



**ASIAN INFRASTRUCTURE
INVESTMENT BANK**

P000163
Feb. 25, 2021

**Project Document
of the Asian Infrastructure Investment Bank**

Sovereign-backed Financing

People's Republic of Bangladesh

Mymensingh Kewatkhali Bridge Project¹

¹ Includes "Construction of Kewatkhali Bridge at Mymensingh Project".

Currency Equivalents
(As at date Feb. 4, 2021)

Currency Unit – Bangladesh Taka (BGT)
BGT1.00 = USD 0.0118
USD1.00 = BGT 84.645

Borrower's Fiscal year
July 1 – June 30

Abbreviations

AIB	Asian Infrastructure Investment Bank
BGT	Bangladesh Taka
BHMS	Bridge Health Monitoring System
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
ENPV	Economic Net Present Value
ES	Environmental and Social
ESP	Environmental and Social Policy
ESS	Environment and Social Standards
GBV	Gender Based Violence
GDP	Gross Domestic Product
GoB	Government of Bangladesh
GRM	Grievance Readdress Mechanism
M&E	Monitoring and Evaluation
MDB	Multilateral Development Bank
MRTB	Ministry of Road Transport and Bridges
NGO	Nongovernmental Organization
O&M	Operation and Maintenance
PAP	Project-Affected People
PD	Project Director
PDS	Project Delivery Strategy
PIU	Project Implementation Unit
PPSF	Project Preparation Special Fund
RP	Resettlement Plan
RHD	Road and Highways Department
SIA	Social Impact Assessment
VOC	Vehicle Operating Cost

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1. Summary Sheet

Project No.	P000163
Borrower	People's Republic of Bangladesh
Project Implementation Entity	Roads and Highways Department (RHD), Ministry of Road Transport and Bridges (MRTB)
Sector Subsector	Transport Roads
Project Objective	To reduce congestion and improve mobility and connectivity by addressing the cross-river bottleneck between Mymensingh and Shambhugonj on the Dhaka-Mymensingh-India corridor.
Project Description	The project will finance (i) construction works of bridge and approach roads with road and rail overpasses; (ii) consulting services and (iii) institutional development and project management support.
Implementation Period	Start Date: March 15, 2021 End Date: September 15, 2025
Expected Loan Closing Date	March/2026
Cost and Financing Plan	Project cost: USD366.9 million <u>Financing Plan:</u> AIIB loan: USD260.0 million Govt. of Bangladesh: USD106.9 million
Size and Terms of AIIB Loan	USD260.0 million Final maturity of 33.5 years, and average maturity of 19.24 years, including a grace period of 5 years. AIIB's standard interest rate for sovereign-backed loans.
Environmental and Social Category	Category A
Risk (Low/Medium/High)	High
Conditions of Effectiveness	(i) Establishment of a fully functional Project Implementation Unit (PIU); and (ii) Adoption of a Project Implementation Manual to guide the PIU operations.
Key Covenants	(i) Resettlement Plan shall be finalized and approved for use prior to the commencement of civil works. (ii) A sustainable funding mechanism of project maintenance shall be agreed with AIIB no later than 6 calendar months before the project bridge and approach roads are open to traffic. (iii) Furnish to AIIB, every six months, a semi-annual Environmental and Social Monitoring Report for the Project based on Supervision Consultant monitoring.
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that AIIB is in compliance with the policies applicable to the Project.
President	Jin Liqun
Vice President	Konstantin Limitovskiy, Investment Operations, Region 2
Director General,	Supee Teravaninthorn, Investment Operations Technical Department, Region 2

Manager	Gregory Liu, Technical Department, Region 2
Team Leader	Natalia Carla Sanz, Senior Operations Specialist - Transport
Team Members	Aditi Khosla, Counsel, Investment Operations Anne Ong Lopez, Young Professional Mengmeng He, Finance Associate Shonell Robinson, Financial Management Specialist Somnath Basu, Principal Social Development Specialist Xiao Zhang, Admin Assistant Yangzom Yangzom, Procurement Specialist (Operations) Zhixi Zhu, Environment Specialist (Operations)

