



# Report and Recommendation of the President to the Board of Directors

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Project Number: 45207-006  
September 2021

## Proposed Loan for Additional Financing People's Republic of Bangladesh: Irrigation Management Improvement Project

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Asian Development Bank

## **CURRENCY EQUIVALENTS**

(as of 20 August 2021)

Currency unit	–	taka (Tk)
Tk1.00	=	\$0.01176
\$1.00	=	Tk85.0607
SDR	=	\$1.4176

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
BWDB	–	Bangladesh Water Development Board
C-IMO	–	construction-phase irrigation management operator
COVID-19	–	coronavirus disease
EIRR	–	economic internal rate of return
ha	–	hectare
ISF	–	irrigation service fee
M-IMO	–	management-phase irrigation management operator
MOM	–	management, operation, and maintenance
O&M	–	operation and maintenance
PAM	–	project administration manual
PPP	–	public–private partnership
SDR	–	special drawing right

## **NOTES**

- (i) The fiscal year (FY) of the Government of Bangladesh and its agencies ends on 30 June. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2022 ends on 30 June 2022.
- (ii) In this report, “\$” refers to United States dollars.

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## PROJECT AT A GLANCE

1. Basic Data		Project Number: 45207-006	
Project Name	Irrigation Management Improvement Project - Additional Financing	Department/Division	SARD/SAER
Country	Bangladesh	Executing Agency	Bangladesh Water Development Board
Borrower	People's Republic of Bangladesh		
Country Economic Indicators	<a href="https://www.adb.org/Documents/LinkedDocs/?id=45207-006-CEI">https://www.adb.org/Documents/LinkedDocs/?id=45207-006-CEI</a>		
Portfolio at a Glance	<a href="https://www.adb.org/Documents/LinkedDocs/?id=45207-006-PortAtaGlance">https://www.adb.org/Documents/LinkedDocs/?id=45207-006-PortAtaGlance</a>		
2. Sector	Subsector(s)	ADB Financing (\$ million)	
✓ Agriculture, natural resources and rural development	Irrigation	13.50	
		Total	13.50
3. Operational Priorities		Climate Change Information	
✓ Addressing remaining poverty and reducing inequalities		GHG reductions (tons per annum)	2,014.000
✓ Accelerating progress in gender equality		Climate Change impact on the Project	Medium
✓ Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability		ADB Financing	
✓ Promoting rural development and food security		Adaptation (\$ million)	4.00
✓ Strengthening governance and institutional capacity		Mitigation (\$ million)	2.40
		Cofinancing	
		Adaptation (\$ million)	0.00
		Mitigation (\$ million)	0.00
Sustainable Development Goals		Gender Equity and Mainstreaming	
SDG 6.4		Effective gender mainstreaming (EGM)	✓
SDG 13.a		Poverty Targeting	
		General Intervention on Poverty	✓
4. Risk Categorization:	Low		
5. Safeguard Categorization	Environment: C Involuntary Resettlement: C Indigenous Peoples: C		
6. Financing			
Modality and Sources		Amount (\$ million)	
ADB		13.50	
Sovereign Project (Concessional Loan): Ordinary capital resources		13.50	
Cofinancing		0.00	
None		0.00	
Counterpart		1.13	
Government		1.13	
Total		14.63	
Currency of ADB Financing: US Dollar			

## I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the People's Republic of Bangladesh for the additional financing of the Irrigation Management Improvement Project.

2. The proposed additional financing will cover cost overruns of the ongoing project.<sup>1</sup> The ongoing project is modernizing the Muhuri Irrigation Project in Feni district in Chattogram division and strengthening the capacity of Bangladesh to improve national practices on sustainable management, operation, and maintenance (MOM) of its large-scale irrigation schemes. The project is critical from a climate change adaptation perspective as it significantly increases flood risk protection for productive land and assures irrigation water supply during lean periods. While introducing innovative infrastructure modernization, it also aims to foster private sector participation in water sector by transferring MOM responsibilities from government departments to private operators.

## II. THE PROJECT

### A. Rationale

3. The primary sources of water in Bangladesh are local rainfall and transboundary inflows, derived mainly from the Brahmaputra, Ganges, and Meghna rivers. Bangladesh occupies only 8% of the total catchment area of these rivers and is located at their downstream end. The result is an abundant excess of surface water during the summer monsoon months and water shortfalls during the winter dry months. Despite being scarce, water is not well-managed. Minimal attention is given to water use efficiency and equitable allocation. Many farmers rely on groundwater to supplement the limited and irregular surface water supplies. However, in many areas, the use of groundwater is significantly constrained by arsenic contamination and aquifer limitations. Consequently, the minimum flows required to meet total dry season demands are less than what is available from surface and groundwater. The performance of irrigation schemes will be further aggravated by the impact of climate change for which changes in temperature and rainfall patterns will modify crop irrigation requirements and river hydrologic regimes.

4. Although agriculture's share of gross domestic product has declined, it is still the primary economic sector in rural areas and provides more than 60% of rural employment in Bangladesh. Women constitute 50% of the labor force in the agriculture sector but, because of the informal nature of work and cultural barriers, paid employment opportunities in the sector are still low for women. Irrigated agriculture productivity remains low, which is the result of unreliable irrigation supply; inadequate agriculture extension services; and poor access to farm inputs, markets, and agricultural credit services. The lack of efficient and sustainable MOM continues to impact the productivity of large irrigation schemes.<sup>2</sup> Other factors include inadequate government financing for maintenance, lack of beneficiary empowerment and engagement in MOM, and limited capacity of public agencies resulting in weak service delivery.

5. The Asian Development Bank (ADB) approved the ongoing project on 30 June 2014 to increase the productivity and sustainability of the Muhuri Irrigation Project. The ongoing project

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<sup>1</sup> Asian Development Bank (ADB). 2014. [\*Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for the Irrigation Management Improvement Project\*](#). Manila. ADB provided project preparatory technical assistance for preparing the Irrigation Management Improvement Investment Program (TA 8154-BAN).

