. Establish women-led platforms to identify gender-specific issues for RBO consideration in basin planning.</li> <li>5. Liaise with educational institutions to identify internship opportunities for young staff and prioritize participation of female students.</li> <li>6. Organize trainings on finance, billing, IT, GIS, communication, and conflict resolution targeting females.</li> </ol>	% women in national/basin level WRM institutions, ALRI, and WUAs. The indicator is captured in the RF as part of assessment of the gender-tagged PDO indicator on effective institutions.
Women in irrigated agriculture (as WUA leaders or farmers) have poorer access to technology, finance, and	<ol style="list-style-type: none"> <li>1. Prioritize grants to female-headed WUAs.</li> <li>2. Conduct training needs assessments to determine specific needs/preferences for delivery mode of female/male farmers (part of GAP).</li> <li>3. Target female WUA members for training-of-trainers on the provision of irrigation extension services and recruit them for delivery of trainings to female</li> </ol>	<ol style="list-style-type: none"> <li>1. % grants awarded to women (target 30%).</li> <li>2. % women recipients of extension services (target 30%).</li> <li>3. % women in training and training-of-trainers delivery (target 30%).</li> </ol> These indicators are not explicitly in the RF but will be included in the WUA



Gender Gap	Project Actions	Indicators
extension services than men.	WUA members/farmers. <b>4.</b> Prioritize women’s trainings and access to demonstration plots (informed by Gender Action Plan).	database and be part of IMIS-based reporting.
Limited gender-disaggregated information available for irrigation management.	<b>1.</b> ALRI to include gender-disaggregated information into the national WUA database on (a) memberships (including de jure/de facto), (b) training needs/delivery, and (c) grants awarded.	National WUA database established with gender-disaggregated information, linked to IMIS: Y/N. The indicator is captured in the RF as part of assessment of a gender tagged intermediate results indicator on IMIS use in reporting.

68. **Citizen engagement.** Engagement with stakeholders and communities is key to ensuring project benefits materialize and are sustainable. The project will adopt participatory approaches to needs assessments, investment prioritization, and feedback, leveraging technology where appropriate. Project implementation will be guided by results from consultations, beneficiary satisfaction surveys, and the GRM to ensure that citizens are engaged throughout the project cycle. Communities in the project areas will be engaged to ensure that the needs of vulnerable households are considered. For identified priority districts in the Upper Vakhsh, the identification of small-scale investments will be informed by consultations with local communities. Women’s councils and female-headed WUAs will be consulted during implementation to ensure project activities are gender inclusive. Surveys will be conducted to track the satisfaction of WUAs and WUA members with irrigation delivery. Beneficiary surveys will be conducted at the start, midterm, and end of the project using self-reporting digital tools as appropriate. The surveys will be complemented by local snapshots and focus groups. International and local firms as well as civil society organizations (CSOs) will be actively involved in all farm- and community-level activities to improve transparency, reduce reliance on local government, and build community capacity. Their involvement will include responsibility for community awareness programs, field-level monitoring and works supervision, beneficiary selection, and WUA capacity building. The GRM will be established at national, basin, and community levels (see below). WUAs, MEWR, and ALRI, all have complaints handling systems that will be reinforced through corporate development under Component 3.

69. **The project will establish a project-specific GRM** to record and address complaints related to project implementation to improve accountability of IAs and service providers. The GRM for project-affected people (resettlement and construction related complaints) will be combined with the sectoral GRM, which is currently suboptimal and is only narrowly focused on emergency accidents on the network. ALRI will establish a national system including a PMU-administered hotline for project-affected people. The GRM for project-affected people and beneficiaries will be accessible to all, particularly women. It will ensure simple and open communication with affected communities including awareness raising and dissemination of project information, feedback collection, and appropriate tools for registering concerns in a structured way. A sectoral GRM will focus on receiving feedback from the WUAs supported under the project. A combination of formal and informal channels for complaints is envisaged. Most complaints are likely to be received through the hotline or verbally in meetings; however, digital tools will also be used for self-reporting and complaint verification, particularly for WUA-level feedback. The GRM will be integrated into the IMIS system of ALRI (under Component 1) to support more effective management and analysis of citizen feedback to improve performance results in the targeted schemes. The Client Orientation Index developed by the World Bank will be used for targeted improvements of the existing GRM (assessed as basic at the stage of the project preparation) at least to the elementary level. The GRM



system will sex-disaggregate the farmers satisfaction and other feedback data to monitor the extent to which farmers are engaged and satisfied with irrigation services.

## V. GRIEVANCE REDRESS SERVICES

70. **Communities and individuals who believe that they are adversely affected by a World Bank supported project** may submit complaints to existing project-level grievance redress mechanisms or the World Bank Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project affected communities and individuals may submit complaints to the World Bank independent Inspection Panel, which determines whether harm occurred, or could occur, as a result of World Bank non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the GRS see [www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service](http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service). For information on how to submit complaints to the World Bank Inspection Panel, see [www.inspectionpanel.org](http://www.inspectionpanel.org).

## VI. KEY RISKS

71. **The overall risk rating for the project is Moderate.** The *inherent* substantial risks to successful project implementation are environmental (as described above), macroeconomic, fiduciary, and sector strategy and policy. The World Bank and the IAs are cognizant of the risks and will adopt mitigation measures during project implementation building on current and prior projects and incorporating lessons learned. The residual risk rating for the project is *Moderate* in view of the risks and mitigation measures described below. As noted, the environmental risks are all temporary and can be easily mitigated; none are likely to lead to significant environmental impacts. All the risks reported below are residual risks and assessed upon implementation of mitigation measures, except for the environmental risks.

72. **Political and governance risks are Moderate** and reflect the fiduciary and operational risks of managing and administering project activities in an environment associated with low levels of transparency, accountability, and participation, as well as the limited recourse to anti-corruption and fiduciary regulations, which exist but are not fully enforced. Risks will be mitigated using the measures applied effectively under PAMP-II and ZIRMIP. International and local firms as well as CSOs will be actively involved in all farm- and community-level activities to improve transparency, reduce reliance on local government, and build community capacity. Their involvement will include responsibility for community awareness programs, field-level monitoring and works supervision, beneficiary selection, and WUA capacity building. A GRM will be established at national, basin, schemes, and community levels. A sectoral and project-specific grievance reporting and monitoring system will be established with involvement of WUAs and local administrations, to identify and respond to any abuses of project resources or beneficiaries. The World Bank will supervise closely to ensure compliance with World Bank procurement rules and anti-corruption guidelines.

73. **Macroeconomic risks are Substantial** and stem from the country's vulnerability to adverse and exogenous events, tight fiscal space, and weak banking system. These factors affect government capacity to ensure continued expenditure on institutions and infrastructure for sustainable WRM, and they affect farmers' capacity for on-farm investment. However, the project's focus on modernization of existing



irrigation systems offsets these risks, and reliance on local labor for civil works in irrigation areas will help mitigate the risk of exogenous shocks to rural livelihoods. The weak banking system could affect the project capacity to receive and disburse funds on time, but careful choice and surveillance of the commercial bank used by the project will mitigate this risk.

74. **Sector strategy and policy risks are Moderate.** The current legal and operational frameworks for irrigation management are suboptimal. The risks this poses to the project will be mitigated by supporting the Government in drafting bylaws for implementation of existing policies and legislation (including those partly developed and endorsed under prior projects) and in preparing a National Irrigation Strategy. The project will support establishment of an NWC as a supervisory and coordinating body for water sector reform and will leverage the PSC to be chaired by the Deputy Prime Minister to ensure cross-sectoral coordination of efforts to develop policy instruments for the sector.

75. **Institutional capacity for implementation and sustainability risk is Moderate.** Weak capacity of ALRI, RBOs, and WUAs for water reforms will be bridged through consulting services to assist public institutions and build their capacity. Component 1 emphasizes capacity building of the NWC, ALRI, RBOs, and WUAs, as the foundation for sustainable WRM and irrigation service delivery.



**VII. RESULTS FRAMEWORK AND MONITORING**

**Results Framework**

COUNTRY: Tajikistan

Tajikistan Strengthening Water and Irrigation Management Project

**Project Development Objectives(s)**

The project development objective is to: (i) strengthen capacity for water resources planning and irrigation management in Tajikistan and (ii) improve performance of selected irrigation schemes in the Vakhsh and Zarafshon river basins.

**Project Development Objective Indicators**

Indicator Name	PBC	Baseline	Intermediate Targets		End Target
			1	2	
<b>Strengthen capacity for water resources planning and irrigation management</b>					
National and basin-level water planning institutions established and resourced (Yes/No)		No	Yes	Yes	Yes
ALRI and WUAs strengthened to enable effective management of targeted large schemes (Yes/No)		No	Yes	Yes	Yes
<b>Improve performance of selected irrigation schemes</b>					
Area with improved water delivery in targeted large schemes (Hectare(Ha))		0.00	15,000.00		25,000.00
Energy intensity of water delivered in targeted large schemes (reduction) (Percentage)		0.00	10.00		15.00
Value of production in targeted large		0.00	5.00		10.00





Indicator Name	PBC	Baseline	Intermediate Targets		End Target
			1	2	
schemes (Percentage)					

**Intermediate Results Indicators by Components**

Indicator Name	PBC	Baseline	Intermediate Targets		End Target
			1		
<b>Water sector reform and institutional strengthening</b>					
Water resources planning staff trained (Number)		0.00	25.00		50.00
WIS Unit established and WIS populated and improved (Yes/No)		No			Yes
RBO offices rehabilitated and equipped (Yes/No)		No			Yes
Representation of women in WRM (Number)		0.00	10.00		20.00
New ALRI units established for scheme-based management (Yes/No)		No			Yes
Irrigation energy audit and tariff review complete (Yes/No)		No			Yes
IMIS modules developed (Yes/No)		No			Yes
WUA Support Unit established and trained (Yes/No)		No			Yes
<b>Irrigation scheme improvements</b>					
Pump stations in target schemes modernized (Number)		0.00	5.00		10.00
Selected major hydraulic structures in target schemes repaired (Number)		0.00	10.00		20.00
Other critical major water infrastructure repaired		No			Yes



Indicator Name	PBC	Baseline	Intermediate Targets	End Target
			1	
(Yes/No)				
Community consultations and beneficiary surveys conducted (Yes/No)		No	Yes	Yes
Selected small/medium schemes rehabilitated for enhanced performance (Number)		0.00	10.00	15.00
Selected vulnerable schemes resilient to climate extremes (Number)		0.00	10.00	15.00
<b>Project Management</b>				
Percentage of grievances redressed (Percentage)		0.00		90.00

**Monitoring & Evaluation Plan: PDO Indicators**

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
National and basin-level water planning institutions established and resourced	This indicator tracks the strengthening of water planning institutions through achievement of intermediate targets. Intermediate Target 1: Vakhsh River Basin Organization staffed, Vakhsh River Basin Council members appointed, National Water Council	Progress will be reported annually in the project M&E report.	MEWR	Interviews with senior officials of MEWR.	PMU M&E Specialist.



	<p>established and two formal meetings conducted.          Intermediate Target 2: First biennial national water resource assessment prepared using WIS, approved by NWC, and published. End Target: Vakhsh River Basin Plan developed by RBO, endorsed by RBC, and approved by NWC.</p>				
<p>ALRI and WUAs strengthened to enable effective management of targeted large schemes</p>	<p>This indicator tracks the strengthening of irrigation management capacity through achievement of intermediate targets.          Intermediate Target 1: IMIS populated with irrigation infrastructure for targeted large schemes, and asset management plans for these schemes prepared by new ALRI units. Intermediate Target 2: National Irrigation Strategy developed by ALRI and approved by NWC End Target: WUA performance audits show that the majority of WUAs in the target large schemes have improved their</p>	<p>Progress will be reported annually in the project M&amp;E report.</p>	<p>ALRI and WUAs</p>	<p>Interviews with senior ALRI officials and structured surveys of WUAs</p>	<p>PMU M&amp;E Specialist</p>



	performance.				
Area with improved water delivery in targeted large schemes	This indicator will use remote sensing analysis for targeted large schemes to determine the (i) changes in the total area irrigated each year and (ii) the area that has moved from single to double cropping, and (ii) the change in double cropped area. The sum of these areas changes form a composite indicator reflecting significantly improved water delivery. Across the targeted large schemes it is expected that the area irrigated will increase by 15,000 ha and the area under double cropping will increase by 10,000 ha.	Progress will be reported annually in the project M&E report.	Publicly available remote sensing data.	Analytical methods used in PAMP-II and ZIRMIP ICR assessments will be adopted.	ALRI: initially via consultancy services and subsequently in-house.
Energy intensity of water delivered in targeted large schemes (reduction)	This indicator measures the percentage change in the average energy intensity (kW.hr/m3) of water delivered in targeted large schemes. Target values are for the percentage reduction in energy	Progress will be reported annually in the project M&E report.	ALRI	Measured daily withdrawals will be aggregated to annual totals. Energy consumed taken from annual pump-station electricity bills.	ALRI and PMU M&E Specialist



	intensity from the baseline. This will be calculated at the scheme level in the basis of total annual energy consumption of all pump stations and the total annual water withdrawals for the scheme.				
Value of production in targeted large schemes	This indicator will assess the change in the total value of irrigated production in targeted large irrigation schemes, and compare this to the change in total value of irrigated production in non-targeted large irrigation schemes. Non-targeted large schemes will be chosen to provide the most appropriate "control" recognizing interventions by other development partners in other schemes.	Progress will be reported annually in the project M&E report.	District level survey data aggregated to scheme level	Analytical methods used in PAMP-II and ZIRMIP ICR assessments will be adopted.	Data is routinely collected by the State Statistical Agency (TAJSTAT).