2. Project Description

A. Project Overview

1. **Project Objective.** The objective of the proposed project is to reduce congestion and improve mobility and connectivity by addressing the cross-river bottleneck between Mymensingh and Shambhugonj on the Dhaka-Mymensingh-India corridor.
2. **Project Description.** The project will finance (i) construction works of bridge and approach roads, with road and rail overpasses; (ii) consulting services and (iii) institutional development and project management support.
3. **Expected Results.** The Project objective indicators include: (i) increased average speed for selected road user groups, namely passenger and heavy vehicles; and (ii) increased cross-river through traffic. The detail of these and other intermediate indicators can be found in the results monitoring framework in Annex 1.
4. **Expected Beneficiaries.** The project will benefit a population of over 11 million in the Mymensingh Division and some part of Dhaka Division composed of Mymensingh District (5.11 million population), Netrokona District (2.23 million population), Sherpur District (1.36 million population) and Kishoreganj District (2.91 million population). It will also provide a safer and more efficient connectivity link for passenger and freight traffic from Mymensingh-Sherpur road, Mymensingh-Phulpur-Haluaghat road, Mymensingh-Netrokona road and Mymensingh-Kishoreganj road to connect to the N3 highway to Dhaka. It is anticipated that these will result in greater integration of local markets with national markets and growth generation in the north- central region.

B. Rationale

5. **Strategic fit for AIIB.** The proposed project is aligned with the AIIB Transport Strategy as it will enable strategic traffic flow to bypass the congested city center of Mymensingh, improving mobility. Moreover, the project targets the river crossing between Mymensingh and Shambhugonj, identified as a bottleneck on the Dhaka-Mymensingh-India corridor, promoting cross border connectivity, in line with AIIB thematic priority of Connectivity and Regional Cooperation.
6. **Value addition by AIIB.** Beyond the provision of financing, AIIB's participation in the project adds value to the client by providing access to and training in a new technology for bridge maintenance, the Bridge Health Monitoring System (BHMS). Moreover, the project will help the client strengthening its capacity to address transport challenges including managing fiduciary, social and environmental risks in line with international good practice.
7. **Value addition to AIIB.** This project will finance the construction of an arch steel bridge, enhancing AIIB's knowledge on this type of engineering and on projects related to inland connectivity in a river delta area. As another stand-alone transport financing in the country, it will further position the Bank in the transport sector, as a strong and reliable partner of the GoB.

8. **Lessons learned.** Reviews of the country's experience, AIIB and other international financial institutions' involvement in the transport sector of the country have demonstrated the importance of adequate Operation and Maintenance (O&M) arrangements and sufficient funding. The Project will support RHD Bridge Management wing and Field unit to ensure adequate capacity to monitor O&M on arch steel bridges with state-of-the-art technology, as well as the knowledge exchange so RHD can benefit from the Bridge Authority experience. The operational sustainability analysis of the project is presented in Section 3.

C. Components

9. **Overview.** The project seeks to ease traffic congestion in the Mymensingh City by diverting traffic away from the city's busy central area via the construction of the Kewatkhali Bridge over the Brahmaputra River at Mymensingh with the overpasses and approach road. The proposed project consists of three components as described below.

10. **Component 1. Bridge and Approach Roads Construction works (USD307 million inclusive of GoB funded land acquisition costs of USD64 million and taxes of USD28 million).** The project will support the construction of the Kewatkhali Bridge, about 1,100 meters in length and an approach road of about six kilometers in length including road and rail overpasses. Other ancillary works to make the project bridge fully functional will include the installation of traffic management equipment and traffic surveillance, installation of state-of-the-art Bridge Health Monitoring System (BHMS) over the main bridge, street lighting and landscaping, construction of O&M facilities, and communication systems.

11. **Component 2. Consulting services (USD7.1 million).** This component will comprise the financing of the bridge and approach roads including road and rail overpasses construction supervision.

12. **Component 3. Project management support and capacity building (USD7.9 million).** Component 3 is comprised of project management costs of the project implementation unit. The project will also support the training, capacity building and institutional development of RHD for operating, managing and maintaining the RHD roads and bridges of the project division areas. This is of particular importance given this will be the first arch steel bridge in the country and RHD has no previous experience on the O&M of this type of bridge.

13. **Other costs (USD44.9 million).** In addition to the baseline cost, price contingency of USD30.7 million, commitment fee and interest during construction of USD13.55 million, and front-end fee of USD0.65 million are included.

D. Cost and Financing Plan

14. **Project Cost.** The grand total project cost is estimated to be USD383.5 million, comprising project and financing costs of USD366.9 million (of which USD260 million is covered by the AIIB sovereign-backed loan), and project preparation cost of USD16.6 million (of which USD2.1 million is AIIB's Project Preparation Special Fund Grant). The government will provide counterpart funds for a total of USD121.4 million which covers

land acquisition, taxes, a portion of the price contingency and preparation costs. The financing sources are as provided in Table 1 below.

15. The cost estimate is based on the detailed design, including the analysis of the price contingency and interest costs during the construction period.