<sup>2</sup> Large irrigation schemes have command areas of 2,000 hectares (ha) or more.

supports the government efforts to address the recurrent lack of MOM and increase water productivity.<sup>3</sup> It aims to achieve these objectives by transferring the MOM of the Muhuri Irrigation Project to private operators and introducing innovative infrastructure modernization, such as replacing diesel motor pumps with electric pumps, developing highly efficient buried-pipe tertiary distribution systems, and installing prepaid card meter systems.<sup>4</sup> It also finances the feasibility studies and detailed designs for modernizing the Ganges–Kobadak Irrigation Project in Khulna division and the Teesta Barrage Irrigation Project in Rangpur division. In all cases, the ongoing project improves Bangladesh’s resilience to climate change by demonstrating improved flood protection, reservoir management, and water use efficiency within irrigation schemes. The approved loan totaled SDR29.6 million, equivalent to \$46.0 million at the time of approval. The revised loan closing date of the ongoing project is 30 June 2022.<sup>5</sup>

**6. Performance of the ongoing project.** The ongoing project is performing well. It is rated *on track* and, as of 30 June 2021, had achieved \$38.67 million in contract awards against a target of \$39.98 million (97%) and \$32.17 million in disbursements against a target of \$29.76 million (108%). The ongoing project is also on track to achieving the project outputs and outcome. Compliance with safeguard policy requirements for the ongoing project is proceeding satisfactorily. However, a social safeguards compliance issue was identified because of the failure to negotiate a settlement resulting in land being acquired in 2020. The Bangladesh Water Development Board (BWDB) undertook necessary due diligence and prepared a resettlement plan that was accepted by ADB and has been implemented. All risks detailed in the risk assessment and risk management plan are being managed successfully.<sup>6</sup>

- (i) **Output 1: Irrigation management and agriculture support services improved.**  
In terms of physical achievements, output 1 activities are underway. The construction-phase irrigation management operator (C-IMO) for the Muhuri Irrigation Project was recruited under a performance-based management contract. The C-IMO has completed the designs and bid documents for the Muhuri Irrigation Project works and is now supervising construction activities. The C-IMO has also established sustainable MOM practices for the completed modernized sections of the Muhuri Irrigation Project, and is providing agriculture support to beneficiary farmers. The project completed 35 training sessions on more productive irrigated agriculture that benefited 1,391 farmers, including 286 female farmers. Recruitment of the long-term post-project management-phase irrigation management operator (M-IMO) will begin after the C-IMO’s performance assessment has been completed. The BWDB is targeting mobilizing the M-IMO by the end of 2022.
- (ii) **Output 2: Irrigation system infrastructure rehabilitated and modernized.**  
Activities to modernize irrigation infrastructure have experienced some delays because of the coronavirus disease (COVID-19) pandemic, and will be completed by June 2023. About 17 kilometers of coastal embankments have been repaired or resectioned and 373 kilometers of canal drains re-excavated. The modernization of the tertiary-level water distribution system is ongoing. Out of the 850 low-lift electrical pump schemes with prepaid card meters planned in the

<sup>3</sup> Water productivity is defined as crop yield or dollars per cubic meter of water consumed or, more popularly, “crop per drop.”

<sup>4</sup> Modernization is the process of upgrading infrastructure, operation, and management of irrigation systems to sustain the water delivery service requirements of farmers, and optimize production and water productivity.

<sup>5</sup> The original closing date of the ongoing project is 31 December 2021. A 1.5-year extension was approved on 2 November 2018.

<sup>6</sup> Summary of Project Performance (accessible from the list of linked documents in Appendix 2).

project, 81 schemes have been commissioned. Works are ongoing in about 590 schemes which are expected to be commissioned by June 2022, and the remaining schemes by June 2023. The project generated construction jobs for men and women as unskilled workers. Female labor-days account for 3% of total labor-days so far. To date, no women have been recruited as pump operators or water unit vendors of the schemes.

- (iii) **Output 3: Project efficiently managed with effective institutional development.**<sup>7</sup> Project management and institutional development activities are ongoing. The institutional support to the BWDB and water management organizations to successfully administer and support public–private partnership (PPP) contracts will be completed by the end of 2022 when the M-IMO is contracted. A project performance monitoring system, including a sex-disaggregated database and management information system, has been developed and is currently being used by the project management unit and its implementing units.

7. **Reason for additional financing.** The additional financing will finance cost overruns experienced across outputs 1 and 2 of the ongoing project that have been caused by the following:

- (i) **Higher bid price than cost estimate at project preparation.** The bid prices of the tertiary system modernization works packages under output 2 were about \$6.8 million (40%) higher than the engineer's estimate. The reasons were (a) the limited competition within the project area and complexity of the works, and (b) the long delays in tendering and awarding these works contracts. The procurement time for these packages was on average 300 days, with a maximum of 530 days. The delays were compounded by high inflation rates, varying between 5.5% and 7.5% per annum, which led the government to revise its official schedule of rates for civil works with forecast annual increases of 8.0%–12.0%, which is higher than the 7.5%–8.5% estimated at project approval.
- (ii) **Increase in contract quantities.** The quantities and cost for the electrification works associated with the low-lift pumps have increased to include an 11/33 kilovolt secondary substation. As agreed during project preparation, this substation was to be installed and financed by the Rural Electrification Board. However, because of lack of funds, the board has not been able to fulfill its commitment. In addition, after completion of the topographic survey and detailed reconnaissance, it was realized that the modernization of the Muhuri Irrigation Project command area could be extended. Modernization of the tertiary system has increased to 18,000 hectares (ha) from the 17,000 ha estimated during project preparation. These increases in contract quantities resulted in an overall cost increase of \$3.8 million.
- (iii) **Additional provisions.** The additional financing will also provide about \$5.3 million to cover price adjustments on civil works contracts and the extension of the C-IMO contract by 2.5 years up to the extended loan completion date.
- (iv) **Special drawing right depreciation against the dollar.** The special drawing right has depreciated significantly against the dollar. When the ongoing loan was approved, the loan amount of SDR29.55 million was equivalent to \$46.00 million, but as of 6 April 2021 it was only equivalent to \$41.53 million.