**Monitoring & Evaluation Plan: Intermediate Results Indicators**

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Water resources planning staff trained	This indicator tracks the number of NWS, RBO and RBC staff trained in areas	Progress will be reported	MEWR PIU	Data will be collected at each training event conducted.	MEWR PIU



	relevant to the respective organizational functions, and track the percentage of trainees that are women against a target of 30%.	annually in the project M&E report.			
WIS Unit established and WIS populated and improved	This indicator tracks the establishment and staffing of the WIS Unit within MEWR, the populating of the WIS with national data sets including links to relevant agencies, and the development of new WIS functionality.	Progress towards the targets will be reported annually in the project M&E report.	Data will be sourced from MEWR.	Data will be collected through interview with senior officials and the WIS Unit of MEWR.	The M&E Specialist at the PMU will be responsible for data collection.
RBO offices rehabilitated and equipped	The indicator tracks the construction/rehabilitation of RBO offices in Vakhsh Basin and the equipping of these offices - furniture, IT, field equipment.	Progress towards the targets will be reported annually in the project M&E report.	Data will be sourced from MEWR.	Site inspections and photographic documentation.	PMU M&E Specialist.
Representation of women in WRM	This indicator tracks the increase of women in national and basin-level WRM decision-making roles. Targets vary by institution as follows: MEWR WIS and	Progress will be reported annually in the project M&E	MEWR PIU	Interviews with senior MEWR officials	PMU



	water wing (10%), NWC/RBO/RBC (20%), ALRI WUA and IMIS units (30%), WUAs (30%). The average target is 20%.	report.			
New ALRI units established for scheme-based management	This indicator tracks the restructuring of ALRI to transition irrigation management from administrative boundaries to hydraulic boundaries. Achievement will be demonstrated by establishment of new autonomous ALRI units with responsibility for management of specified irrigation schemes in the lower Vakhsh.	Progress will be reported annually in the project M&E report.	ALRI	Interviews of senior ALRI staff.	PMU M&E Specialist
Irrigation energy audit and tariff review complete	This indicator tracks the completion of the national energy audit of irrigation and the review of sector tariff and subsidies, and endorsement of the final reports by NWC.	Progress will be reported annually in the project M&E report.	ALRI	Interviews of senior ALRI staff.	PMU M&E Specialist
IMIS modules developed	This indicator will track the completion of the IMIS modules for asset	Progress will be reported	ALRI	Interviews of senior ALRI staff.	PMU M&E Specialist



	management, financial management, water delivery, and WUA database.	annually in the project M&E reports.			
WUA Support Unit established and trained	The indicator tracks the establishment and strengthening of the WUA Support Unit in ALRI including staffing of the unit and delivery of appropriate training for the staff.	Progress will be reported annually in the project M&E report.	ALRI	Interviews of senior ALRI staff.	PMU M&E Specialist
Pump stations in target schemes modernized	This indicator tracks the number of pump stations modernized to improve scheme energy efficiency across the two targeted large schemes.	Progress will be reported annually in the project M&E report.	Visual inspections and photographic documentation	Field survey	PMU M&E Specialist
Selected major hydraulic structures in target schemes repaired	This indicator tracks the number of major hydraulic structures (headworks, canals etc.) in the two targeted large schemes that have been repaired.	Progress towards the targets will be assessed and reported annually in the project M&E	Data will come site inspections by the PMU.	Data will be collected through visual inspections and photographic evidence.	Assessments will be conducted by the PMU.





		reports.			
Other critical major water infrastructure repaired	This indicator tracks the completion of the emergency works for the Dangara diversion tunnel and the Beshkent distribution point.	Progress will be reported annually in the project M&E report.	Visual inspections and photographic documentation	Field survey	PMU M&E Specialist
Community consultations and beneficiary surveys conducted	This indicator tracks key citizen engagement actions for subcomponent 2.2 including the conducting of community consultations to inform small-scale investment selection, and the conducting of beneficiary surveys after the completion of small-scale works. The consultations and surveys will be conducted annually and results disclosed publicly e.g. on project website Intermediate target 1: community consultations in priority districts of the upper Vakhsh basin conducted and actions taken based on feedback	Progress will be reported annually in the project M&E report.	ALRI	Interviews with senior ALRI officials.	PMU M&E Specialist



	disseminated and discussed. End target: beneficiary surveys for subcomponent 2.2 conducted and survey results as well as actions taken based on results publicly disseminated and discussed.				
Selected small/medium schemes rehabilitated for enhanced performance	This indicator will track the number of small and medium schemes rehabilitated for enhanced performance.	Progress will be reported annually in the project M&E report.	Project site inspections and project records.	Visual inspections and photographic documentation.	PMU M&E Specialist.
Selected vulnerable schemes resilient to climate extremes	This indicator will track the number of small and medium schemes benefits from works that them from floods and mudflows, and thus improve their resilience to climate change impacts.	Progress will be reported annually in the project M&E report.	Project site inspections and project records.	Project site inspections and project records.	PMU M&E Specialist
Percentage of grievances redressed	This indicator will track the functioning and effectiveness of the project GRM, and so is relevant to citizen engagement. The indicator is the percentage of registered grievances that	Progress towards the target will be assessed and reported	The data will be sourced from the project GRM database.	All grievances received (by whatever means) will be registered in the GRM database. These will be tracked and resolutions will also be recorded in the	The PMU will be responsible for data collection.



	are satisfactorily resolved with two months of receipt.	annually in the project M&E reports.		database.	
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## ANNEX 1: Detailed Project Description

COUNTRY: Tajikistan

### Tajikistan Strengthening Water and Irrigation Management Project

#### Project Area

1. Major project investments will focus on the VMC and ShMC schemes (see *Technical Analysis* and annex 2 for scheme selection process) located in the Lower Vakhsh basin. These schemes span six districts of the southern Khatlon region. The total irrigated area of the two schemes is almost 50 percent of the irrigated area of the Khatlon region, and Khatlon region is home to around half the total irrigated area of Tajikistan.<sup>36</sup> It is the most irrigation-dependent region and has the largest cotton growing areas. Here, irrigation meets around 90 percent of cotton crop water requirements. Khatlon is also, however, characterized by underutilization of irrigation potential. This, a high density rural population that is heavily reliant on agriculture, and comparatively high poverty rates make it a high priority for development investment. Additionally, the World Bank's 2021 Multi-Sector Refugee Response Study undertaken post NATO withdrawal from Afghanistan identified rural and peri-urban areas of Khatlon and Gorno-Badakhshan Autonomous Region (GBAO) as most susceptible to Afghan refugee influx given proximity to the national border and the capacity to accommodate temporary reception areas in the Jaihun, Shahrtuz, Shamsiddin Shohin, and Farkhor districts.

#### Project Components

##### Component 1: Water Sector Reform and Institutional Strengthening (US\$7.60 million)

2. **Subcomponent 1.1: Strengthening national and basin-level water resources policy and planning (US\$1.80 million)** will support implementation of the WSRP, including establishing the NWC, strengthening MEWR capacity, establishing RBOs and RBCs, and preparing a river basin plan. The functions and responsibilities of the NWC are set out in the National Water Code and include approving river basin plans and sector strategies. The project will support the NWC by drafting necessary bylaws and regulatory documents; facilitating meetings and dialogues; conducting an international study tour; and building NWC capacity for planning, policy, and regulatory decisions. Capacity building for MEWR and RBO staff and RBC members will include intra-basin study tours and the design and delivery of tailored trainings on at least three non-duplicative areas. Training topics may include (a) hydrology and climate change, (b) remote sensing data in water resource analyses, and (c) water resources planning approaches (economic cost-benefit analysis, future water use projections, water allocation models, and water quality assessment). Training modules will be developed for in-person delivery and distance learning. The format of the in-person training sessions will be determined in consultation with operational teams and may take a 'training-of-trainers' approach. Training will be included in the Strategy for Capacity Building of the Water Sector Professionals (2021–2030) and modules developed in coordination with qualified staff of the TajikNigim under MEWR leadership.

3. MEWR capacity strengthening will include support for WIS implementation. Prior WIS support focused on system design and development and on coding hydrological 'objects'. Focus will now shift toward (a) digitalizing relevant historical meteorological, hydrological, and water resources data; (b) preparing technical and user documentation, (c) enhancing data exchange between disaster

<sup>36</sup> Tajikistan - Analytical Report. Remote Sensing GIS Applied to Irrigation Performance (2022).



monitoring, forecasting, and water management agencies (Committee of Emergency Situations and Civil Defense, Tajikhydromet, MEWR, Committee of Environmental Protection (CoEP), and ALRI), including information on dam management by the Barki Tajik, facilitating access to geospatial data and information for river basin plans, (d) developing and disseminating analytical and information products based on the WIS. Specifically, MEWR will be supported to institutionalize the preparation and publication of annual national water assessment reports (for example, water cadaster report). The WIS has four modules: (a) a river basin planning database, (b) a water balance database, (c) IMIS, and (d) a geospatial module. The river basin planning database and the geospatial module are operational but need functionality enhancements. Areas for expansion of support to the WIS were identified during project preparation. First, integration of geospatial data, including remote sensing imagery, with already existing geospatial layers. This will build on ongoing World Bank analytical work<sup>37</sup> on remote sensing for agricultural water use and productivity monitoring. Second, incorporation of analytical tools into the WIS and linking to other databases/data sets that facilitate production of an annual water assessment report (water cadaster). The project will consult with relevant agencies on potential links to other databases, especially the groundwater cadaster data hosted by the Department of Geology and the database on water use and abstraction permits hosted by CoEP. The potential to link to the water supply and sanitation MIS proposed under the first World Bank-financed Water Sector Improvement Project (WSIP-1) will also be explored. This subcomponent will also finance equipment and services to improve the WIS user interface and data visualization.

Table 1.1. Current WIS Functionalities and Advances Planned under the Project

WIS functionality	Status	Planned under the project
Water use and abstraction permits	Not included	Water use and abstraction permits for major irrigation schemes digitized and included (Department of Geology and CoEP). Establish link to WSS MIS.
Remote sensing	Not included	Integrate remotely sensed data on water use /productivity for water accounting and drought risk management. Establish information exchanges with Ministry of Agriculture.
Data dissemination & analytics	Online mapping	Dashboards; reports/communication products; WIS built-in analytical products.

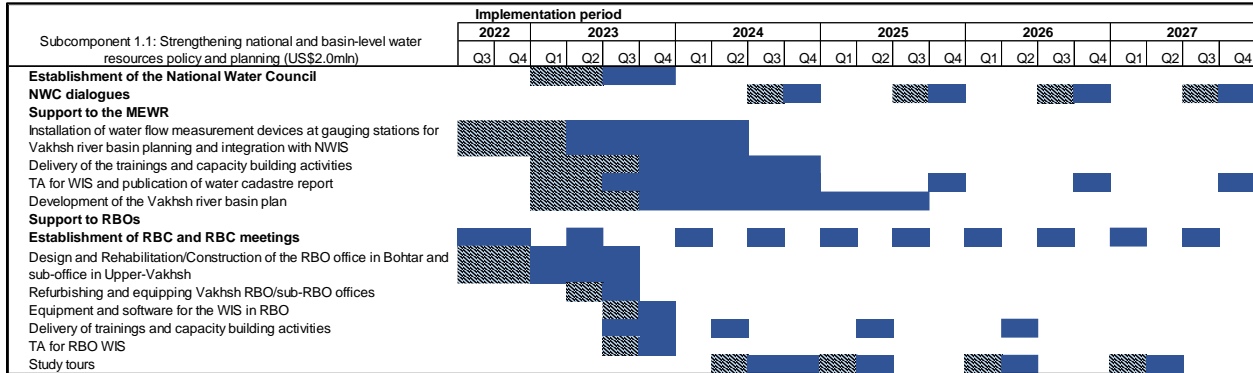
4. In contrast to other basins where RBOs were initially established as working groups, in the Vakhsh, the RBO was formally established by MEWR in 2020, but without technical assistance. The RBO is staffed and temporarily located at the BWO Amu Darya premises but requires significant capacity building (equipment and training). Equipment needs include (a) design, supply, installation, and commissioning of water flow measurement devices at gauging stations for Vakhsh; (b) construction of Vakhsh RBO office in Bokhtar and rehabilitation of the existing suboffice in Rasht; and (c) office furniture, IT equipment, laboratory equipment, and vehicles. Technical capacity building will focus on establishing a basin WIS and developing the river basin plan. The river basin plan will enable a strategic approach to basin planning and development. Plan preparation will follow MEWR methodological guidance applied in the Kofarnihon, Syr Darya, and Zarafshon basins. The plan will require comprehensive analysis of existing and future trade-offs between economic, social, and environmental objectives, considering changing water demands. Modelling of hydrological, environmental, ecological, social, and economic scenarios will be required to explore alternative futures and capture uncertainties in development trajectories and climate change. In

<sup>37</sup> Strengthening Irrigation Management and Reforms in Central Asia (P173250).



coordination with the EU-financed IRDP/TRIGGER, the Vakhsh RBC will be established before project approval. The indicative implementation plan for Subcomponent 1.1 is in figure 1.1.

Figure 1.1. Implementation Schedule for Subcomponent 1.1



5. **Subcomponent 1.2: Improving irrigation planning and management (US\$5.80 million)** will support improved irrigation management at national/regional/district levels of ALRI and at WUA levels. The subcomponent will be implemented by the PMU. National-level ALRI activities include (a) development of a national irrigation strategy informed by a review of irrigation tariffs and subsidies and an irrigation energy use/efficiency assessment and (b) capacity building for the WUA Support Unit and the envisaged IMIS Unit. Capacity building will include (a) advisory and consulting services for ALRI, (b) development of the national WUA database (IMIS module), (c) IMIS refinements to support scheme-level irrigation performance management and long-term irrigation planning, and (d) development of IMIS technical and user basin manuals and IMIS training for staff. IMIS development will include coding of all irrigation ‘objects’ and capture of historical irrigation data on all scheme configurations and water withdrawals and distribution for target schemes.