Table 1: Project cost and financing plan

Components	Cost	Financing		Remarks
	(USD m)	(USD m)		
		AIIB loan	Government Budget	
Component 1: Construction works	307.0	215.0	92	GoB budget including land acquisition costs of USD64 M and tax of USD28 M
Component 2: Consulting services	7.1	4.6	2.5	
Component 3: Project management support and capacity building	7.9	4.7	3.2	
Subtotal	322.0	224.3	97.7	
Other costs				
Price Contingency ² (10%)	30.7	21.5	9.2	
Commitment fee and Interest during construction	13.55	13.55	0	
Front-end fee	0.65	0.65	0	
Subtotal	44.9	35.7	9.2	
Total Project	366.9	260.0	106.9	
Total Project percentage	100%	71%	29%	
Project preparation	16.6	2.1	14.5	AIIB contribution consists of a grant via Project Preparation Special Fund. Counterpart funding covers resettlement costs of USD11.5 million, consultant for RAP implementation for USD0.50 million, and utility relocation for USD2.5 million.
Grand Total	383.5	262.1	121.4	

15. **Project Preparation Special Fund (PPSF).** The AIIB Project Preparation Special Fund is currently being used to finance the hiring of consultants to prepare: (i) a full feasibility study; (ii) detailed engineering designs; (iii) Environmental and Social

² A price contingency of ten percent has been included after careful analysis of the major construction materials and labor costs.

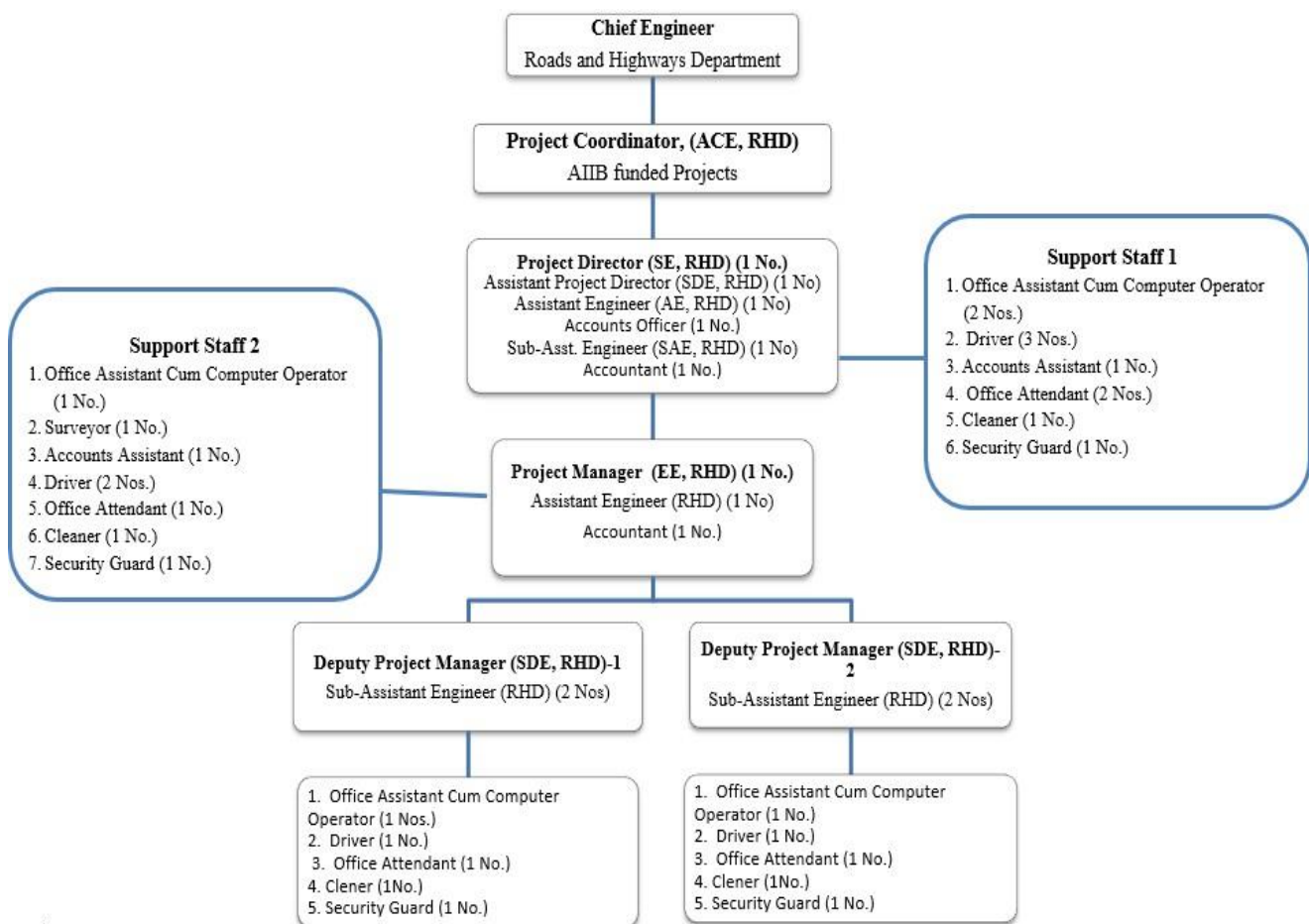
Impact Assessments (EIA and SIA) and Resettlement Plan (RP); (iv) tender documents; and (iv) training and capacity building of the PIU and RHD on O&M for arch steel bridge.