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<sup>7</sup> Output 3 of the ongoing loan's original design and monitoring framework has been reclassified as "project management activities," in line with ADB. 2020. [Guidelines for Preparing and Using a Design and Monitoring Framework: Sovereign Operations and Technical Assistance](#). Manila.



8. **Eligibility criteria for additional financing.** The additional financing meets the eligibility criteria for additional financing because the overall project (i) remains technically feasible and economically viable with an updated economic internal rate of return (EIRR) of 15.4%; (ii) agricultural growth is accorded high priority in the government's Eighth Five-Year Plan (FY2020–FY2025);<sup>8</sup> (iii) is consistent with the project's development objectives; and (iv) is consistent with ADB's country partnership strategy for Bangladesh, 2021–2025, which prioritizes acceleration of rural transformation and modernization of agriculture by creating conditions for (i) integrated and strategic water resource management, (ii) increased productivity of agriculture, (iii) sustainable O&M, (iv) private sector participation, and (v) climate- and disaster-resilient infrastructure and services.<sup>9</sup>

9. **Suitability of using additional financing.** Additional financing is the most appropriate modality to fund the cost overruns to complete the project in the most efficient way. The overall project will be completed within the ongoing project's extended completion date. The ongoing project's implementing arrangements will be maintained to ensure a high degree of readiness for the additional financing.

10. **Relevance to post-pandemic recovery.** The COVID-19 pandemic has had a severe and persistent impact on Bangladesh's population and economy. The project will provide much-needed support for the long-term growth prospects of the economy, particularly in providing employment and income opportunities in rural communities. Infrastructure spending on irrigation systems modernization will increase farmers' incomes and provide job opportunities for the most vulnerable. Improved irrigation services will help farmers increase crop production, contributing to enhanced food and nutritional security, which are important for post-COVID-19 pandemic recovery.

## B. Project Description

11. The overall project's impact and outcome remain unchanged. The project is aligned with the following impact: high growth of agriculture in Bangladesh sustained.<sup>10</sup> The overall project will have the following outcome: productivity and sustainability of the Muhuri Irrigation Project increased. However, the following outcome and output indicators were adjusted: (i) command area increased from 17,000 ha to 18,000 ha, and the number of low-lift electrical pumps installation increased accordingly; (ii) scope of embankment and canal rehabilitation was reduced based on actual need; and (iii) gender targets were reduced to reflect the realities in the project area.<sup>11</sup>

12. The project is aligned with ADB Strategy 2030 operational priorities on (i) addressing remaining poverty and reducing inequalities, by improving irrigation infrastructure to benefit smallholder farmers; (ii) accelerating progress in gender equality, through the involvement of women as part of the construction and MOM workforce; (iii) tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability, by switching to more efficient electric pumps from diesel pumps; (iv) promoting rural development and food security, through modernizing the irrigation systems on 18,000 ha of farmlands; and (v) strengthening governance and institutional capacity, by promoting a PPP model for the sustainable MOM of

<sup>8</sup> Government of Bangladesh. 2020. *Eighth Five-Year Plan (July 2020–June 2025): Promoting Prosperity and Fostering Inclusiveness*. Dhaka.

<sup>9</sup> ADB. 2021. *Country Partnership Strategy: Bangladesh, 2021–2025—Sustain Growth, Build Resilience, and Foster Inclusion*. Manila.

<sup>10</sup> The impact statement of the ongoing project remains aligned with the government's Eighth Five-Year Plan (footnote 8).

<sup>11</sup> The revised design and monitoring framework is in Appendix 1.

large irrigation schemes.<sup>12</sup> The additional financing is included in ADB's country operations business plan for Bangladesh, 2021–2023.<sup>13</sup>

### C. Value Added by ADB

13. In 2009, ADB provided technical assistance to the BWDB to examine alternative approaches to service delivery agreements and management arrangements, and it recommended the use of PPPs for sustainable MOM in large irrigation schemes.<sup>14</sup> The project preparatory technical assistance proposed a conceptual framework for engaging a third-party operator to address the shortcomings in MOM in the Muhuri Irrigation Project.

14. During preparation of the ongoing project, ADB supported the BWDB and the water users' associations in building a consensus on a suitable PPP model for the Muhuri Irrigation Project and appropriate MOM financing modalities, including irrigation service delivery tariff structures and approval principles. ADB assessed the social and economic feasibility of the approach and confirmed farmers' willingness to pay for improved irrigation service delivery. ADB also supported the BWDB in developing a performance-based management contract and recruiting a private firm as the C-IMO. Before the end of the project implementation period, ADB will support the BWDB with an assessment of the C-IMO's performance and recruitment of the longer-term M-IMO.

15. ADB's value addition also includes assuring replication and upscaling of the ongoing project by financing the preparation of modernization strategies for the Ganges–Kobadak Irrigation Project and the Teesta Barrage Irrigation Project, including preparing their feasibility studies and detailed designs. These two major irrigation schemes have a combined command area of 875,000 ha and the modernization strategies include (i) guaranteed and equitable irrigation supply to all parts of the scheme throughout the year; (ii) environmentally sound and sustainable use of water; (iii) establishment of a strong and effective irrigation management organization with private sector participation; (iv) support for new technologies (supervisory control and data acquisition, canal automation, and smart meters) and initiatives to reduce costs and increase agricultural returns including addressing issues of inequity, poverty, and gender issues; and (v) establishment of effective and sustainable systems of cost recovery to meet operation and maintenance (O&M) costs.

### D. Summary Cost Estimates and Financing Plan

16. The overall project is estimated to cost \$68.13 million, with \$14.63 million provided through this additional financing (Table 1). Detailed cost estimates by expenditure category and by financier are included in the updated project administration manual (PAM).<sup>15</sup>

<sup>12</sup> ADB. 2018. [Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific](#). Manila.