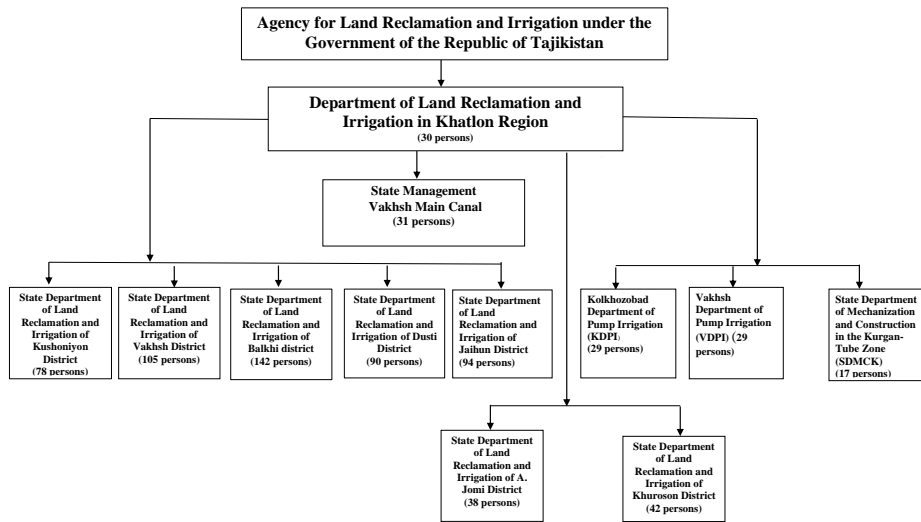
6. The subcomponent will establish national and scheme-level GRMs. The WUA Support Unit (currently five specialists) will receive advisory support in development, facilitation, and administration of a WUA performance-focused grants program for target schemes. IMIS data will be augmented by remotely sensed data on agricultural production, land use, and water balances across the Vakhsh basin. The subcomponent will support (a) development by MoA (linked to Agriculture Modernization Project) of systems for agricultural and land use data collection and exchange at jamoat, district, and scheme levels; (b) collection of remotely sensed data on crop patterns, agricultural production, and climate risks; and (c) capacity building for scheme- and WUA-level irrigation management.

7. Currently, irrigation sector institutions in the Lower Vakhsh basin include a regional ALRI department (in Khatlon region), a State Management Unit for the VMC, seven district-level ALRI units, departments of pump irrigation in two districts, and a State Department of Mechanization and Civil Works (in Bokhtar district) (figure 1.2). The Dangara State Department for Land Reclamation and Irrigation (SDLRI) manages the Danghara and Yavan tunnels. Consistent with the WSRP and water management based on hydraulic boundaries, the project will support the transition of regional- and district-level ALRI units toward efficient and customer-oriented scheme-based irrigation service providers, focused on management and maintenance of the primary irrigation infrastructure and water delivery to WUAs, as defined by irrigation scheme boundaries. Scheme boundaries for the target VMC and ShMC were defined during project preparation. ALRI restructuring for target schemes will transition from administrative areas



to hydraulic areas for service delivery. Irrigation asset management plans will be developed for targeted schemes, underpinned by GIS inventories of hydraulic infrastructure. Institutional, operational, FM, and monitoring capacity building will be provided to new ALRI units and support continued for the restructured ALRI units in the Kofarnihon and Zarafshon basins. IMIS development and user training will be undertaken for the targeted schemes to track service delivery performance at the scheme level. Volumetric management of main canal flows and water delivery to WUAs will be introduced in the target schemes, and associated software systems for tariff collection and accounting will be rolled out for WUAs.

Figure 2.2. Institutional Structure of ALRI in Lower Vakhsh Basin



8. WUAs across the targeted schemes will be trained in the provision of agronomic extension services (for example, soil moisture monitoring, irrigation scheduling, use of agrometeorological data). Training modules will be developed by GIZ under the EU-financed IRDP/TRIGGER Project. Demonstration plots of innovative irrigation techniques will be established on 70 ha within at least seven WUAs. Demonstrations will be managed by WUAs and monitored by ALRI. Support will be provided for preparation of WUA-level feasibility studies, water management plans, and simple asset management plans. Through training, the project will promote smart agricultural practices and resource utilization at the farm level (for example, deep ripping, laser levelling, and furrow shortening).

9. US\$0.6 million will be allocated to performance-focused WUA grants in the target schemes, using Specific, Measurable, Achievable, Relevant and Time-bound (SMART) indicators defined in the GM. Grants will seek to improve on-farm water management primarily through the cleaning and repair of on-farm water distribution channels and other structures. Two rounds of WUA grants are anticipated during the project, with the second round awarding based on relative WUA performance improvement and demonstration of continued need. Support will be channeled through qualified organizations seconded to the WUA Support Unit and tasked with facilitation, FM, implementation support, and monitoring of grant implementation plans in compliance with the GM.

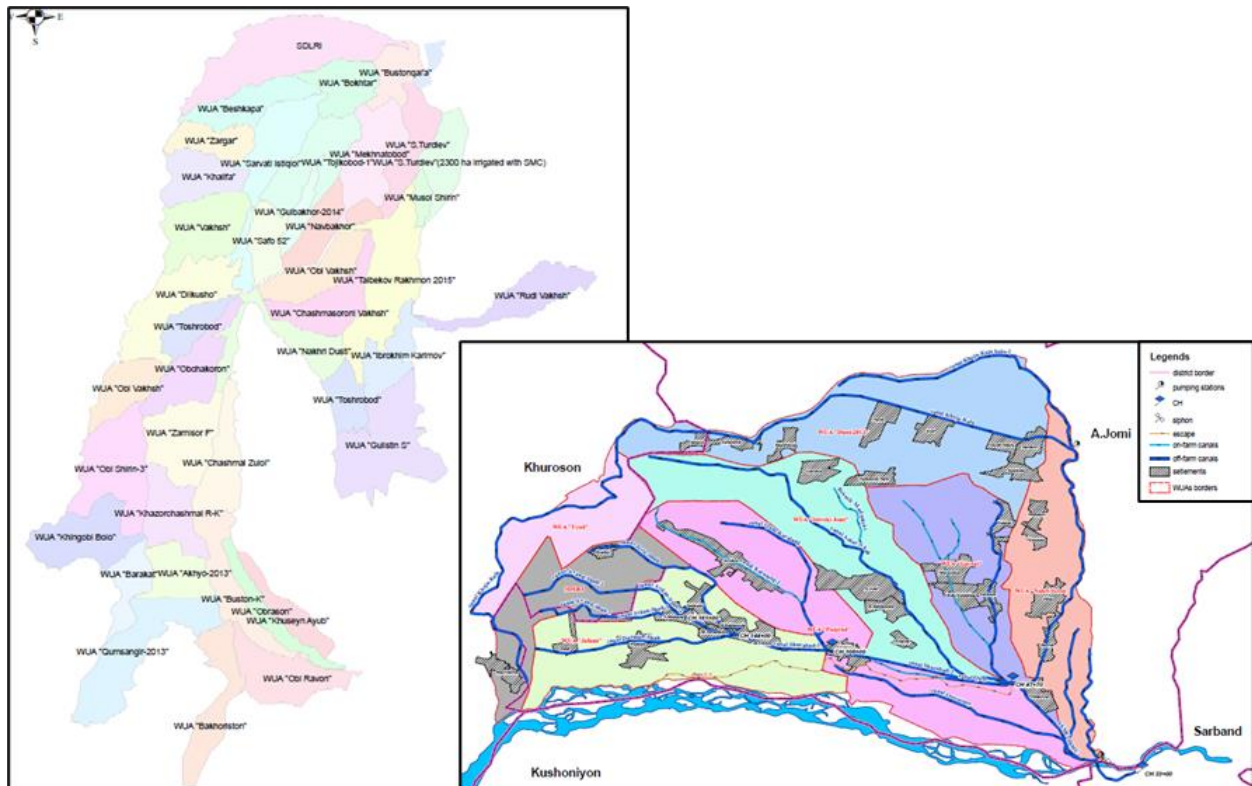
**Component 2. Irrigation Scheme Improvements (US\$36.91 million)**

10. **Subcomponent 2.1: Improving large-scale irrigation schemes (US\$31.91 million).** This subcomponent will focus on the Vakhsh and Shurabad schemes (see *Technical Analysis* and annex 2 for



description of selection process) in the Lower Vakhsh basin spanning six districts of the southern Khatlon region. These schemes cover 128,000 ha and are managed by seven district ALRI offices (under the Khatlon regional ALRI office) and by 45 WUAs. Pre-feasibility studies and performance indicators have identified intake structures, headworks, control gates, main canals, drainage networks, and pump stations to be rehabilitated or modernized. Final selection of works will be based on feasibility studies for these two schemes. Rehabilitation will seek to enhance resilience to climate change including by minimizing disruptions from extreme events. Climate hazard assessments will be conducted by ALRI with World Bank support.

Figure 1.3. Map of WUA areas for VMC (left) and ShMC (right) (Source: World Bank)



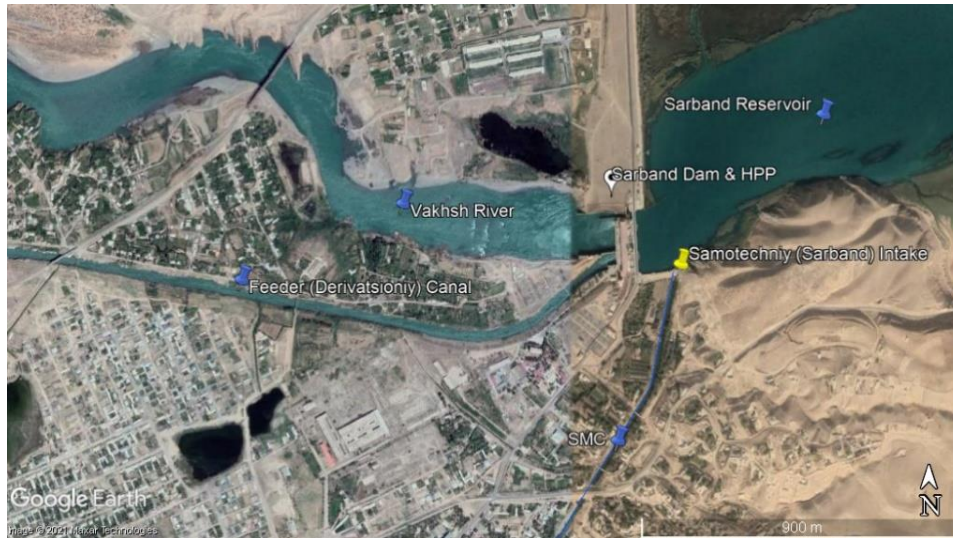
11. The Vakhsh and the Shurabad schemes are supplied from the Vakhsh river below Sarband Dam (figures 1.3–1.5). Four of the six power units of Sarband Hydroelectric Power Plant discharge into the river, while two discharge into a separate tailrace. The tailrace is a feeder canal to the Vakhsh and Shurabad scheme intakes, with surplus flows discharging back into the river through a gated escape structure. The tailrace/feeder canal is considered as part of the river system, rather than scheme infrastructure. In the Vakhsh Basin Needs Assessment Study, this was denoted as the Sarband Dam Feeder Canal. Herein it is referred to as the Derivatsioniy Canal or bypass canal. The Shurabad scheme intake (figure 1.5) is on the Derivatsioniy Canal left bank, just upstream of escape structure. The scheme area is on the Vakhsh right bank, supplied through siphon, 1.6 km downstream from its intake. The main canal flows serve not only the scheme areas but also important fishpond, and both need to be considered in design of any improvements. The Vakhsh scheme main intake is also on the Derivatsioniy Canal left bank, just upstream of Shurabad intake. The Vakhsh scheme area is on the Vakhsh left bank (although a small fraction at the tail end lies outside the Vakhsh on the Panj right bank just above the river confluence). The large VMC





flows supply irrigation areas but also two off-stream hydropower plants within the scheme area (figure 1.6), the needs of which should also be considered in the design of any improvements. The project will finance emergency works on the Danghara diversion tunnel and the Beshkent distribution point in the Kofarnihon basin.

**Figure 1.4. Sarband Dam Layout**

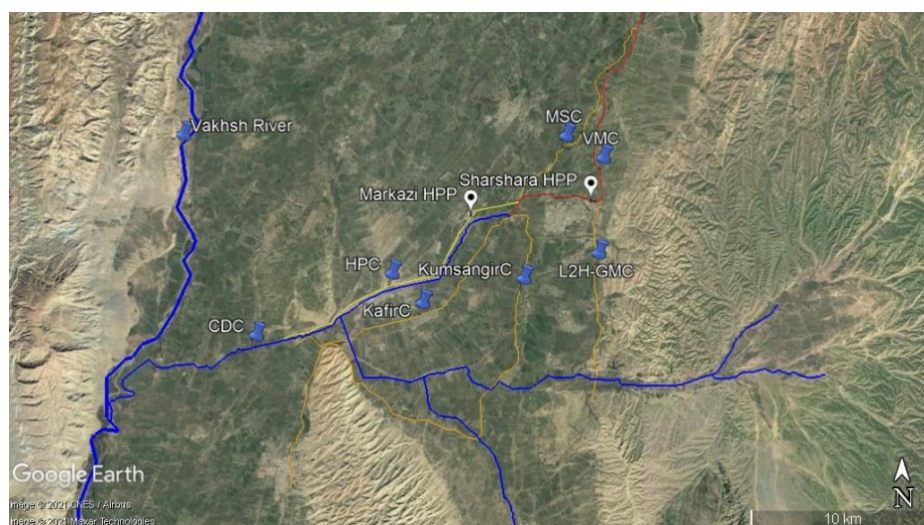


**Figure 1.5. VMC and ShMC Intakes**





Figure 1.6. Vakhsh Main/Hydropower Canals and Central Discharge Channel Service to Off-stream Hydropower Plants



12. A scheme-based approach to systems improvement will be adopted. Particularly for the Vakhsh scheme, interventions will be considered on the basis of sub-schemes/subsystems. The VMC subsystems are summarized in table 1.2. Subcomponents 1.2 and 2.1 will be implemented synergistically as shown in figure 1.7.

Table 1.2. Summary Description of VMC Subsystems and ShMC

Short Name and Description	Service Area (ha)	Pumped Area (ha)	Flow Capacity (m <sup>3</sup> /s)	Areal Capacity (l/s/ha)	Pump Stations	Comments
NBC-JC: Northern Branch Canal and Jaibor Canal network	25,758	1,950	60.0	2.33	3	RB: 8 secondary/tertiary gravity canals and 3 PS need attention. 6 of these correspond to the internal RK/Urtabuz system.
OMC: OMC network	9,527		24.0	2.52		RB: most compact of the defined subsystems. Its upstream location and absence of internal pumping make it suitable as a pilot system to demonstrate integrated modernization approach: physical, operational, and production. 5 internal secondary/tertiary canals need attention.
Direct 1: Group 1 direct outlets	4,225		16.0	3.79		L/RB: 9–10 relatively minor gravity and pumped canal systems. One gravity-fed and one pump-fed canal need attention.
L2HWC-GMC: L2 Headworks Canal and GMC Canal network	11,699	5,660	22.0	1.88	14	LB: 2 major internal branch canals (L2 and GMC), the smaller Tashrabad MC, 2 tertiary pump-fed canals, and 3 PS need attention.