E. Implementation Arrangements

16. **Implementation period.** The project is expected to take 4.5 years, from March 2021 to September 2025 considering the process of high embankment settlement on soft ground, with 3.5 years for construction works.

17. **Implementation Management.** The RHD, within the MRTB, is the implementation entity. The RHD will establish a PIU to manage the day-to-day project implementation under the leadership and direction of the ministry (see organizational structure of PIU, Figure 1). A manual for project management will be prepared to clearly describe the functions of each branch of the PIU and the essential workflows for key project activities.

Figure 1: Project Organizational Structure



18. **Procurement.** All procurement under the project will be carried out by the PIU procurement team in accordance with the AIB Procurement Policy of January 2016 and the Interim Operational Directive on Procurement Instructions for Recipients dated June 2, 2016. The Assistant Project Director as the procurement focal point will be responsible for all procurement activities. The PIU will apply procurement methods and approach to

market defined in the Project Delivery Strategy (PDS) and procurement plan which was prepared by RHD and was agreed with the Bank. All the proposed high value procurement activities under the Project will be subject to prior review by the Bank. The PDS and procurement plan will be updated as and when required during implementation subject to the Bank's review and approval. To familiarize the PIU procurement team with the AIIB requirements, the Bank will provide an introductory session on AIIB Procurement Policy and the Interim Operational Directive on Procurement Instructions for Recipients.

19. **Financial Management.** A PIU to be established under RHD, will be charged with the financial management responsibility of the project. The project will be assigned an Accountant and Accounts Officer both from the Accounts Division of the Comptroller and Auditor General's Office, who will also be supported by staff from the Accounts Division. The Accounts Division and RHD have experience implementing AIIB financed projects, and other projects financed by Multilateral Development Banks (MDBs) such as the World Bank and ADB. As RHD does not have a functioning internal audit department, internal audits will be conducted independent auditors acceptable to AIIB. The annual project audits will be conducted by the Foreign Aided Project Audit Directorate (FAPAD), a specialized arm of the Comptroller and Auditor General of Bangladesh, that provides independent assurance on the proper use and accounting of resources for foreign-funded projects.

20. **Monitoring and Evaluation (M&E).** An M&E team in the PIU will be responsible for data collection and daily monitoring and evaluation. Through monthly and annual reports, RHD's M&E team will report the overall project progress, especially the indicators in the agreed results framework. The incremental costs for M&E will be financed through the loan under Component 3.

21. **Government M&E.** The National Integrity Strategy (NIS), which is enforced by the government to improve governance and project integrity will apply to this project. RHD will also assign the Bangladesh Road Research Laboratory (BRRL) and its Monitoring and Evaluation Circle to audit quality and progress on behalf of the ministry. Furthermore, the Implementation Monitoring and Evaluation Division (IMED) of the Planning Commission will monitor and supervise the use of project funds, as it is a large infrastructure project. Monitoring and supervision will be conducted by reviewing construction progress and evaluation of economic indicators to ensure that overall project objectives are being met. The Comptroller and the Auditor General of Bangladesh will carry out regular financial audits of the project.

22. **AIIB's Implementation Support.** Under normal circumstances, AIIB is expected to conduct supervision missions twice a year, as well as technical review visits for special implementation support as needed at different implementation stages. Given the uncertainty of the COVID-19 pandemic situation, local environmental and social consultants have been hired to conduct field visits and support RHD and the PIU. An Environmental and Social report will be required every six months to ensure proper monitoring is being conducted. Additional measures could involve strategic partnerships with local offices of other International Financing Institutions with whom AIIB is already working on other projects.