<sup>13</sup> ADB. 2020. [Country Operations Business Plan: Bangladesh, 2021–2023](#). Manila.

<sup>14</sup> ADB. 2009. [Technical Assistance to the People's Republic of Bangladesh for Developing Innovative Approaches to Management of Major Irrigation Systems](#). Manila (TA 7260-BAN).

<sup>15</sup> Updated Project Administration Manual (accessible from the list of linked documents in Appendix 2).

**Table 1: Summary Cost Estimates**  
(\$ million)

Item	Current Amount <sup>a</sup>	Additional Financing <sup>b</sup>	Total
<b>A. Base Cost<sup>c</sup></b>			
1. Irrigation management and agriculture support services improved	7.12	0.76	7.88
2. Irrigation system infrastructure rehabilitated and modernized	35.14	11.71	46.85
3. Project management	8.53	0.00	8.53
<b>Subtotal (A)</b>	<b>50.79</b>	<b>12.46</b>	<b>63.25</b>
<b>B. Contingencies<sup>d</sup></b>	<b>1.10</b>	<b>1.94</b>	<b>3.04</b>
<b>C. Interest Charges During Implementation</b>	<b>1.61</b>	<b>0.23</b>	<b>1.84</b>
<b>Total (A+B+C)</b>	<b>53.50</b>	<b>14.63</b>	<b>68.13</b>

Note: Numbers may not sum precisely because of rounding.

<sup>a</sup> As of 6 April 2021. Original project cost was estimated at \$58.0 million at approval. The Asian Development Bank loan value was reduced because of depreciation of the special drawing right against the dollar.

<sup>b</sup> Includes taxes estimated at \$1.13 million, which the borrower will reimburse to the Bangladesh Water Development Board.

<sup>c</sup> In April 2021 prices.

<sup>d</sup> Physical contingencies of 5% on civil works. Price contingencies computed on all costs except international and national consultants, based on an annual cost escalation factor of 5.8% for 2021–2024 for local currency costs and 1.6% for 2021, 1.7% for 2022–2023, and 1.8% for 2024 on annual foreign exchange costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

Source: Asian Development Bank estimates.

17. The government has requested a concessional loan of \$13.50 million from ADB's ordinary capital resources to help finance the project.<sup>16</sup> The loan will have a 25-year term, including a grace period of 5 years, an interest rate of 2.0% per year during the grace period and thereafter, and such other terms and conditions set forth in the draft loan and project agreements. The government will ensure that the counterpart funds for the project are provided in a timely manner and has assured that it will cover any shortfall in the finance required to meet the agreed outputs. The summary financing plan is in Table 2. ADB will finance the civil works and consulting services expenditures.

**Table 2: Summary Financing Plan**

Source	Ongoing Loan <sup>a</sup>		Additional Financing		Total	
	Amount (\$ million)	Share of Total (%)	Amount (\$ million)	Share of Total (%)	Amount (\$ million)	Share of Total (%)
Asian Development Bank	41.50	77.6	13.50	92.3	55.00	80.7
Beneficiaries <sup>b</sup>	4.40	8.2	0.00	0.0	4.40	6.5
Government <sup>c</sup>	7.60	14.2	1.13	7.7	8.73	12.8
<b>Total</b>	<b>53.50</b>	<b>100.0</b>	<b>14.63</b>	<b>100.0</b>	<b>68.13</b>	<b>100.0</b>

<sup>a</sup> The original project cost was estimated at \$58.0 million during loan approval. As of 6 April 2021, the Asian Development Bank loan, denominated in special drawing rights, was reduced from \$46.0 million to about \$41.5 million because of the depreciation of the special drawing right against the dollar.

<sup>b</sup> Contribution to irrigation operation and maintenance costs of each project funded by water charges levied on farmers. Irrigation management operator costs for initial 5 years paid by the Asian Development Bank share.

<sup>c</sup> Includes financing by the Bangladesh Water Development Board of project level 1 (primary irrigation) infrastructure, and project management.

Source: Asian Development Bank estimates.

18. For the additional financing, climate adaptation is estimated to cost \$4.0 million. ADB will finance 100% of the adaptation costs. The climate change risk is assessed *medium* because of increased intensity of rainfall and associated flood discharge. Climate adaptation was

<sup>16</sup> The government has opted to borrow in dollars.

incorporated into the design by increasing the drainage capacity from a 1-in-10-year to a 1-in-25-year return period. The overall project's climate mitigation amount is estimated at \$2.4 million. The project will replace about 850 diesel water pumps with more energy efficient electric pumps. This is estimated to reduce greenhouse gas emissions by 2,014 tons annually.<sup>17</sup> The project will finance 100% of the mitigation costs.

## E. Implementation Arrangements

19. The implementation period for the overall project will be extended up to 31 December 2023 (this includes a second 1.5-year extension of the ongoing loan, for an aggregate extension period of 3.0 years).<sup>18</sup> The implementation arrangements will remain unchanged. These are summarized in Table 3 and described in detail in the updated PAM.

**Table 3: Implementation Arrangements**

Aspects	Arrangements
Implementation period	November 2021–June 2023
Estimated completion date	30 June 2023
Estimated loan closing date	31 December 2023
<b>Management</b>	
(i) Oversight body	Project steering committee Ministry of Water Resources secretary (chair) Ministry of Agriculture; Ministry of Local Government Rural Development and Cooperatives; Ministry of Environment and Forests, Economic Relations Division, Implementation Monitoring and Evaluation Division; Planning Commission; Bangladesh Water Development Board; Department of Agriculture Extension; Ministry of Fisheries and Livestock; and a representative of ADB
(ii) Executing agency	Bangladesh Water Development Board
(iii) Key implementing agencies	Project management unit in Dhaka
(iv) Implementation unit	Project implementation unit in the Muhuri Irrigation Project
Procurement	None for the additional financing
Consulting services	None for the additional financing
Retroactive financing and/or advance contracting	Not applicable
Disbursement	The loan proceeds will be disbursed following ADB's <i>Loan Disbursement Handbook</i> (2017, as amended from time to time) and detailed arrangements agreed between the government and ADB.