Short Name and Description	Service Area (ha)	Pumped Area (ha)	Flow Capacity (m <sup>3</sup> /s)	Areal Capacity (l/s/ha)	Pump Stations	Comments
CHPC: Central Hydropower Canal	195	195	0.42	2.15	1	RB: supplies one small pumped system
Direct 2: Group 2 direct outlets	509		3.1	6.09		LB: comprises minor canal systems
JKC: Jilikul-Kafir Canal network	17,042		32.0	1.88		LB: 2 main branch canals (Jilikul-Kafir and Jilikul) and 2 internal branch or large secondary canals (Yakadin and Kofirkala) and 5 secondary /tertiary canals need attention. There is internal pumping in the JKC.
KC: Kumsangir Canal network	24,324	14,000	52.0	2.14	13	LB: 18 canals and 5 PS need attention. 6 are large secondary canals (R2.1 and R2.2 pump-fed canals and KS3–KS6 gravity-fed canals). The other 12 are tertiary canals: 9 gravity fed and 3 pump fed. The focus of works will be on downstream end of KC (internal R2 pumped and KS3–KS6 gravity systems).
ShMC: Shurabad Main Canal	15,000	1348	40		2	

Note: LB = Left bank, PS = Pumping station(s), RB = Right bank.

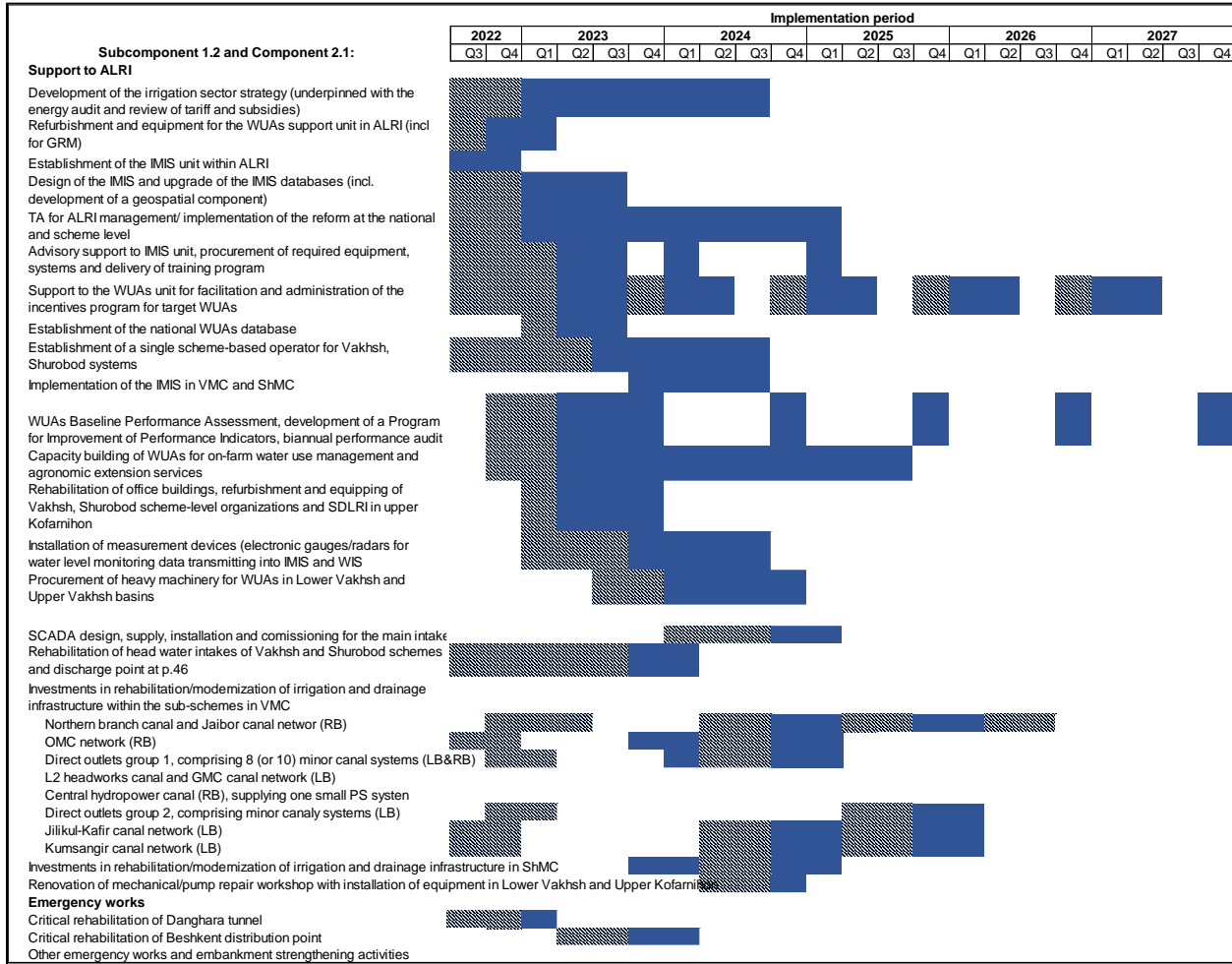
**13. Subcomponent 2.2: Improving small- and medium-scale irrigation schemes (US\$5.00 million).**

For priority schemes in the Zarafshon and Lower Vakhsh, rehabilitation or replacement of selected works will be undertaken. Feasibility studies for these priority schemes will be conducted early in project implementation. Pre-feasibility studies for schemes in the Upper Vakhsh basin have been completed. These identified priority districts in the Upper Vakhsh (Rasht, Tojkobod, and Lahsh) where small-scale investments will be selected early during implementation based on consultations with local communities and district-level ALRI and the Vakhsh RBO. In these districts, consideration of flood/mudflow exposure, simple cost-benefit analysis, and numbers of beneficiaries will guide selection. Investments will be coordinated with other development projects in these basins and will be implemented using local/community labor. Detailed engineering designs will be strengthened by separate technical assistance financed by the World Bank. The subcomponent will finance the design, reinforcement, replacement, and protection of key infrastructure at risk from floods and mudflows. The focus will be on off-farm irrigation infrastructure that are the O&M responsibility of ALRI and established WUAs.

14. Training will be provided to enhance ALRI, TajikGiprovodhoz, and local design company’s capacity for designing, implementing, and maintaining structural and nonstructural resilience measures, considering climate change and potential impacts. Specialized heavy machinery will be procured for the Upper Vakhsh basin for regular maintenance and emergency response. Technical specifications for machinery will consider future climate.



Figure 1.7. Implementation Schedule for Subcomponents 1.2 and 2.1.



**Component 3: Project Management (US\$2.83 million)**

15. MEWR and ALRI will implement the project with responsibilities set out in the POM. This component will cover incremental operating costs for project execution, including project management, management of social and environmental issues, FM, procurement, contract administration, reporting, and M&E. It will finance additional staff for the MEWR PIU and PMU to complement IA capacity including for coordination with other activities under the EU-financed program, baseline and project completion surveys, preparation of assessments and data collection, and annual audits. The component will finance payments for project preparation before signing the Financing Agreement, and on or after September 24, 2021, for the eligible expenditures approved by the World Bank on December 4, 2021.

**Component 4: Contingent Emergency Response Component (CERC) (US\$0 million)**

16. To compensate for the absence of a fast-disbursing instrument for IDA countries, the World Bank encourages inclusion of a CERC in IDA operations. A CERC is a financing mechanism to strengthen a borrower’s country response and recovery capacity by allowing World Bank investment project funds to be quickly reallocated to emergency recovery activities after an eligible emergency has occurred.



Emergencies could include pandemics, floods, droughts, or landslides. The CERC allows the Government to request the World Bank to recategorize and reallocate uncommitted financing to cover emergency response and recovery costs or channel additional funds to fully or partially replenish funds reallocated to the CERC following an eligible emergency. If the requirements for activation are met, uncommitted project funds are reallocated to the CERC for crisis or emergency response. To facilitate a rapid response, a formal project restructuring is deferred to within six months after CERC activation. The CERC will be established and managed in accordance with the provisions of the World Bank Policy and the World Bank Directive on Investment Project Financing. If activated, the CERC will finance eligible activities listed in the POM's dedicated CERC annex.



## ANNEX 2: Irrigation in Project Areas and Scheme Prioritization

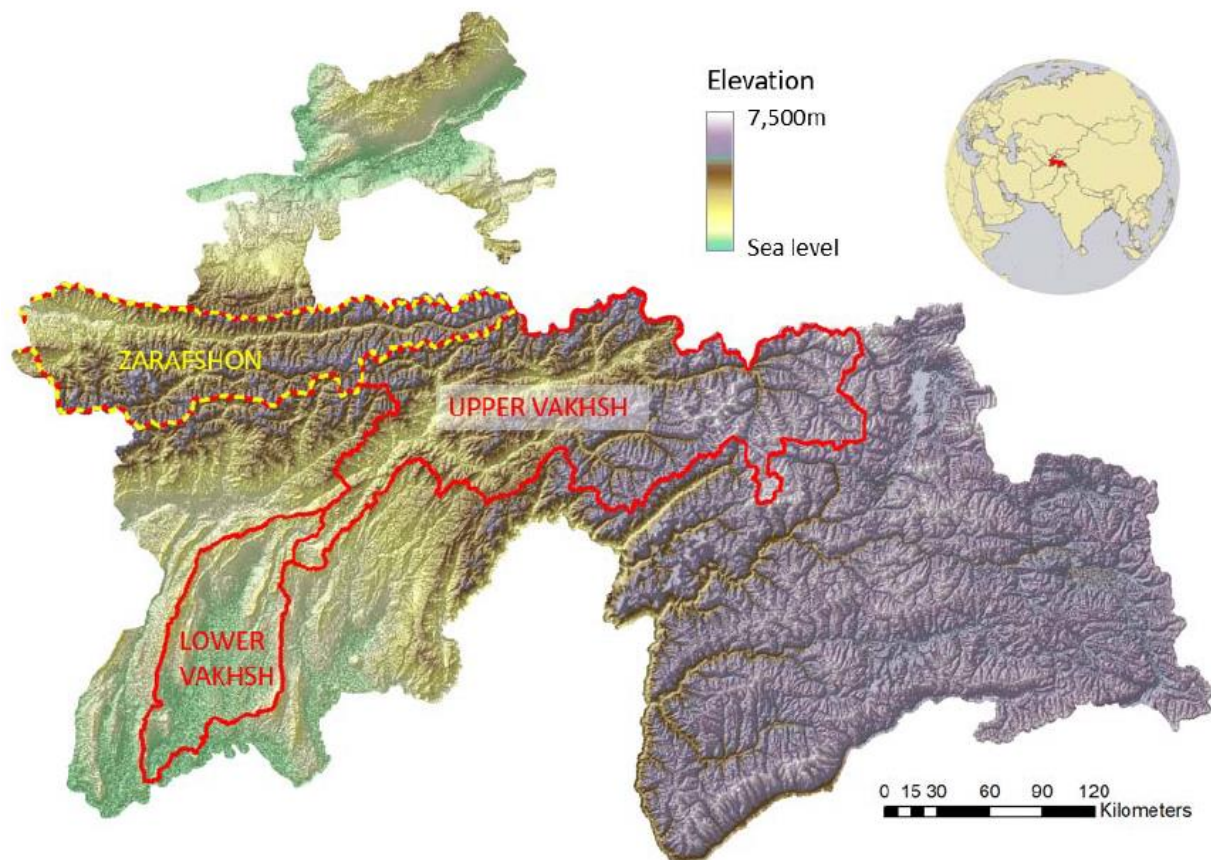
COUNTRY: Tajikistan

Tajikistan Strengthening Water and Irrigation Management Project

1. The prioritization of irrigation schemes for investment under the project has been based on (a) mapping and analysis of existing irrigation scheme areas and actual irrigated areas across the project areas, (b) analysis of indicators of *need* and *impact* for irrigated areas across the project areas, and (c) studies conducted for and learnings from ZIRMIP.

2. While water reform aspects in the project are national in scale, irrigation infrastructure investments are confined to three basins areas: (a) the Upper Vakhsh basin, (b) the Lower Vakhsh basin, and (c) the Zarafshon basin (figure 2.1).

Figure 2.1. Project Areas for Irrigation Infrastructure Investment



### Scheme Mapping

3. GIS mapping of existing irrigation schemes was not available and was developed during project preparation for the project areas. Irrigation areas were manually digitized in ArcMap based on interpretation of recent high-resolution satellite imagery as well as the series of historical high-resolution imagery available in Google Earth Pro. Irrigated areas were then discretized into individual schemes based on contiguous areas, consideration of identified water intake locations, and treating rivers as boundaries to delineate left- and right-bank schemes. Schemes were named by the rural settlements that defined



their extent. Boundaries and names were validated by PMU staff familiar with the project areas. In the mountainous areas of the Upper Vakhsh and Upper Zarafshon, irrigation is across many small and spatially dispersed areas, unlike the large, contiguous schemes of the lower valleys. In these mountainous areas, irrigated areas were aggregated into ‘scheme groups’ for consideration in the prioritization process and named by the sub-basins in which they are located. These ‘scheme groups’ while in many cases quite large, comprise multiple small and fragmented farmer-led irrigation areas. This expert-driven, manual mapping was time-consuming, but was the only viable option for generating accurate spatial maps of irrigation across the project areas. Final scheme boundaries are a consensus between the World Bank’s GIS and irrigation specialists and the PMU staff. Maps of the scheme extents for each of the three project areas are in figures 2.2a to 2.2e and summary statistics of these schemes are in table 2.1. For the Zarafshon basin, the mapping is presented on a district basis: (a) the downstream Panjakent district, (b) the mid-reach Ayni district, and (c) Upper Zarafshon Kustoni Mashtokh district. GIS and spreadsheet data (including scheme names and numbering on the maps) and a full technical description of the mapping process are retained in the project files.