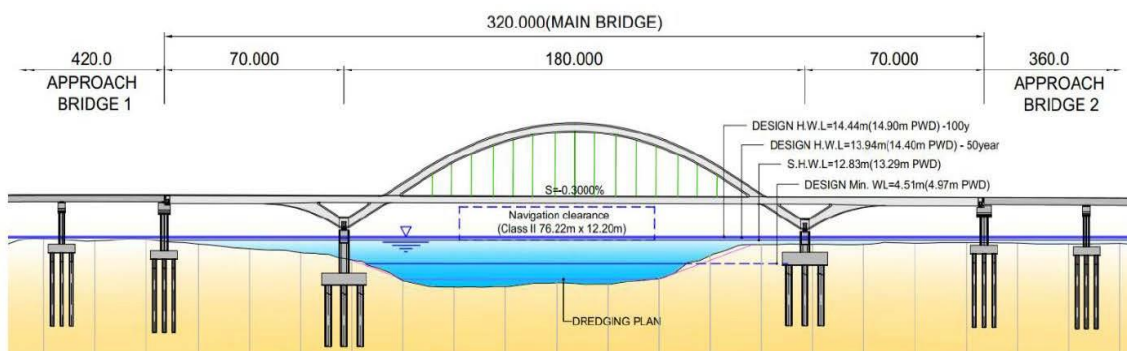
3. Project Assessment

A. Technical

23. **Project Design.** The selected project design option is the most effective solution in economic, social and environmental terms. The project supports the construction of the Kewatkhali Bridge over the Brahmaputra river at Mymensingh with a railway overpass and approach roads (including service road), with road and rail overpasses.

24. The bridge location has been selected at 90 meters downstream of the existing Kewatkhali Railway Bridge. A hydro-morphological study including a detailed mathematical model was developed and the preferred bridge location was selected among three possible bridge sites based on: (a) shortest river terrace width and therefore shortest length of bridge required, and (b) proximity to the existing transport network. The steel arch bridge has been adopted as the main bridge-type considering the various aspect of aesthetics, uniqueness, structural effectiveness, constructability, and O&M. In addition, the approach roads' viaducts have been designed properly considering all possible aspects, a detail of these characteristics can be found in Annex 2.

Figure 2. Steel Arch Bridge Profile



25. **Road Safety Audit.** A road safety audit was carried out as part of the project feasibility study and detailed design. Road safety improvements are expected to be significant with the consequent reduction in road accident costs. The physical segregation of slow-moving vehicle traffic from normal motorized traffic is anticipated to further decrease the potential for serious accidents.

26. **Operation and Maintenance.** BHMS will be used to increase the safety of the structure and provide early warnings of structural problems of the bridge. This is a state-of-the-art system that will provide alarms measured by the On-Structure Instrumentation System through the Computer System for Operation and Control when the preset criteria for traffic, wind, or structural loads are exceeded. The BHMS will be based on a common distributed data acquisition network with a fiber optic backbone. The collected data will be captured in real-time and transferred to the main server in the maintenance office.

27. **Operational sustainability.** Once construction is completed, the bridge and approach roads will be subject to toll collection. O&M will be done following RHD Local

Guidelines for operation and maintenance of roads and bridges. The loan will finance RHD technical staff training in the use of BHMS for operations and maintenance.

28. **O&M funding.** Under the current practice, the government charges tolls based on the maintenance needs, and adjusts the toll rate at regular intervals of between 3 to 5 years to offset the inflation. Assessment to the tolling mechanism at existing toll stations and the maintenance needs of the project bridge and approach road shows that with the proposed regular adjustments the toll revenue would cover the O&M costs. With a marginal toll rate increase (about 5 percent increase every five years), the operation and maintenance needs for the bridge life cycle can be covered.

B. Economic and Financial Analysis

29. **Traffic Demand.** Traffic surveys were conducted on several road segments around the location of the proposed bridge in October 2019. Results show that the average volume of all types of motorized traffic moving daily around the area is about 13,200 vehicles, three-wheelers being two-thirds of the traffic. The main traffic source for the new bridge is expected to come from diversion from the existing Shambhugonj bridge. To estimate how much traffic would be diverted, data was analyzed using 'Cube' transport model application. The model estimated that 19,998 motorized vehicles and 724 non-motorized vehicles (i.e., average daily traffic) will use the bridge when it starts operation (i.e., the opening year of the Kewatkhali Bridge). Forecasted future traffic is based on the growth of registered vehicles; a conservative linear rate of 6 percent annual growth is applied throughout the project life.

30. **Project Costs and Benefits.** A Cost-Benefit Analysis (CBA) was carried out to assess the economic viability of the project comparing "with" and "without-project" scenarios. The project costs considered in the analysis include initial construction costs and periodic and routine O&M costs. The expected economic benefits include: (i) time savings for passenger traffic that will be diverted to the proposed bridge; (ii) time savings for passenger traffic still using the existing bridge; (iii) savings on vehicle operating cost (VOC) for vehicular traffic that will be using the proposed bridge; (iv) savings on VOC for retained vehicular traffic on the existing bridge due to removal of present congestion; (v) VOC savings for vehicular traffic on the approach roads/connecting roads of the project bridge; and (vi) reduction in NOx emissions. Road accident savings, another potential economic benefit, is not included due to data limitations on the number and severity of accidents on the existing and proposed bridges.