ADB = Asian Development Bank.

Source: ADB.

20. **Project readiness and impact of COVID-19.** Readiness of the additional financing is high as all contracts have been awarded under the ongoing project and implementation arrangements are in place. The COVID-19 pandemic has had a moderate impact on implementation performance of the ongoing project. Hence, an extension of the overall project's

<sup>17</sup> The overall project's climate mitigation financing amount was updated during the preparation of this additional financing project to reflect the mitigation benefits derived from switching to electric pumps, which was not captured in the original project loan. This is aligned with: ADB (Sustainable Development and Climate Change Department). 2016. Guidance Note on Counting Climate Finance at ADB. 13 October (internal).

<sup>18</sup> Upon the approval of the ADB Board of Directors of the proposed additional financing loan, the director general of the South Asia Department, acting under the authority set forth in ADB. 2018. Loan Closing Dates. [Project Administration Instructions](#). PAI 4.03. Manila (para. 12), approves a 1.5-year extension of the ongoing loan's closing date from 30 June 2022 to 31 December 2023.

implementation period up to 31 December 2023 (including the ongoing loan) is necessary because of the continuing risk that the COVID-19 pandemic may impact on the timely completion of remaining works.

### III. DUE DILIGENCE

21. The additional financing is to cover cost overruns within the existing project scope. Due diligence was carried out on the overall project's economic viability and the financial sustainability.

#### A. Technical

22. The ongoing project and additional financing remain technically feasible and comply with Bangladesh and international engineering standards, regulations, and conditions. Since the same climate baseline and projections are still applicable and the expected impacts are the same as for the ongoing project, the climate risk and vulnerability assessment prepared during project appraisal remains applicable.

#### B. Economic and Financial Viability

23. **Economic analysis.** With the additional financing, the project remains economically viable.<sup>19</sup> The project provides benefits by increasing the irrigated area from 11,300 ha to about 18,000 ha, increasing the crop intensity from 131% to 184%, increasing yields by up to 50% for paddy rice, and increasing cash crop production. With the additional financing included, the project's EIRR was reduced from 20.9% at project appraisal to 15.4%. The increase in investment cost is offset by changes in farm product prices and farm input prices during 2013–2020. The sensitivity analysis indicates that the EIRR will drop to below the economic viability threshold of 9% if either the project costs further increase by more than 75% or the project benefits reduce by more than 33%. The direct beneficiaries of the project are the Muhuri Irrigation Project farmers, and the benefit distribution analysis confirms that small farmers and sharecroppers will share a substantial proportion of the total project benefits.

24. **Financial analysis.**<sup>20</sup> The assets created under the project comprise the level 1 water control infrastructure (a coastal barrage), level 2 irrigation canals, and level 3 tertiary water distribution systems. The BWDB will be responsible for the O&M of the level 1 infrastructure, and a new M-IMO, which is expected to be a private organization recruited through a PPP agreement, will be responsible for the O&M of the level 2 and level 3 assets. The M-IMO will be financed from collection of irrigation service fees (ISFs) from the farmers. The farmers are already incurring high costs for diesel pumping, which the project will replace with electric pumps that are cheaper to operate. The ISFs will cover the M-IMO costs, O&M of the level 2 and level 3 assets, and electricity charges. The BWDB and Muhuri Irrigation Project water users' associations have agreed to closely monitor the M-IMO and promptly resolve any performance issues. A financial analysis was undertaken to assess the BWDB's capacity to operate and maintain all level 1 project assets and farmers' capacity to pay an ISF that will be used to maintain the level 2 and level 3 assets. The annual O&M costs of the primary irrigation assets are estimated to be Tk6.8 million. However, the BWDB's financial capacity to fund these costs will depend on the government's budgetary appropriations to the BWDB for its O&M operations. Unfortunately, the BWDB has received only an average of 12% of its annual O&M budget requests during FY2014–FY2019. Hence, there is a risk that the BWDB may not be able to sustainably fund its Muhuri Irrigation Project operations.

<sup>19</sup> Economic Analysis (accessible from the list of linked documents in Appendix 2).

<sup>20</sup> Financial Analysis (accessible from the list of linked documents in Appendix 2).

For the secondary and tertiary irrigation assets, financial modeling indicates that, during FY2024–FY2028, the total ISF collection will be about Tk274.0 million, which is substantially more than the combined O&M cost of about Tk158.6 million.

### C. Sustainability

25. The project's sustainability depends on the quality of the MOM of the Muhuri Irrigation Project system. The better the MOM, the longer the infrastructure will last and support quality irrigation services for the farmers. On the other hand, quality irrigation services are a necessary condition for farmers' willingness to pay for a service fee. Lessons from past irrigation projects in Bangladesh have demonstrated the recurrent inability of the public sector to ensure suitable MOM. Consequently, many irrigation investments have fallen into disrepair and failed to deliver the intended benefits. The ongoing project has introduced technical and institutional innovations to break this prevailing build–neglect–rebuild cycle. The project is installing innovative infrastructure to substantially increase the Muhuri Irrigation Project water use efficiency, reduce pumping costs, and facilitate irrigation tariff collection by (i) replacing diesel motor pumps with electric pumps, with positive climate change impact; (ii) developing highly efficient buried-pipe tertiary distribution systems; and (iii) installing prepaid card meters to allow transparent irrigation tariff payment and accounting. On the institutional side, the transfer of MOM to the private sector through a PPP model aims to establish performance-based management of the irrigation system and guarantee quality service delivery to farmers.

### D. Governance

26. **Financial management.** A financial management assessment has been conducted for the BWDB, in accordance with ADB's guidelines.<sup>21</sup> The assessment found that, during the ongoing project, all audited project financial statements have been unqualified and submitted to ADB in a timely manner. However, the assessed financial management risk is *substantial*, mainly because (i) the BWDB's internal audit function may not have the capacity to audit the project regularly, (ii) there is scope for improving project financial reporting, and (iii) the receipts and payments under the ADB financing are captured using manual accounting systems. These risks will be mitigated by (i) providing continuous training in ADB's financial reporting and auditing requirements, (ii) requiring more comprehensive financial information to be submitted as part of quarterly progress reports, (iii) including detailed instructions and reporting templates in the updated PAM, and (iv) adopting an accounting software system at the project management unit level to record receipts and payments under ADB financing.