Figure 2.2a. Irrigation Areas in the Panjakent District of the Lower Zarafshon Basin

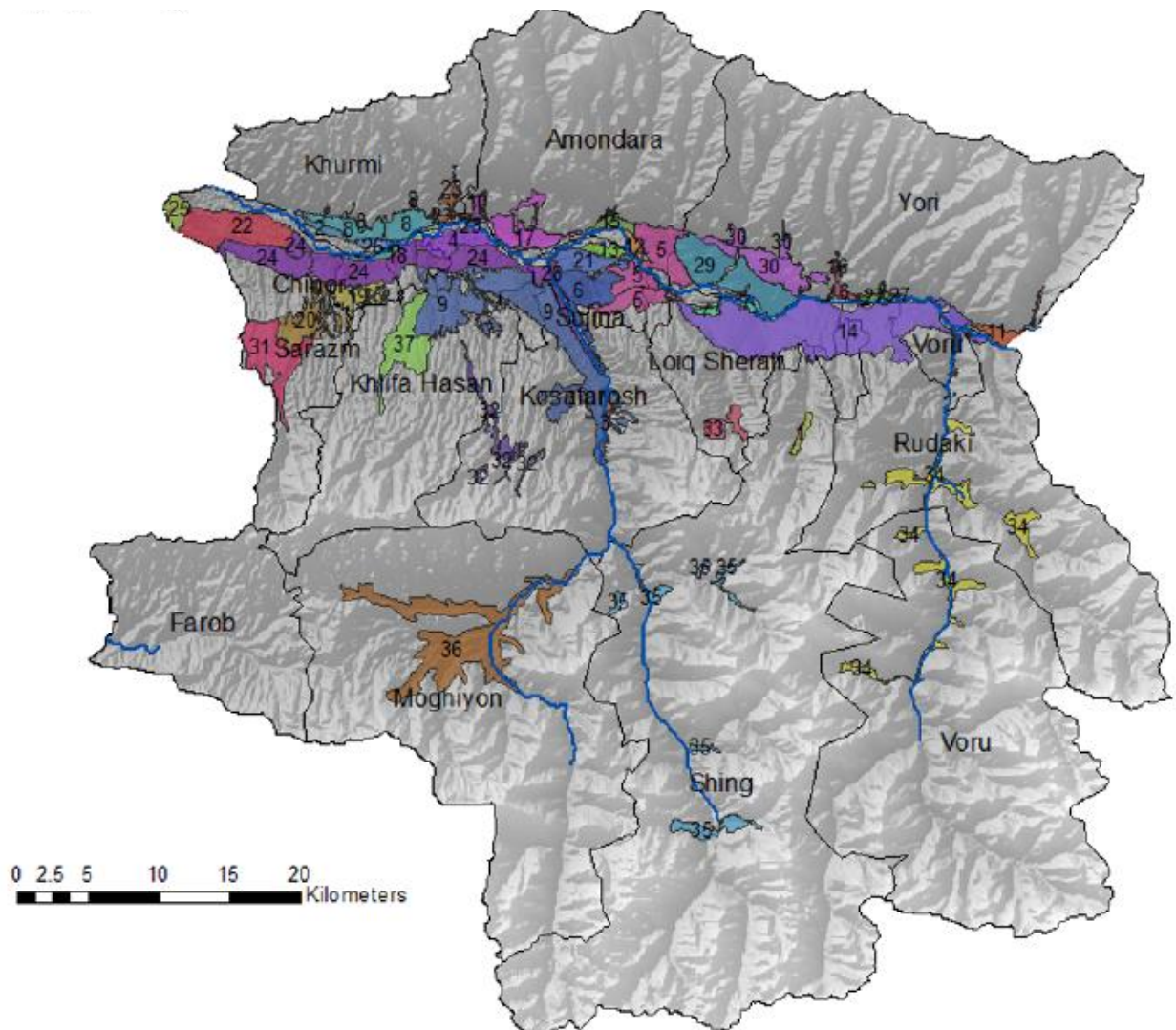




Figure 2.2b. Irrigation Areas in the Ayni District of the Middle Zarafshon Basin

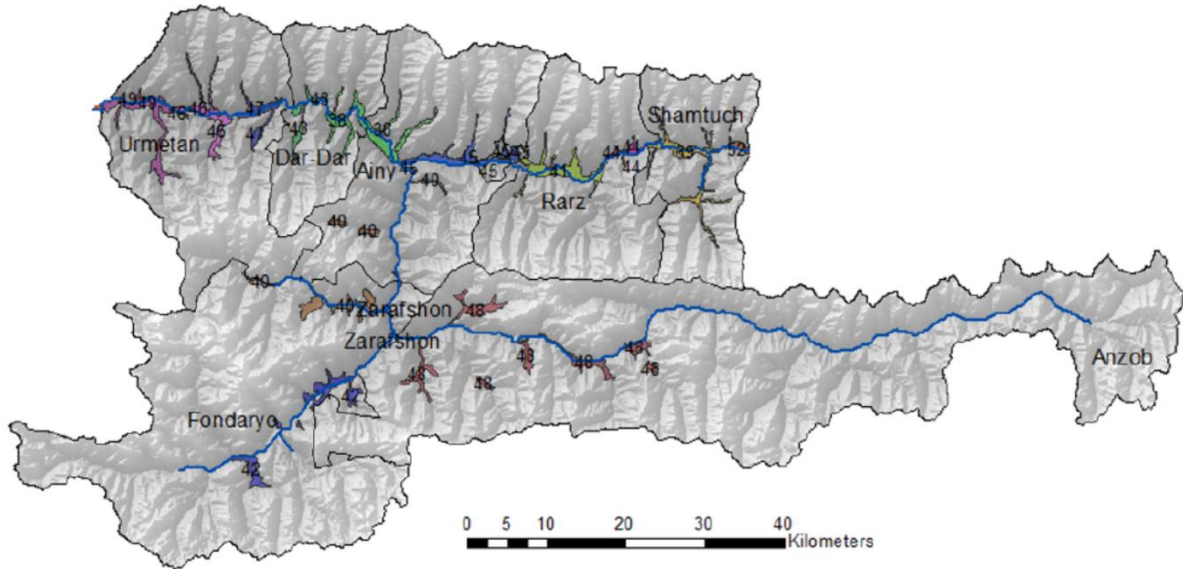


Figure 2.2c. Irrigation Areas in the Kustoni Mashtokh District of the Upper Zarafshon Basin

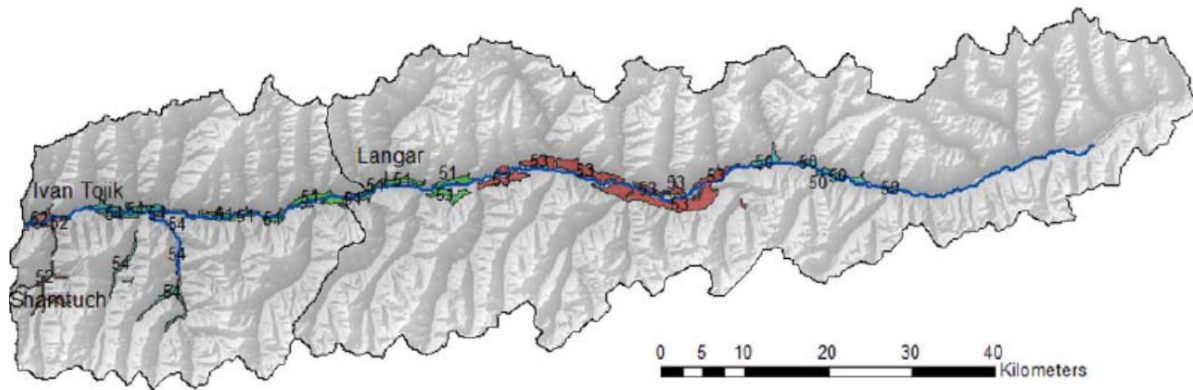






Figure 2.2d. Irrigation Areas in the Upper Vakhsh Basin

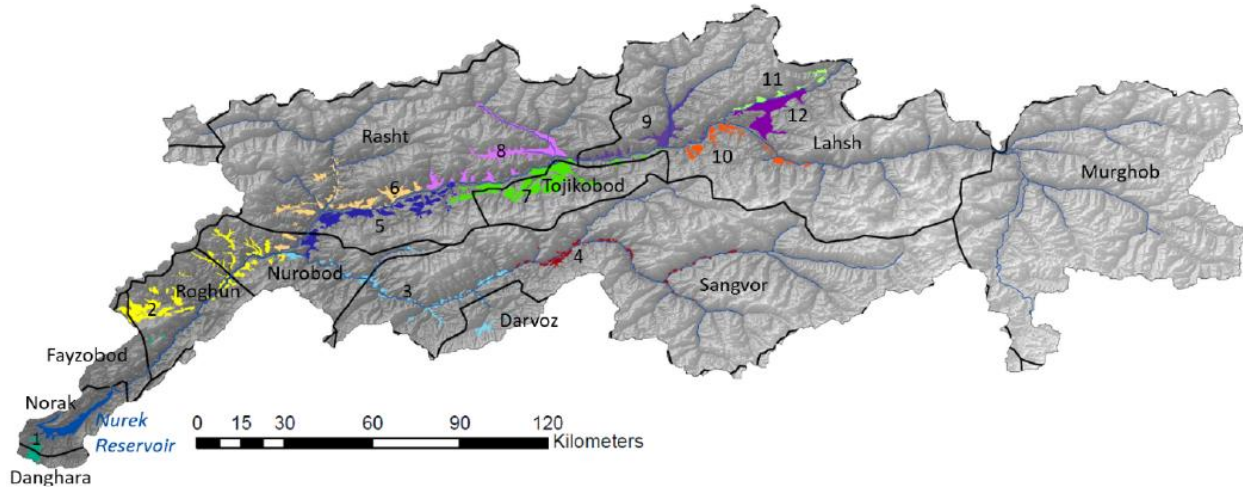
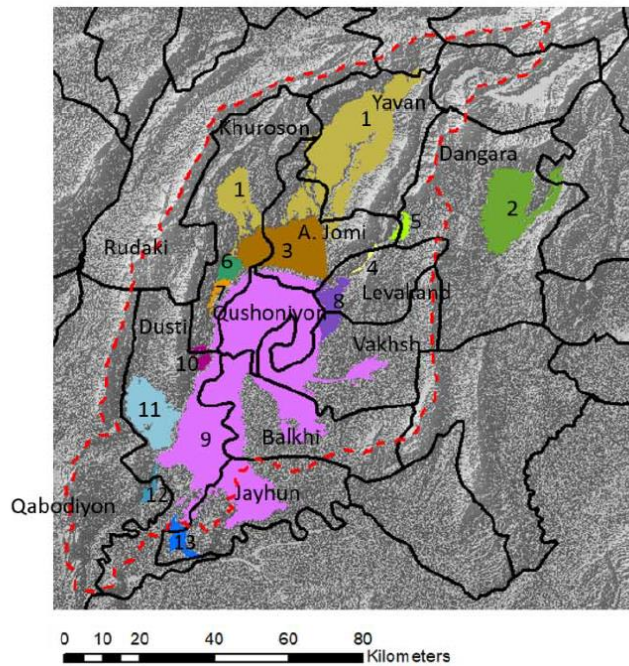


Figure 2.2e. Irrigation Areas in the Lower Vakhsh Basin



Note: Dangara (2) and Tigrovaya Balka (13) schemes are not inside the Lower Vakhsh basin but are supplied with water from the basin.

**Table 2.1. Summary Statistics of Irrigation Areas in the Three Project Areas (areas in ha)**

	<b>Number of Schemes</b>	<b>Total Scheme Area</b>	<b>Average Area Per Scheme</b>	<b>2020 Irrigated Area (%)</b>	<b>Basin Share of Total Scheme Area (%)</b>	<b>Basin Share of 2020 Irrigated Area (%)</b>
Upper Vakhsh	12	84,180	33,945	40	20	14
Lower Vakhsh	13	268,499	187,634	70	64	76
Zarafshon	54	67,057	25,090	37	16	10