31. **Economic Analysis.** The Economic Internal Rate of Return (EIRR) was estimated at 18.08 percent and Economic Net Present Value (ENPV) at USD174.08 million (or 1,479.67 crore Taka) based on a 12 percent discount rate. The EIRR exceeds the social discount rate and the project demonstrates strong economic viability. Sensitivity analyses of the EIRR and ENPV with respect to a ten percent increase in project costs, a ten percent reduction in project benefits, and a combination of both scenarios were carried out. The EIRR remained at or above 15.73 percent under all scenarios. Methodology and detailed results are elaborated in Annex 3.

32. **Fiscal Analysis.** RHD is a non-revenue-generating government agency and the national government will be the ultimate borrower. The project will be funded by a

sovereign backed AIIB loan. Land acquisition (estimated at USD64 million) will be financed by the government and the budget will be allocated for this purpose following Executive Committee of the National Economic Council (ECNEC) approval. According to the operational sustainability analysis, no additional GoB financing will be required during the O&M period (see para 27). Overall, Bangladesh exhibits a low risk of debt distress, with an estimated public debt-to-GDP ratio of 39.6 percent in 2020, with a favorable debt profile, and external public debt expected to remain around current levels (see Annex 5). Hence, it is not foreseen that repayment of the project loan would bring about a particular fiscal burden to the country.

C. Fiduciary and Governance

33. **Procurement.** Through its past investments, RHD (PIU) has experience with the procurement practices and methods of other MDBs, such as ADB and the World Bank, and staff responsible for procurement of civil works, goods and consultants have relevant qualifications. The Assistant Project Director responsible for all procurement activities will be supported by the RHD procurement group which will provide advisory services on all procurement matters. A Supervision Consultant firm will be hired to support the PIU with supervision and construction management of the construction works. The Bank has reviewed the PDS and procurement plan prepared by RHD and is satisfied with the proposed procurement methods and contract packaging. Adequate internal control measures for procurement exist in RHD such as the delegation of financial power for approval of contract awards, minimum of 5 years of procurement experience required for tender evaluation committee members, procurement complaints mechanism with a review panel and yearly auditing of procurement activities. Except for two small value contracts, all contracts will be procured through International Open Competitive tendering/selection and prior reviewed by the Bank. With the PIU's experience in MDB financed projects and based on the supply market analysis and risk mitigation measures in the PDS, the project procurement risk is assessed as medium.

34. **Financial Management.** A financial management capacity assessment of RHD was carried out in accordance with the requirements of Operational Policy on Financing (March 20, 2020). The assessment concluded that the proposed financial arrangements are deemed to be adequate by AIIB and should enable the provision of timely and accurate reporting on the uses of funds for the purposes intended.

35. The key risk factors identified are the absence of an internal audit function, which may impact the effectiveness of risk management and internal control. Secondly, there is need for closer monitoring of the project budget and available resources against project implementation, which otherwise could result in delayed payments for land acquisition and contracts. In addressing these risks, the internal audit function will be executed by an independent auditor; and the budget arrangements will be enhanced and reflected in the project financial management manual.

36. RHD has a systematic budgeting process, which is linked to the GoB annual budget. In the Government's estimate of revenue and expenditure, the project budget will be presented, clearly identifying AIIB's and GoB financing sources. In addition, the project budget will be submitted to AIIB each year for review and approval. The PIU will

conduct quarterly budget variances analysis to properly monitor available resources against activities to be implemented.

37. The Government's "Integrated Budgeting and Accounting System" (IBAS++) will be used to account and report on project transactions. The project chart of accounts will be designed by project components, sub-components, activities and categories, enabling the proper classification of transactions and the preparation of timely and reliable financial statements. Project transactions will be accounted and reported on in accordance with The Bangladesh Accounting Standards, which is broadly based on the cash-basis International Public Sector Accounting Standards. The PIU will be required to submit to the Bank an unaudited interim financial report as part of the project progress report, covering each calendar quarter which will become due within 45 days after the end of the reporting period. The project annual audit report will cover each fiscal year ending June 30th and will be due to the Bank six months after the end of the fiscal year.

38. The daily financial management function will be guided by a financial management procedures manual approved by the Bank. Enhancements to the internal control procedures will be reflected in the financial procedure's manual. During implementation, the AIIB team will monitor the execution and functioning of these internal controls.