27. **Procurement.** All procurement of goods, works, and consultants financed by the ADB loan have been carried out in accordance with ADB's Procurement Guidelines (2015, as amended from time to time) and Guidelines on the Use of Consultants (2013, as amended from time to time). All works and consulting services packages under the project have been awarded. Some contract amendments are under preparation and will be included in the ongoing works and consulting contracts.

28. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and the BWDB. The specific policy requirements and supplementary measures are described in the updated PAM (footnote 15).

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<sup>21</sup> ADB. 2015. [Technical Guidance Note on Financial Management Assessment](#). Manila.

## E. Poverty, Social, and Gender

29. **Poverty.** A poverty and social assessment was completed when preparing the ongoing project. It is anticipated that modernizing the irrigation scheme will reduce poverty in the project area by about 7%. The beneficiaries are marginal, small, medium-sized, and large landholders; sharecroppers; landless people; destitute women; households headed by women; minority groups; as well as the general population in the project's area of influence. The total number of beneficiaries is about 1.4 million people, more than 60% of whom live below the poverty line. The project creates direct employment opportunities for the poor during the construction of water-related infrastructure. The ongoing project summary poverty reduction and social strategy has been updated for the additional financing.<sup>22</sup>

30. **Gender.** The overall project is categorized as *effective gender mainstreaming*. The project area of greater Noakhali, including Feni district, is a culturally conservative area with strict observance of *purdah* (seclusion of women from public observation). While both the BWDB and ADB are committed to adopting aspirational gender targets at the ongoing project design stage, project implementation has faced unexpected challenges because of (i) the overt discouragement by family and community members of the active participation of women in project activities; and (ii) strict observance of *purdah*, which affected women's ability to take up the opportunities provided by the project.<sup>23</sup> These circumstances led to the revision of selected gender-related targets in the overall project's design and monitoring framework and related gender action plan.<sup>24</sup> The project commits to ensure that at least 5% of the employment generated from the project works accrue to women, 2% of employment as pump operators and 5% of employment as mobile water unit vendors is reserved for women, and there is 20% female participation in training in irrigated farming methods.

## F. Safeguards

31. The environmental and social safeguard requirements for the ongoing project are unchanged. The environmental and social safeguards plan implementation, monitoring, and reporting, and the grievance redress mechanism established for the ongoing project, will remain unchanged and are applicable to the additional financing. In compliance with ADB's Safeguard Policy Statement (2009), the project's safeguard categories are as follows.<sup>25</sup>

32. **Environment (category C).** The ongoing project will remain category B for environment. The additional financing will be category C for environment since funds will be used for covering cost overruns, which have no adverse environmental impacts.

33. **Involuntary resettlement (category C).** The ongoing project was recategorized from C to B on 13 July 2020 for involuntary resettlement, as land acquisition became necessary for one electrical substation. Also, 34 non-titled structures were temporarily relocated during construction of the embankments, so a corrective action plan was implemented, and all affected squatters have received compensation. All involuntary resettlement impacts have been mitigated by the project. The additional financing is classified C for involuntary resettlement, as no additional land acquisition is envisaged.

<sup>22</sup> Summary Poverty Reduction and Social Strategy (accessible from the list of linked documents in Appendix 2).

<sup>23</sup> The challenges faced during project implementation have been formally recorded in the aide-mémoire finalized after two project review missions, in May 2017 and January 2018.

<sup>24</sup> Gender Action Plan (accessible from the list of linked documents in Appendix 2).

<sup>25</sup> ADB. [Safeguard Categories](#).

34. **Indigenous peoples (category C).** The project will remain category C for indigenous peoples; there are no indigenous peoples living in the project site. Social safeguards measures will be achieved in line with the provisions stated in the updated PAM and no indigenous peoples plan will be required.

## **G. Summary of Risk Assessment and Risk Management Plan**

35. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the project's updated risk assessment and risk management plan.<sup>26</sup>

**Table 4: Summary of Risks and Mitigating Measures**

<b>Risks</b>	<b>Mitigation Measures</b>
The private sector shows little interest in PPP for irrigation despite government promotion.	<p>The project follows a two-stage approach. The first stage comprises the project establishing the sustainability of the scheme by using the C-IMO. The second stage comprises recruitment of the M-IMO.</p> <p>There is thorough risk analysis and allocation of the risks to the parties that can best control it.</p> <p>The government finances the viability gap.</p> <p>A communication campaign enhances private sector awareness of the project objectives and PPP approach.</p>
Financing of recurrent operation and maintenance of project assets after project completion is uncertain.	<p>BWDB will finance level 1 infrastructure. The Project Agreement includes assurance that the government will allocate BWDB adequate resources to carry out the necessary O&amp;M activities.</p> <p>A third-party M-IMO will be engaged to manage, operate, and maintain the secondary and tertiary irrigation assets.</p> <p>Farmers have expressed willingness to pay an annual ISF that exceeds the M-IMO requirements depending on provision of quality service delivery, which will be closely monitored by the BWDB and the farmers. The ISF for each year will be prepared and approved by the Implementation Coordination Committee with farmer representatives.</p>
Prolonged impact of the COVID-19 pandemic could continue to delay civil works progress and the recruitment of the M-IMO, resulting in delayed project completion.	<p>The situation in Bangladesh will be monitored and the construction work schedule updated regularly. The project will be extended, as required, to account for possible delays if the COVID-19 pandemic prevents timely completion of all activities.</p>
Cultural barriers could limit participation of women.	<p>The stakeholder communication strategy will promote women participation in the project. Women will be included in the different training programs (more productive irrigated agriculture methods, pump operators, prepaid card water unit vendors).</p> <p>Evaluation of challenges encountered during the gender action plan implementation will be conducted at project completion.</p>
Weak financial management capacity may lead to material misstatements in project financial statements and qualified audit reports.	<p>Continuous training will be provided to the PMU and its accounts staff in ADB's financial reporting and audit requirements.</p> <p>More comprehensive financial information will need to be submitted as part of quarterly progress reports.</p>

<sup>26</sup> Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).