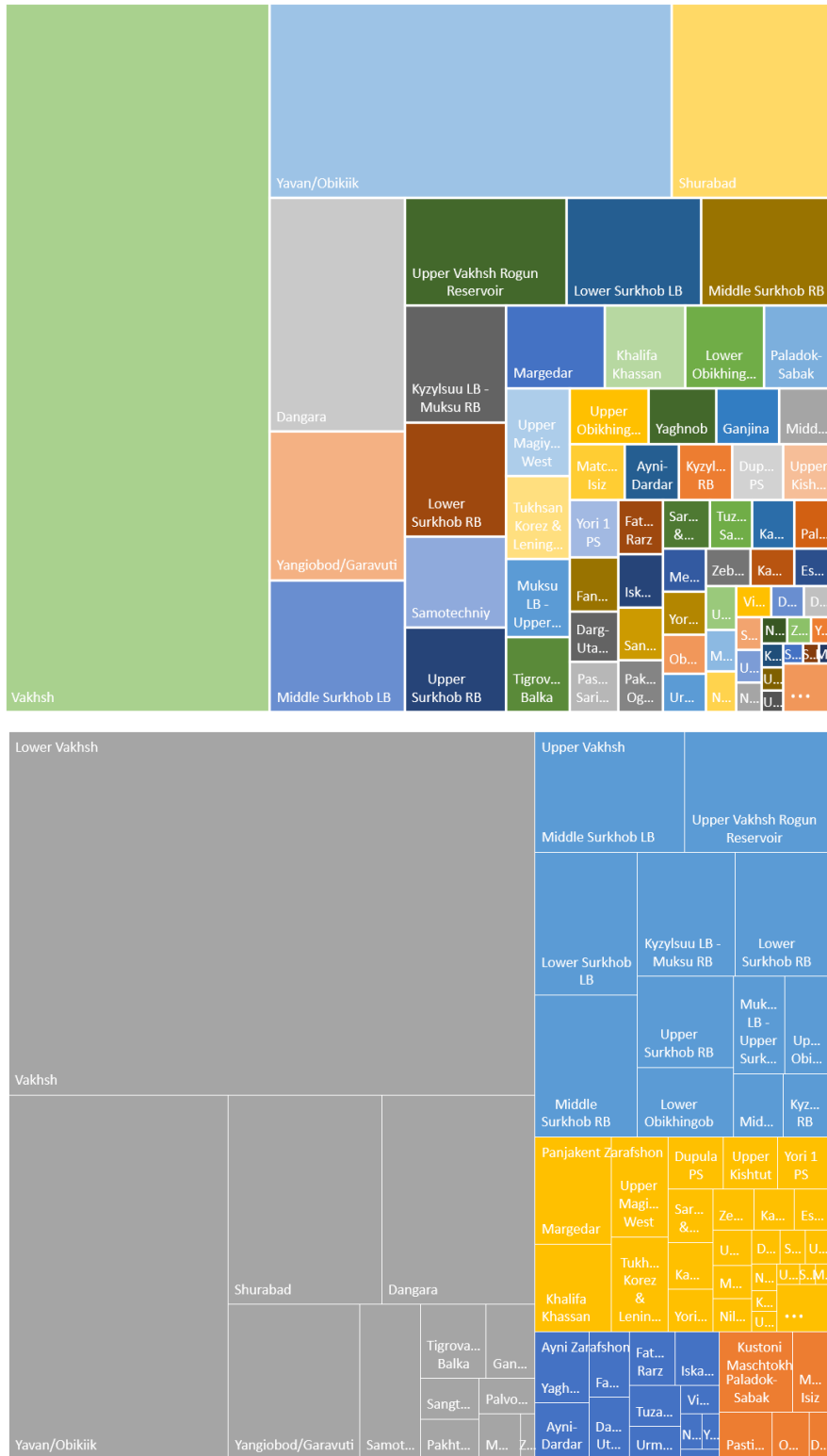
4. The 79 identified schemes are visualized as tree maps in figure 2.3, highlighting the dominance of a small number of large schemes and of the Vakhsh, especially the Lower Vakhsh in the overall picture. The 79 schemes can also usefully be categorized as large (>10,000 ha), medium (1,000–10,000 ha), and small (<1,000 ha). The distribution across these size categories is shown in table 2.2. Nearly 80 percent of the 2020 irrigated area was in nine large schemes—five in the Lower Vakhsh and four in the Upper Vakhsh, noting that the latter are aggregations of many smaller irrigated areas.

**Table 2.2. Descriptive Statistics of Irrigation Areas by Scheme Size**

<b>Category</b>	<b>Number of Schemes</b>	<b>Percent of Total Area</b>	<b>Percent of 2020 Irrigated Area</b>
<b>Large</b>	9	70	79
<b>Medium</b>	40	27	20
<b>Small</b>	30	3	1



Figure 2.3. Tree Maps of (a) all Schemes in Project Areas and (b) Grouped into Basins and Sub-schemes





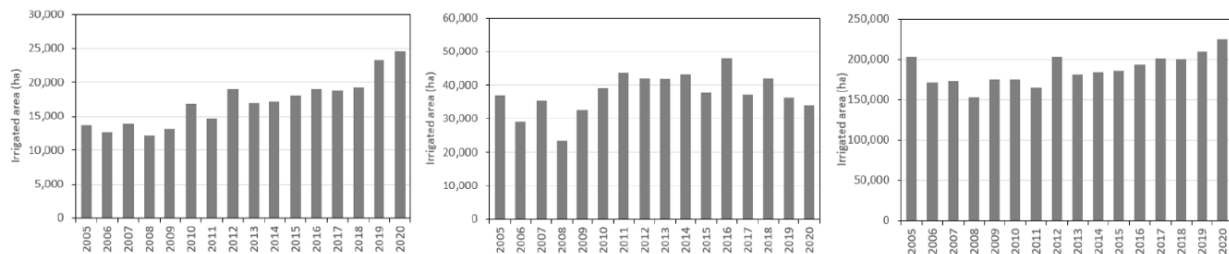
### Mapping Actively Irrigated Areas

5. Actively irrigated areas are typically significantly less than the total schemes area, reflecting a combination of water availability and the condition of water distribution systems. As water availability varies strongly year-to-year (especially in the areas without irrigation water storage), the actual areas irrigated also vary strongly year-to-year.

6. Actual irrigated areas were mapped for 2005–2020 based on Landsat-7 Enhanced Thematic Mapper Plus multispectral data. Irrigated cropland pixels were identified annually based on greenness expressed by the Normalized Difference Vegetation Index through a supervised classification approach, with some manual post-classification corrections. Reference data (for irrigated and non-irrigated) were split 70:30 into training data and validation data. Algorithm accuracy was 99–100 percent for the training data and from 94 percent (Upper Vakhsh) to 98 percent (Lower Vakhsh and Zarafshon) for the validation data.

7. Table 2.1 indicates the total irrigated area for 2020 and proportion of the total irrigation area. The portion irrigated is significantly higher in the Lower Vakhsh. This is attributed to the higher reliability of irrigation supply, given the significant water storage and flow regulation upstream. Interannual variation is high at the individual scheme level but less variable once aggregated to basin areas (figure 2.4). The strongest apparent trend in irrigated area is in the Zarafshon basin and for 2019 and 2020 this most likely reflects the investments under ZIRMIP.

Figure 2.4. 2005–2020 Annual Irrigated Areas in Zarafshon, Upper Vakhsh, and Lower Vakhsh (left to right).



### Prioritizing Schemes for Investment

8. To prioritize schemes for investment, a framework was developed with indicators of *need* and expected *impact* across five dimensions: economic, social, environmental, institutional, and technical performance. Based on similar prior assessments in other countries conducted by the Food and Agriculture Organization of the United Nations (FAO), 29 need indicators and 22 impact indicators were selected, distributed evenly across the five dimensions. Considerable effort was put into identifying global, national, and local data that could be used to evaluate these indicators for the 79 identified schemes. Ultimately, data availability and quality severely constrained application of the prioritization framework. No data were available for the Upper Vakhsh, and for the other two areas it was available data allowed evaluation of only 38 percent of the proposed need indicators and 18 percent of the proposed impact indicators. Across the five dimensions, 40 percent of the proposed economic indicators could be evaluated, 31 percent of the social indicators, 66 percent of the environmental indicators, none of the institutional indicators, and 11 percent of the technical indicators. Based on available data, some new indicators were defined, but the proposed framework remained partially and unevenly populated. Scrutiny of the individual indicators revealed many had limited discriminatory utility, especially because



few reliable local data were identified and so a heavy reliance on coarse global data sets was required. From the originally proposed 51 indicators, only 6 were found to be useful in the prioritization process— 4 need indicators and 2 impact indicators. The need indicators were farmers minimum profit (economic), area exposed to salinity (environmental), climate water deficit (potential evapotranspiration minus precipitation, environmental), and irrigation conveyance efficiency (technical). The impact indicators were potential crop yield increase (economic) and projected population density increase (social). A simplified approach was adopted to score and rank schemes using this reduced set of indicators. The 12 Upper Vakhsh schemes were omitted as no data were available to evaluate indicators. Rank scores (1, 2, 3) were assigned to terciles (low/medium/high) of indicator values and ranks were then averaged to give overall need and impact scores (0–100 percent).

9. There is a high level of skewness in the areas of scheme—a small number of large schemes dominate overall irrigated areas and thus dominate irrigated production. Comparing these large schemes to the many much smaller schemes in a combined prioritization would not be inappropriate. The large schemes were thus prioritized separately using the indicators and additional scheme-specific relevant information including ongoing investments by other development partners. Five large schemes in the Lower Vakhsh represent 71 percent of the total area irrigated in 2020: Vakhsh, Yavan/Obikiik, Shurabad, Dangara, and Yangiobod/Garavuti. Ongoing projects supported by other development partners are currently focused on the Yavan/Obikiik and Dangara schemes. Of the remaining three large schemes, two that scored highly for need and impact—the Vakhsh and Shurabad schemes—were selected for project investment. Together, these two schemes represent almost 50 percent of the total area irrigated in 2020 across the project basins.

10. Prioritizing across the 62 small and medium schemes outside of the Upper Vakhsh, 21 scored highly for both need and impact (table 2.3), 30 scored highly for either need or impact, and 11 did not score highly for either need or impact. Fourteen of the top priority schemes are in the Zarafshon and seven are in the Lower Vakhsh; collectively they represent around 9 percent of the total scheme area across the project basins.

**Table 2.3. Top Priority Small and Medium Schemes**

Basin	Scheme	Total Scheme Area (ha)	2020 Irrigated Area (ha)
Lower Vakhsh	Samotechniy	6,580	4,550
Lower Vakhsh	Ganjina	2,517	954
Lower Vakhsh	Sangtuda	1,680	750
Lower Vakhsh	Mekhnatabad/Sarband	1,320	436
Lower Vakhsh	Palvontugay	1,395	390
Lower Vakhsh	Zigirti	451	135
Lower Vakhsh	Tigrovaya Balka	3,399	2,531
Zarafshon	Margedar	5,806	3,579
Zarafshon	Mugolon Plus	899	520
Zarafshon	Dam Daryo	665	505
Zarafshon	Zebonsay-Soursay	1,177	120
Zarafshon	Sarazm and Leningrad 2 PS	1,652	989
Zarafshon	Sangsalok	603	342
Zarafshon	Kiziljar	137	120
Zarafshon	Yori 2 PS	1,314	237
Zarafshon	Dupula PS	2,024	738



Zarafshon	Yori 1 PS	1,970	590
Zarafshon	Veshist Plus	134	71
Zarafshon	Kishtudak	363	31
Zarafshon	Nilufar 3 PS	896	22
Zarafshon	Nilufar 2 PS	478	10

11. Given recent investment under ZIRMIP, the data-driven prioritizations for Zarafshon schemes were reviewed to assess if recent rehabilitation works or the available detailed local knowledge from prior assessments suggested adjustments to priorities. On review, 7 of the 14 top priority small or medium schemes in the Zarafshon basin were considered a lower priority, while 5 of the lower priority schemes were raised to top priority. The adjusted list of 12 top priority small and medium Zarafshon schemes is Margedar, Mugolon Plus, Dam Daryo, Zebonsay-Saursay, Sarazm and Leningrad 2 PS, Sangsalok, Kiziljar, Tukhsan Korez and Leningrad 1 PS, Eshon, Kamartoshsay, Kumsoy, and Upper Chinorsay.

12. In the Upper Vakhsh, data were not available for data-driven prioritization. The areas around Rogun Reservoir that will be affected by dam filling are not a priority for investment. In discussion with the Government, considering the limited financing envelop for small-scale schemes, the logistical complexity of operating in the mountainous areas of the Upper Vakhsh, and the pre-feasibility assessments for irrigation investment prepared by the Government for two districts in the Upper Vakhsh, it was agreed to exclude schemes along the Obikhingob tributary and to prioritize the areas along the upper Surkhob spanning the Rasht, Tojkobod, and Lahsh districts. The six scheme areas defined across these districts represent around 10 percent of the total area irrigated in 2020 across the project areas. Around 5 percent of this area is irrigated by pump stations and the remainder is gravity-fed. In the remote Upper Vakhsh, where mudflow risks and protection costs are high, where distance to market is high, and access to equipment and expertise for pump station maintenance is challenging, the project will prioritize investments on gravity-fed irrigation only. While specific investments will be identified in these districts by the Government, prioritization of these comparatively small works will be undertaken during project implementation in consultation with local communities.



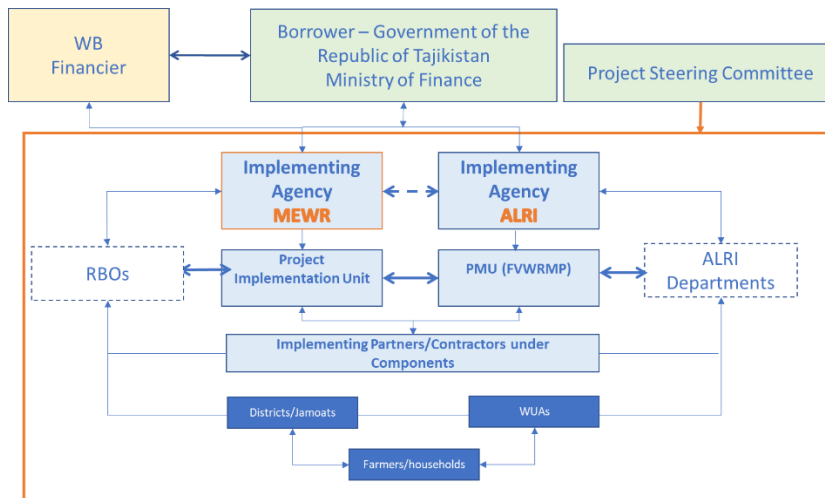
**ANNEX 3: Implementation Arrangements and Support Plan**

**COUNTRY: Tajikistan**

**Tajikistan Strengthening Water and Irrigation Management Project**

1. MEWR and ALRI will be the project IAs. The MEWR PIU will implement Subcomponent 1.1 and the ALRI PMU will implement Subcomponent 1.2, Component 2, and Component 4. FM, construction supervision, and M&E will be consolidated under the PMU (figure 3.1). Technical responsibilities of the IAs are defined by their sectoral and institutional functions.

**Figure 3.1. Project Implementation Arrangements**



2. MEWR regulates water resources and coordinates water sector reforms. MEWR comprises a main Department of Water and Energy Policy, seven other departments, and four divisions at the central level. The First Deputy Minister is responsible for water issues. Since 2020, four RBOs were added as departments to the ministry structure.

3. MEWR has not been directly involved in implementation of World Bank water sector projects but has been instrumental in coordination of activities under PAMP-II and ZIRMIP as well as other donor-financed projects relating to establishment of the WIS and support to RBOs and RBCs. MEWR has also led donor-financed efforts on drafting water legislation and implementing capacity development programs. MEWR has considerable experience in implementing donor-funded energy projects and hence has project management, procurement, contract management, and M&E expertise.