39. **Disbursements.** The project will adopt the advance and direct payment disbursement methods. Under the advance method, AIIB will disburse funds to a segregated USD designated account maintained at the Bangladesh Bank (Bangladesh's Central Bank). Advances to the designated account will be based on a variable ceiling. The Bangladesh Bank will convert the USD amounts to Bangladesh Taka (BGT) and then transfer funds to an operations account maintained at a commercial bank acceptable to AIIB and GoB. This account will finance expenditures eligible for AIIB's portion of financing. Payments from counterpart funding will be made by RHD through the issuance of government cheques. AIIB's disbursement will be based on a six-monthly cash forecast. All withdrawal applications will be initiated by the Project Accountant of the PIU and authorized by Project Director before submission to AIIB. The disbursement arrangements will be set out in the project's Disbursement Letter, to which the Interim Disbursement Manual for Sovereign-backed loans is attached.

40. **Governance and Anti-corruption.** The AIIB's Policy on Prohibited Practices (2016) (PPP) will apply to this Project. AIIB is committed to preventing fraud and corruption in the projects it finances. It places the highest priority on ensuring that projects it finances are implemented in compliance with its PPP. The Bank will monitor the work related to tender document preparation and tender/proposal evaluation and award under Bank financing. Implementation will be monitored regularly by AIIB staff. The Bank reserves the right to investigate, directly or indirectly through its agents, any alleged Prohibited Practices relating to the project and to take and/or require the borrower to take necessary measures to mitigate the risk of such practices and address any issues in a timely manner, as appropriate.

41. **Institutional Capacity.** RHD as the Department in charge of construction of roads and bridges up to 1,500 meters in length in Bangladesh, will implement the Project, the first bridge of its kind in the country. Weak institutional capacity is one of the

challenges that RHD faces, and the focus of capacity building in Component 3. The detailed designs emphasized the methodologies and requirements to maintain steel arch bridges, and RHD and its O&M department will be trained by expert consultants on structures. The Supervision Consultant financed by Component 2 will also support the PIU on the initial stage of bridge operation, during the one-year defect liability period. AIIB project team will also support implementation and follow up on the PIU's capacity (see para 22).

D. Environmental and Social

42. **Environmental and Social Policy and Categorization.** The Bank's Environmental and Social Policy (ESP), including the Environment and Social Standards (ESSs) and the Environmental and Social Exclusion List, applies to this Project. ESS 1 (Environmental and Social Assessment and Management) is applicable to the environmental and social (ES) impacts of the Project. ESS 2 (Involuntary Resettlement) is also applicable to land acquisition and resettlement issues of this Project. The Project has been classified as Category A given the alignment of the road through built-up areas in the city at the southwest side of the Brahmaputra River, which will require a considerable amount of resettlement and relocation of businesses.

43. RHD has prepared an Environmental Impact Assessment (EIA) for Government environmental clearance. The EIA has been updated to meet the requirements of AIIB's ESP, including an Environmental Management Plan (EMP). A Social Impact Assessment (SIA) including a Resettlement Plan (RP) has also been prepared. The detailed RP finalization, addressing land acquisition and resettlement issues and approval for use is a condition for the commencement of civil works.

44. **Environmental Aspects.** The proposed bridge will be built over the Brahmaputra River with approach roads across urban and rural areas. According to the EIA, the Ganges River Dolphin uses the Brahmaputra River as a passage to upstream and downstream areas but not as a habitat due to its unstable and low water level. The EIA concludes that the construction of the bridge, which will be conducted during non-monsoon season, will have minimal impact on this species. There will be limited dredging and embankment protection works conducted at the main bridge location. The small works will cause minimal adverse impact on water quality as it will be carried out during non-monsoon season but will have positive impacts in terms of increase of water flow in dry season and protection of embankment from flood. Precautionary measures to prevent the noise of construction on the mud flat (piling) and potential water contamination have been included in the EMP and will be implemented by the contractors.

45. The construction of the approach road on the northeast side of the bridge will permanently change the land use patterns and have impacts on some water ponds, which will lead to impacts on habitats of terrestrial and aquatic wildlife species and will cause habitat fragmentation. The culverts and bridges included in the design of approach road can provide migration corridors for the amphibians and reptiles, so the impact of habitat fragmentation can be minimized. Other measures for wildlife conservation have also been included in the EMP. The EMP also requires RHD to carry out a detailed wildlife

survey in this area and prepare a Wildlife Management Plan prior to the implementation of the Project.