Risks	Mitigation Measures
	<p>Detailed instructions and reporting templates will be included in the updated project administration manual.</p> <p>Accounting software will be adopted at the PMU level to capture receipts and payments under ADB financing.</p>

ADB = Asian Development Bank, BWDB = Bangladesh Water Development Board, C-IMO = construction-phase irrigation management operator, COVID-19 = coronavirus disease, ISF = irrigation service fee, M-IMO = management-phase irrigation management operator, PMU = project management unit, PPP = public-private partnership.  
Source: ADB.

#### IV. ASSURANCES

36. The government and BWDB have assured ADB that project implementation shall conform to all applicable ADB requirements, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, financial management, and disbursement as described in detail in the updated PAM and loan documents.

37. The government and BWDB have agreed with ADB on certain covenants for the project, which are set forth in the draft loan agreement and project agreement.

#### V. RECOMMENDATION

38. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of \$13,500,000 to the People's Republic of Bangladesh for the additional financing of the Irrigation Management Improvement Project, from ADB's ordinary capital resources, in concessional terms, with an interest charge at the rate of 2.0% per year during the grace period and thereafter; for a term of 25 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Masatsugu Asakawa  
President

6 September 2021

## REVISED DESIGN AND MONITORING FRAMEWORK

The revised design and monitoring framework strikes out content for deletion and underlines content to be added.<sup>a</sup>

Impact the Project is Aligned with High growth of agriculture in Bangladesh sustained ( <u>Government of Bangladesh's Eighth Five-Year Plan</u> ) <sup>b</sup>			
Results Chain	Performance Indicators	Data Sources and Reporting Mechanism	Risks and Critical Assumptions
<b>Outcome</b> Productivity and sustainability of the Muhuri Irrigation Project increased	By <del>2019</del> 2024: a. Dry-season irrigation area in the Muhuri Irrigation Project increased by <del>50% 60%</del> to <del>47,000</del> 18,000 ha (2013 baseline: 11,300 ha) ( <u>OP 5.3.1</u> )  b. O&M funding (from farmers and government) increased to 100% (2013 baseline: 84%)  c. Average yield of irrigated winter paddy ( <i>boro</i> ) increased to 4 tons/ha (2013 baseline: 3 tons/ha) ( <u>OP 5.3</u> )	a. BWDB project monitoring and evaluation reports  b. Annual statements of cost recovery by PPP operators and government records  c. BWDB annual reports for Muhuri Irrigation Project	A: Rural Electrification Board supplies power to the Muhuri Irrigation Project as per agreement (memorandum of understanding signed with BWDB).  R: Future climate change impact exceeds projections in terms of average annual temperature, precipitation and sea level rise and negatively affect the project.
<b>Outputs</b> 1. <del>Performance-based</del> Irrigation management and agriculture support services <del>established</del> <u>improved</u>	By <del>2019</del> 2023: 1a. Long-term <u>performance-based</u> lease contract signed for Muhuri Irrigation Project large-scale irrigation project (2013 baseline: Not applicable)  1b. Efficient Irrigation management in place with 100% recovery of cost of management, operation, and maintenance for levels 2 and 3 achieved. (2013 baseline: Not applicable, 63%) <sup>c</sup>  1c. 300 trained farmers (of whom 20% are women) adopted more productive irrigated agriculture methods (2013 baseline: 0) ( <u>OP 2.2, OP 5.3.2</u> ) <sup>d</sup>	1a. Signed lease agreement  1b. Annual statements of cost recovery by PPP operators and government records  1c. PPP operator records, training reports	<del>A: Government continues to promote PPP for irrigation.</del>  R: The private sector shows little interest in PPP for irrigation <u>despite government promotion.</u>
2. Irrigation system infrastructure	By <del>2019</del> 2023: 2a. Muhuri Irrigation Project rehabilitated and modernized,		

Results Chain	Performance Indicators	Data Sources and Reporting Mechanism	Risks and Critical Assumptions
rehabilitated and modernized <sup>e</sup>	<p>covering <del>17,000</del> 18,000 ha and comprising rehabilitation of one barrage and installation of <del>800</del> 850 <u>low-lift electric pump schemes</u> with prepaid meters and piped tertiary distribution <u>system</u> <del>employing at least 10% 2% women as pump operators and 30% 5% as mobile water unit vendors.</del> (2013 baseline: 0) (OP 1.3.1, OP 3.3.3, OP 5.1.1, 5.3.1)<sup>e</sup></p> <p>2b. <del>23</del> 17 km of coastal embankment repaired, <del>460</del> 373 km of canal drains re-excavated (2013 baseline: 0) (OP 1.3.1, OP 3.2.1, OP 5.1.1)</p> <p>2c. <del>At least 10% 2% of pump operators, 30% 5% of mobile water unit vendors, and 5% of construction workers employed are women and 20% poor and socially excluded.</del> (2013 baseline: 0) (OP 2.1)<sup>f</sup></p>	2a.–c. BWDB, C-IMO records, and MIS data	R: <u>Cultural barriers could limit participation of women.</u>
3. Project efficiently managed with effective institutional development <sup>9</sup>	<p>By 2015: 3a. The project MIS established with sex-disaggregated database <u>(2013 baseline: Not applicable)</u></p> <p>By 2018: 3b. PPP unit permanently established with adequate capacity. <u>(2013 baseline: Not applicable)</u></p> <p>By 2019: 3c. The project meets annual contract award and disbursement schedule. <u>(2013 baseline: Not applicable)</u></p>	<p>3a.–b. BWDB project progress reports</p> <p>3c. ADB records Financial records</p>	
<b>Key Activities with Milestones</b> <b>1. <del>Performance-based</del> Irrigation management and agriculture support services established improved</b> 1.1 Award PPP management contract for one large-scale irrigation scheme by September 2014 (completed). 1.2 Establish implementation coordination committee to support scheme management for the Muhuri subproject by October 2014 (completed). 1.3 Assess C-IMO viability ( <del>October 2017</del> April 2021) and prepare lease bidding documents ( <del>January–October 2016</del> July–October 2021). 1.4 Award long-term irrigation management lease contract for Muhuri M-IMO ( <del>April 2019</del> December 2022). 1.5 <u>Conduct farmers' training on productive irrigated agricultural methods (December 2021).</u>			