4. In 2021, MEWR established a PSC with representatives of MEWR, ALRI, relevant RBOs, the MoA the Committee for Environmental Protection, the Ministry of Finance, and the State Investments and State Property Committee. For the project implementation, the PSC will be upgraded to be chaired by the Deputy Prime Minister responsible for water, agriculture, and land use issues, to ensure cross-sectoral oversight, coordination, and guidance to the project. The committee will act as a forum for (a) reviewing annual work plans prepared by the PIUs; (b) providing relevant technical inputs, especially those at a strategic and policy level; (c) reviewing progress against performance indicators; and (d) ensuring there is a continued policy dialogue among the involved entities.



5. A MEWR PIU will be established by internal decree of the ministry, headed by the Minister or First Deputy Minister responsible for water, with specialists from relevant MEWR departments (Main Department of Energy and Water Policy, Department for Investments, Department of Water Resources, TajikNigim, WIS Unit). These specialists will provide technical inputs and supervise consulting services for (a) irrigation energy audit (included in Subcomponent 1.2), (b) Vakhsh river basin plan, (c) WIS and IMIS upgrades, and (d) design and delivery of water sector training program. The PIU will include consultants (project coordinator, FM specialist, procurement specialist, communication specialist, and technical support staff) financed under Component 3 and hired according to World Bank procurement guidelines for the duration justified by a business need. These specialists will handle (a) FM and procurement, (b) contract management and supervision, (c) implementation of the communication and visibility plan and gender action plan, (d) management of environment and social issues, and (e) M&E. Operating costs associated with supervision and implementation will be financed under Component 3. The PIU will manage the Designated Account in a financial institution acceptable to the Association.

6. The PMU will have primary responsibility for technical inputs, coordination, and supervision of Subcomponent 1.2 and Component 2. The state entity 'Ferghana Valley Water Resources Management Project Management Unit' was established in 2005 by the Government Decree No. 493 dated December 27, 2005, for implementation of the World Bank-financed FVWRMP. The PMU is a substructure of ALRI, and the PMU Director is appointed by the Government of the Republic of Tajikistan. No changes to the PMU charter were introduced after closure of FVWRMP, or after restructuring of the Ministry of Land Reclamation and Water Resources, but it should be revised to reflect the institutional changes introduced in 2014.

7. The PMU will handle procurement, FM, contract management, ensuring compliance with the environmental and social principles, construction supervision, and M&E. It will manage consultations with communities, ALRI subordinate organizations, and WUAs in the project area, for prioritization of civil works, development of detailed engineering designs for prioritized project sites, construction supervision, contracting of civil works, and reporting on construction. The PMU will establish satellite offices in scheme-level ALRI offices in the Lower Vakhsh basin, Upper Vakhsh basin, and Zarafshon basin to support target ALRI units in construction supervision, community mobilization, local government liaison, and project coordination. Representatives of the Vakhsh RBO from its Rasht suboffice will supervise civil works financed under Subcomponent 1.2 and will be part of the technical supervision team of ALRI and the PMU for endorsing detailed designs for the key intakes and modernization and automation of the intake structures. Given its extensive project management experience, the PMU will also bear responsibilities for (a) consolidation of FM reports from the PIU and PMU; (b) preparation of consolidated operating cost budget; (c) consolidation of audited financial statements for the project; (d) administration of third-party audits; (e) semiannual project progress reports, annual M&E reports consolidating all components and activities; (f) hiring and management of consultants, as needed, for the studies and assessments pertinent for these tasks; and (g) project management training.

8. The central ALRI office and its subordinate organizations in Zarafshon and Upper Kofarnihon and Vakhsh basins will be engaged in project implementation. Subcomponent 1.2 will require strong political support. ALRI commitment for intrasectoral and intersectoral coordination will be ensured through an Interagency Working Group. ALRI staff will assist in day-to-day coordination and implementation of institutional activities and liaison between the WUA Support Unit, the PMU, and consulting firms. ALRI will establish a working group headed by the responsible Deputy Director and including representatives of district authorities, district-level ALRI offices, WUAs, and other stakeholders. The working group will





facilitate activities related to transition of regional and district-level ALRI units toward efficient and customer-oriented scheme-level irrigation service providers. All activities related to the IMIS upgrade will be channeled through ALRI and an adequately resourced IMIS Unit will be established in ALRI by the third year of implementation.

9. A community-driven approach will be used for some activities. WUAs, or farmer groups where WUAs do not exist, will have responsibility for activity selection, design, and implementation. For the WUA grants, experienced national and international organizations will assist the WUA Support Unit with information campaigns, community mobilization, setup of performance targets, preparation of grant proposals, and implementation and monitoring. These organizations will help build WUA administrative and technical capacity through trainings on irrigation planning, asset management, billing, budgeting, accounting, fund raising, georeferencing, and use of Kobo toolbox for reporting. Fund flow arrangements to WUAs will be transparent with grant funds transferred from the PMU's Designated Account to beneficiary accounts in local banks. The WUA Support Unit will lead this process, while the PSC will review proposals considering reported WUA performance.

10. The POM will be prepared by the PMU with MEWR PIU input. It will be adopted following World Bank approval and PSC recommendation before effectiveness. It will describe institutional and implementation responsibilities, technical aspects of all activities, M&E processes, management of environmental and social risks, disbursements and FM, procurement processes and planning, and supervision and reporting requirements.

### **Procurement**

11. The project will comply with the World Bank Anti-Corruption Guidelines. These include without limitation, the World Bank's right to sanction and the World Bank's inspection and audit rights. This requirement will be included in the Financing Agreement. The World Bank will pay particular attention to the procurement arrangements detailed in the POM, particularly on composition of the evaluation committees that should include qualified technical experts with no conflicts of interest. Procurement training will be offered for evaluation committees. Measures to mitigate corruption risks are detailed in the PPSD.

12. The World Bank team supported preparation of the PPSD, including the Procurement Plan for the entire project duration. Its key deliverables will be (a) a summary of packages to be put to market, (b) a summary of risks and opportunities to manage, (c) contracting options, and (d) the Procurement Plan. The World Bank team will review any future updates of the PPSD and Procurement Plan.

13. In addition to routine reviews, accredited procurement specialists will join World Bank implementation support missions. Procurement supervision will be undertaken at least twice a year. Review of contracts not subject to World Bank prior review will occur annually and post-review report recommendations will be followed up.

14. Contracts for goods, works, and consultancy services will follow the procedures set out in the Public Procurement Law dated March 3, 2006 (as amended by Law #815, the Law of the Republic of Tajikistan on 'Introduction of Amendments and Additions' to the Law of the Republic of Tajikistan on 'Public Procurement of Goods, Works and Services' dated April 16, 2012)—the provisions of which are



consistent with the World Bank Procurement Regulations Section V - Para 5.4 National Procurement Procedures, subject to conditions specified in the PPSD.

### **Financial Management and Disbursements**

15. To strengthen FM capacity in the IAs, accounting software satisfactory to the World Bank should be installed (by effectiveness at the PMU and within 30 days after at MEWR) for project accounting, budgeting, and reporting. The system should have in-built controls for data security, integrity, and reliability. It should enable auto-generation of unaudited interim financial reports and statement of expenditures. In addition (a) the FM content of the POM should be developed and adopted by both IAs by effectiveness; (b) FM and disbursement specialists should be hired by each IA within 30 days after effectiveness—ToR for these specialists should be approved by the World Bank and include responsibility for all financial aspects of the project; and (c) project FM and accounting staff should be trained as soon as possible by the World Bank.

16. Adoption of a GM acceptable to the World Bank will be a disbursement condition for Category 3 of the project. It will describe the disbursement, funds flow, and internal controls over WUA Grants under Subcomponent 1.2. The WUA Grant Agreement format will be developed and attached to the GM. A separate WUA Grant Agreement will be signed for each grant. Based on WUA performance (in achieving the indicator targets), the PSC will decide annually on grants to the top performing 30 percent of WUAs. Support to this process will be channeled through the WUA Support Unit and tasked with facilitation, FM, implementation support, and monitoring of grant implementation plans in compliance with the GM. The adoption of the GM, plus adequate accounting and reporting arrangements in WUAs, will be a minimum requirement to receive funds from the PMU. This FM requirement will be documented in the GM.

17. Payments for grant expenditures will be made by the PMU using the reimbursement method of disbursement from the grant Designated Account, once the advance method is allowed (after the 'lapsed loan' situation is resolved). Dedicated local currency accounts will be opened by each WUA and will be used exclusively for grant purposes. Advances for grant funds will be made by the PMU to these dedicated accounts in tranches. The initial tranche will be based on a beneficiary request, with replenishment once the beneficiary provides supporting documents and reports acceptable to the PMU. Further details of the arrangements for the funds flow and grant reporting will be set out in the GM.

18. The audit ToR will clearly indicate that the auditor shall review a sample of 10 percent of the number of transactions of grants made by the PMU to confirm the eligibility of respective expenditure. The project will receive disbursements from the World Bank through direct payments, reimbursements, and commitments, for example, letters of credit. In application of section 5.2 of the Disbursement Guidelines for Investment Project Financing, the use of a Designated Account is not permitted due to the recipient's failure to refund undocumented advances to Designated Accounts within two months after the disbursement deadline date under three recently closed projects. The detailed disbursement arrangements will be in the DFIL. Payments for expenditures below the thresholds for direct payments stipulated in the DFIL will be made by IAs directly from ALRI and MEWR accounts, using their own funds.



### **Implementation Support Plan**

19. The World Bank will supervise project implementation, in line with World Bank procedures, standards, and requirements and in line with the appraisal stage assessments of project design and risks. Implementation support will recognize the following:

- IAs and design companies may not fully understand modernization concepts and may have limited exposure to resilient infrastructure design approaches.
- The implementation arrangements are new for water sector project and require coordination across agencies and donor-financed projects.
- IAs have limited capacity for managing international consulting contracts and ensuring quality and have limited experience in implementing performance-based management and benchmarking.
- Stakeholders understand the importance of data exchange but are hesitant to establish transparent data sharing protocols and processes.
- Design and implementation of the performance-focused grants may require additional FM and social mobilization expertise.

20. Given the above issues and other identified risks, the project will require substantial World Bank support in the early years of implementation. World Bank support will include expertise in WRM, operations, procurement, finance, and management of social and environmental risks. The World Bank team will field missions throughout project implementation with increased support during the first 18 months. In the early period, the World Bank will provide training on procurement, FM, and the ESF. A workshop will be delivered to increase participation of qualified, small and medium size contractors; consultants; and material suppliers. The workshop will explain project design, envisaged packages of civil works/consulting services/goods, World Bank procurement regulations and processes, and environmental and social risk management principles. The World Bank will support the PMU in reviewing technical designs and bidding documents for priority packages for the 2023–2024 construction season, to ensure high technical designs and outputs, finalize bidding process, and award contracts totaling at least 30 percent of the project financing. In the initial phase, the World Bank will support the contracting of consulting services for the irrigation energy audit and the irrigation strategy and development of the Vakhsh basin plan.

21. The World Bank will continue high-level sector reform dialogue, including updating national policies and strategies, improving tariff setting in coordination with other donors, to move forward water tariff and sector reforms. It will also engage support of the Water in Agriculture Global Solutions Group and the INSPIRE (International Network of Service Providers for Irrigation Excellence) team in the World Bank for defining a concept for the IMIS, developing the Monitoring KPI<sup>38</sup> Guide, and conducting a scoping study of the information currently available within the IMIS to develop ToRs for the consulting services to upgrade the existing IMIS and train implementation agencies.

22. On completion of the national database concept and design, the World Bank team will support ALRI in developing a mobile app for self-reporting and verification of the information from WUAs. The app

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<sup>38</sup> KPI = Key performance indicator.



will provide general information on the project and serve as a tool within the national GRM ecosystem that can aid users to automatically provide a GPS<sup>39</sup> location, submit photographs and information on the project incompliances, ask questions, and receive clarifications. At the same time, the app will have a module for WUAs registered with ALRI to ensure self-reporting on established KPIs. The WUA module will be developed in collaboration with the World Bank to align with the IMIS design. The WUA module will have an in-built feature for questions and answers either through a chatbot with the WUA Support Unit or through public chat.

23. The World Bank team will engage the support of the Water Knowledge and Learning teams in Washington DC to design blended and self-pace learning modules to build capacity in the water sector. These modules will be designed through a twinning arrangement with the practitioners and representatives of the research and academia institutes subordinate to the IAs. The World Bank team will advise the appropriate solutions, draft ToRs, provide technical and quality reviews of deliverables, and conduct virtual consultations on these learning modules.

24. The World Bank team will conduct a training on design of M&E framework, baseline and evaluation studies, and digital tools used in monitoring (including Kobo toolbox) as part of POM preparation. The World Bank will work with the MEWR PIU and the PMU to agree on a quarterly progress report format and M&E systems. In addition to environmental and social due diligence to ensure that the ESMP is adhered to during construction phases, the World Bank will support the client in developing construction supervision logs and construction reporting templates.

25. The World Bank will work with MEWR, ALRI, and the PMU to ensure effective coordination between implementing entities and subordinate organizations, local governments, and jamoats. This will ensure citizen engagement and strengthen supervision. The World Bank team will work with MEWR and ALRI to improve their transparency and information sharing, including development of websites and use of social media. Communications training for IAs should be delivered in the first three months of implementation. Continued high-level dialogue and national and regional stakeholder consultations will help drive change toward sector improvement and sustainability.

26. The World Bank team (table 3.1) will involve experts with the skills and profiles to support the IAs, especially through the country office. The project design emphasizes social inclusion, communication, and M&E. The emphasis on information gathering and management will complement implementation support by the World Bank team.

27. Coordination of activities with development partners will be ensured through defined geographical focus of projects on target river basins and synergies created at the national level across four pillars: Water Governance, Information and Knowledge Sharing, Capacity Building, and Infrastructure Investments.

**Table 3.1. World Bank Team Skills Mix for Project Implementation**

Skills Needed	Staff Weeks	Number of Missions	Comments
Task team leaders	30	12	Field-based staff
Irrigation engineer	20	10	Field-based staff/consultant

<sup>39</sup> Global positioning system.



<b>Skills Needed</b>	<b>Staff Weeks</b>	<b>Number of Missions</b>	<b>Comments</b>
IMIS specialist	5	2	HQ/Local consultant
GIS and remote sensing data specialist	10	0	International consultant
ICT specialist/Database specialist	4	0	HQ/Local consultant
Knowledge and learning specialist	4	0	HQ
Institutional specialist	10	6	Consultant
Environmental specialist	15	10	Field-based staff
Social specialist	15	10	Field-based staff
Communication specialist	5	2	Field-based staff
FM specialist	5	0	Field-based staff
Procurement specialist	5	0	Field-based staff

Note: HQ = Headquarters.



## ANNEX 4: Economic and Financial Analysis

COUNTRY: Tajikistan

### Tajikistan Strengthening Water and Irrigation Management Project

1. The PDO is to (i) strengthen capacity for water resources planning and irrigation management in Tajikistan and (ii) improve performance of selected irrigation schemes in the Vakhsh and Zarafshon river basins. The capital investments will enhance performance of target irrigation systems and improve management of water resources in the Vakhsh basin by creating streams of additional benefits associated with increased area under effective irrigation, reduced energy intensity of irrigation, increased value of agriculture production through double cropping, and improved crop performance.
2. The economic analysis assesses project impact at the level of target schemes by aggregating all project costs and projected benefits. The analysis includes the following three steps: (a) convert financial prices into economic values to assess the real costs and benefits from the country perspective, (b) analyze target irrigation schemes using economic values and aggregating scheme-level costs and benefits, and (c) undertake a sensitivity analysis. Economic benefits come from capital investments in irrigation and drainage infrastructure. Costs and benefits for the two large target schemes are aggregated. Financial prices are adjusted to obtain economic values from an aggregate farm model.
3. The main assumptions in the economic analysis are as follows:
  - Baseline crop composition and yields in the project areas use data for Shurabad and Vakhsh schemes for 2017–2020. Crop inputs and outputs used data from the MoA for 2017–2020.
  - The area under effective irrigation under the project scenario is estimated to be 100,000 ha. The area out of production in the without project baseline and the return to irrigation under the project scenario is estimated at 15,000 ha.
  - A fixed exchange rate of US\$1 = TJS 11.31 is used. It is assumed that price inflation for inputs will be outweighed by increases in output prices. Incremental O&M costs (excluding electricity)—to ensure adequate maintenance of project infrastructure and equipment—are assumed to be 2 percent of corresponding investment costs. Economic cost conversion factors are same as for ZIRMIP.
  - Electricity tariff for pumping stations and other electricity users under ALRI is assumed to be TJS 0.1/kWh and the post-project electricity consumption (kWh) is assumed to equal baseline electricity consumption—in other words, the expected decrease in energy intensity (kWh/m<sup>3</sup>) will be approximately offset by the increased area under irrigation. The impact of incremental changes in electricity consumption on the analysis results is considered in the sensitivity analyses.
  - It is difficult to distinguish the impact of irrigation on crop yields from the impact of external factors (including market specifics). Empirical evidence is limited and unreliable. The analysis is therefore conservative and targets a 10 percent increase in crop yields as was achieved in ZIRMIP and other prior projects.
4. The financial analysis is based on crop budgets, that is, input-output models of different crops. Project area, cropping pattern, and yields for the with and without project scenarios that drive the analysis are in table 4.1. Table 4.2 shows the year-by-year costs and benefits and the annual net incremental



benefits out to 2031. The NPV of the aggregated net benefits of the project (using a 10 percent discount rate) is close to US\$45 million or a little under US\$400 per irrigated hectare. The IRR of the annual series of incremental benefits is 26.3 percent. These summary results of the analysis are in table 4.3. The sensitivity analysis is summarized in table 4.4 and indicates that although the project benefits are sufficiently robust against adverse changes (for example, a 20 percent reduction in the area benefiting from improved irrigation reduces the IRR only to 21.4 percent), a 16.6 percent decrease in output prices is needed to switch the results.

**Table 4.1. Key Data for Project Economic Analysis**

Crops	Area (ha)				Cropping Pattern (%)		Yield (kg/ha)	
	Without		With		Without <sup>b</sup>	With <sup>c</sup>	Without <sup>d</sup>	With <sup>e</sup>
	Cropped	Out of production	Cropped <sup>b</sup>	Out of production				
Wheat	2,251		2,376		2.25	2.07	3,143	3,457
Cotton	53,567		56,543		53.57	49.17	20,125	22,138
Fodder	34,182		36,081		34.18	31.37	29,133	32,046
Double crop <sup>a</sup>	10,000		20,000		10.00	17.39	32,275	35,503
Subtotal	100,000	15,000	115,000		100.00	100.00		
Total irrigation area	100,000		115,000					

Note: a. Double cropping assumed for wheat mixed with fodder crops. Baseline area under double cropping 10,000 ha, final area 20,000 ha.

b. Baseline cropping pattern based on weighted average of 2017–2020 of irrigated area for Shurabad and Vakhsh.

c. For existing irrigated area, crop composition for with project is same as for baseline. Additional irrigated area is 10,000 ha double cropping and remaining area pro rata to baseline.

d. Baseline crop yield based on weighted average 2017–20 for Khatlon.

e. Increase in crop yield under the with project scenario of 10 percent assumed.

**Table 4.2. Project Economic Viability in Terms of Net Incremental Benefits (US\$)**

Year	Project Costs	Annual Incremental O&M Costs excluding Electricity	Fraction of Full Benefits (%)	Annual Incremental Benefits	Net Incremental Benefits
2023	3,525,000	—	0	—	3,607,500
2024	6,266,666	72,150	0	—	6,485,483
2025	15,666,667	200,417	0	—	16,233,750
2026	15,666,667	521,083	10	3,651,990	12,902,426
2027	5,875,000	841,750	20	7,303,981	449,731
2028	—	962,000	30	10,955,971	9,993,971
2029	—	962,000	40	14,607,962	13,645,962
2030	—	962,000	50	18,259,952	17,297,952
2031	—	962,000	60	21,911,943	20,949,943
2032	—	962,000	70	25,563,933	24,601,933
2028	—	962,000	80	29,215,924	28,253,924
2029	—	962,000	90	32,867,914	31,905,914
2030	—	962,000	100	36,519,905	35,557,905
2031	—	962,000	100	36,519,905	35,557,905



**Table 4.3. Summary Results of the Economic Analysis**

Economic NPV net incremental benefits (US\$)	44,951,308
Economic NPV net incremental areal benefit over irrigated area (US\$/ha)	391
Economic IRR (%)	26.3
Benefit to cost ratio	2.5

**Table 4.4. Sensitivity Analysis (%)**

<b>Variable</b>	<b>Change</b>	<b>IRR</b>	<b>Switching Value</b>
Area benefiting from improved cropping decreases from 100% to 80%	-20	21.4	-55
Crop yield increase projections decline	-20	21.4	-55
Crop output prices decline with and without project	-20	5.1	-16
Crop input prices increase with and without project	+20	13.4	23
Project costs increase	+20	22.2	120
Benefits decrease	-20	21.4	-55
O&M costs increase	+20	26.0	1,050
Energy consumption increase	+20	26.1	1,450





**ANNEX 5: Team List**

**COUNTRY: Tajikistan**

**Tajikistan Strengthening Water and Irrigation Management Project**

**Table 5.1. Task Team List**

<b>Bank Staff</b>	<b>Position/Role</b>	<b>Specialization</b>
Farzona Mukhitdinova	Team Leader (ADM Responsible)	WRM Specialist
William Young	Team Leader	Lead WRM Specialist
Verena Schaidreiter	Team Member	Water Supply and Sanitation Specialist
Dilshod Karimova	Procurement Specialist (ADM Responsible)	Procurement Specialist
Niso Bazidova	FM Specialist (ADM Responsible)	FM Specialist
Gulru Azamova	Social Specialist (ADM Responsible)	Social Specialist
John Bryant Collier	Environmental Specialist (ADM Responsible)	Environmental Specialist
German Kust	Environmental Safeguards Consultant	Environmental Specialist
Nodira Pirmanova	Team Member	Program Assistant
Sylvie Ngo-Bodog	Team Member	Program Assistant
<b>Extended Team</b>	<b>Role</b>	
Michael Sandoz	Engineering Consultant	Independent Consultant
Stefanie Herrmann	Remote Sensing and GIS Expert	Independent Consultant
Maher Salman	Senior Land and Water Officer	Food and Agriculture Organization

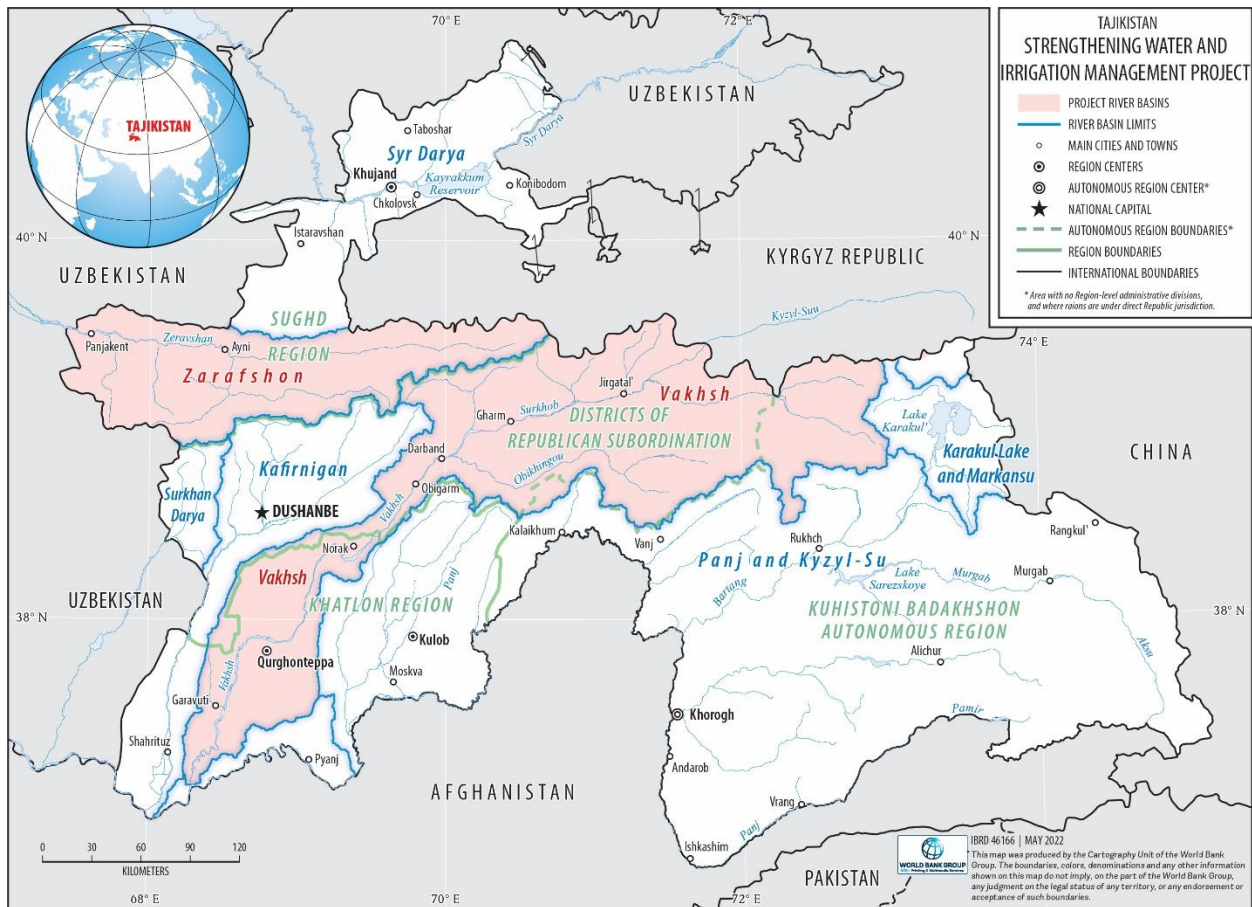


ANNEX 6: Project Map

COUNTRY: Tajikistan

Tajikistan Strengthening Water and Irrigation Management Project

Figure 6.1. Project River Basins





**ANNEX 7: European Union Rural Development Programme II**

**COUNTRY: Tajikistan**

**Tajikistan Strengthening Water and Irrigation Management Project**

1. EU financing for the project is allocated under the second phase of the Rural Development Programme (2019–2027). The EU budget contribution to RDP-II is estimated at EUR 59 million, with parallel co-financing expected from grantees and GIZ. The indicative implementation period of the program is 96 months from the date of Financing Agreement signed between the EU and the Government of Tajikistan (August 14). The program is structured along three broad components aiming at improving rural livelihoods.

- Component 1 - to boost added value of agricultural production. This will develop a performant (productivity gains) and sustainable (environment-friendly) agriculture through increased investment and innovation in the value chains.
- Component 2 - to improve management of natural resources. This will support rural livelihood by contributing to the reduction of food and nutrition insecurity of rural populations relying on fragile ecosystems. Both Components 2 and 3 will promote climate-resilient production models.
- Component 3 - to promote sustainable and efficient use of water. This will contribute to mitigate rarefaction of water resources whose regular supply is essential for agriculture and sanitation. This will be done by improving management of water (better techniques and governance) and reduction of losses (rehabilitated infrastructure).

2. Activities under Component 3, and partially Component 2, are proposed for implementation through the World Bank-administered Trust Fund. Indicative budget and implementation modalities for activities under RDP-II are demonstrated in table 7.1.

**Table 7.1. EU RDP-II Financing**

<b>Components</b>	<b>EU Contribution (EUR, millions)</b>	<b>Indicative Third-Party Contribution</b>
1. Indirect management with a member state (GIZ)	20.5	BMZ - EUR 9 million parallel financing to TRIGGER
2. Grants under direct EU management	20.0	Grantee’s co-financing of 10% - EUR 2 million
3. Indirect management with the World Bank	17.5	~US\$30 million
Evaluation and audit	0.5	
Communication and visibility	0.5	
<b>Total</b>	<b>59.0</b>	