Results Chain	Performance Indicators	Data Sources and Reporting Mechanism	Risks and Critical Assumptions
<b>2. Irrigation system infrastructure rehabilitated and modernized</b> 2.1 Award contract for 30% of works including (i) <i>khal</i> (channels) excavation and embankment rehabilitation, and (ii) 2,000 ha pumps and pipe irrigation (September 2014) <u>(completed)</u> . 2.2 Undertake detail design for remaining works including (i) structures, river protection, and buildings; (ii) electrification; and (iii) remaining pumps and pipe irrigation (September 2014–September 2016) <u>(completed)</u> . 2.3 Award all civil works contracts (October 2017) <u>(completed)</u> . 2.4 Complete detail designs of Ganges–Kobadak Irrigation Project and Teesta Barrage Irrigation Project modernization (April 2016–August 2021). <b>3. <del>Project efficiently managed with effective institutional development</del><sup>g</sup></b> <del>3.1 Establish PMU (July 2014) <u>(completed)</u>.</del> <del>3.2 Award PMDC contract (July 2014) <u>(completed)</u>.</del> <del>3.3 Establish project MIS (August 2014) <u>(completed)</u>.</del> <del>3.4 Establish BWDB PPP unit (December 2014).</del>			
<b>Project management activities<sup>h</sup></b> <u>Establish PMU (July 2014) (completed).</u> <u>Award PMDC contract (July 2014) (completed).</u> <u>Establish project MIS with sex-disaggregated data (August 2014) (completed).</u> <u>Establish Appoint a permanent PPP unit officer under BWDB procurement cell (December 2014) (completed). A temporary PPP cell under PMU is established).</u> <u>Conduct review missions and midterm review (2014–2023).</u>			
<b>Inputs</b> Asian Development Bank Concessional ordinary capital resources loan: <del>\$46.0</del> \$55.0 million ( <u>\$13.50 million additional</u> ) <sup>h</sup> Government of Bangladesh: <del>\$7.6</del> \$8.7 million ( <u>\$1.1 million additional</u> ) Beneficiaries: \$4.4 million			

A = assumption, ADB = Asian Development Bank, BWDB = Bangladesh Water Development Board, C-IMO = construction-phase irrigation management operator, ha = hectare, km = kilometer, M-IMO = management-phase irrigation management operator, MIS = management information system, OP = operational priority, PMDC = project management and design consultant, PMU = project management unit, PPP = public–private partnership, R = risk.

<sup>a</sup> The design and monitoring framework has been retrofitted to align with ADB. 2020. [Guidelines for Preparing and Using a Design and Monitoring Framework: Sovereign Operations and Technical Assistance](#). Manila.

<sup>b</sup> The impact statement of the ongoing loan remains aligned with Government of Bangladesh. 2020. *Eighth Five-Year Plan (July 2020–June 2025): Promoting Prosperity and Fostering Inclusiveness*. Dhaka.

<sup>c</sup> For secondary (level 2) and tertiary (level 3) drainage and irrigation networks, efficient irrigation management (i.e., buried-piped and metered water distribution system, leading to less water consumption while increasing crop yield) will be provided by the long-term performance-based operator.

<sup>d</sup> Examples of more productive irrigated agriculture methods: system of rice intensification method, alternate wetting and drying technique, better control of fertilizer, use of hybrids, pest control, crop diversification, and use of drip irrigation.

<sup>e</sup> After completion of the topographic survey and detailed reconnaissance, it was realized that the modernization of the Muhuri Irrigation Project command area could be extended to 18,000 ha (850 schemes) instead of the 17,000 ha (800 schemes) estimated during the project preparation.

<sup>f</sup> The project area of greater Noakhali, including Feni district, is a culturally conservative area with strict religious values and practices. As such, women's active participation in the project was discouraged and often prohibited by their families and communities. The women in the area strictly observe *purdah*, which does not allow them to work outside their home, especially with men outside the family. This situation and the challenges it caused to implementation is recorded in the aide-mémoire of the May 2017 and January 2018 project review missions. To respond to this situation, some indicators related to labor and hiring were reduced in the additional financing.

<sup>g</sup> Output 3 of the ongoing loan's original design and monitoring framework has been reclassified as "project management activities" in line with ADB. 2020. [Guidelines for Preparing and Using a Design and Monitoring Framework: Sovereign Operations and Technical Assistance](#). Manila.

<sup>h</sup> As of 6 April 2021, the original ADB loan (Loan 3135-BAN), which was denominated in special drawing rights, was reduced from \$46.0 million to around \$41.5 million because of the depreciation of the special drawing right against the dollar. Combined adjusted original loan and additional financing amounts to \$55.0 million.

Source: ADB.

### **LIST OF LINKED DOCUMENTS**

<http://www.adb.org/Documents/RRPs/?id=45207-006-3>

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Agriculture, Natural Resources, and Rural Development
4. Project Administration Manual
5. Summary of Project Performance
6. Financial Analysis
7. Economic Analysis
8. Summary Poverty Reduction and Social Strategy
9. Risk Assessment and Risk Management Plan
10. Gender Action Plan
11. Contribution to Strategy 2030 Operational Priorities

### **Supplementary Documents**

12. Financial Management Assessment
13. Economic and Financial Analysis: Supplementary Tables