46. It is envisaged that other environmental impacts of the Project will be temporary and reversible, which will take place during construction and maintenance periods. They include air pollution, noise, water contamination, soil erosion, felling of trees, impacts of borrow areas, and the disposal of solid wastes as well as disturbance to communities, public utilities and traffic. The construction of the approach roads and the bridge will generate an increase in traffic during the operational phase of the Project. This will lead to an increase in traffic noise and emissions, which are analyzed in the EIA. In addition, a detailed noise modelling will be carried out by RHD prior to the implementation of the Project, so that mitigation measures can be specified to address the traffic noise near communities.

47. The management, mitigation, and monitoring measures to address environmental risks and impacts of the bridge and its approach roads have been included in the EMP. The EMP also includes provisions related to occupational health and safety, air and water pollution control, noise control, protection of flora and fauna, the management of construction camps and construction sites, and traffic management. Archaeological chance finds procedures will also be applicable to all construction activities. The EMP has also set out the institutional arrangements for its implementation, a monitoring plan, a capacity building program and Environmental Code of Practices. The RHD will be required to ensure that the EMP and the code of conduct for workers are incorporated into the construction contracts and subcontracts.

48. **Climate Change Risks and Opportunities.** The major climate change risk that the project is facing is flooding in the Brahmaputra River basin. The road area might have to drain 20 percent additional discharge due to climate change induced higher rainfall during extreme events. Thus, more culverts and/or bridges and additional of roads' height have been designed for the Project to ensure enough drainage facilities and adapt to discharge pattern due to climate change. The bridge has also been designed based on 100-year return period of flood event in the Brahmaputra River while the approach roads designs are based on 20-year return period. It is estimated that the Project will contribute to 8,954 tons CO₂ equivalent emissions by 2023 due to incremental traffic. This impact has been included in the Economic Analysis (see Annex 3).

49. **Social Aspects.** A total of 81.59 acres of land will be acquired to carry out project activities. The type of land earmarked for acquisition includes agricultural land (51.67 acres), Homestead, and Commercial land (25.36 acres) and Ponds and Ditches (4.6072 acres). The SIA survey has determined that about 650 households (HH) located in the project area have structures within the Right of Way of the alignment. Approximately 258 HH will be displaced from their residential land, and another 297 HH will be displaced from their commercial activities. Additionally, 95 HH will lose both homestead and commercial land. Therefore, loss of income from business earning and rented structures among title and non-titleholders is likely to occur because of the interventions. Employees working in potentially displaced businesses, daily laborers, farmers, and service holders are also expected to suffer from short- and long-term loss of livelihoods. Moreover, several community properties in the form of religious establishments including mosques (4), madrasas (2) and mazar (1) will also be impacted. The project's negative

impacts will be mitigated in line with the provisions of the entitlement matrix, which has been developed in accordance with GoB regulations and ESS2 of AIIB.

50. Also, this project will hire various types of workers, and several risks are involved. The following is a summary of some of the risks and the full set of risks is provided in the SIA: (a) safety issues while at work like injuries/accidents/ fatalities while at work; (b) short term effects due to exposure to dust and noise levels while at work; (c) long term effects on life due to exposure to chemical/hazardous wastes; (d) non-payment of wages by employer; (e) non-payment of benefits (compensation, bonus, maternity benefits) by employer; (f) discrimination in employment; (g) sexual harassment at work; (h) forced labor trafficking; (i) security of women in the workforce; and (j) inadequate facilities for pregnant women and lactating mothers. These risks will be addressed in the civil works contracts for the works.

51. **Gender Aspects.** The project has prepared a Gender Action Plan to ensure that women are informed and provide feedback in selection, design, implementation, and monitoring and evaluation of the subproject activities including land acquisition and resettlement. The project will be carefully screened to identify needs and expectations of, and potential adverse impacts on, women and document them. The Gender Action Plan will identify the impact details and the most appropriate mitigation measures through intensive consultation with the affected women and their communities, NGOs and civil society organizations. A note for addressing Gender Based Violence (GBV) will also be included in the bidding documents to ensure that women in the workplace are protected from exploitation and abuse.

52. **Occupational Health and Safety, Labor and Employment Conditions.** The EMP contains provisions related to occupational health and safety (OHS) and guidance to address GBV. There will be some migrant labor influx for the bridge construction. The contractors' EMPs will include Construction Camp Management Plans to address the potential impacts of labor influx. Continuous monitoring on this issue will be conducted during construction. In addition, a Code of Conduct for workers will be incorporated into the bidding documents and the contracts with the contractors. Appropriate measures to mitigate the potential risk of GBV and sexual exploitation will also be prepared and incorporated in the contracts.

53. **Stakeholder Engagement, Consultation and Information Disclosure.** Stakeholder consultations in the form of focused group discussions and interviews were held in the project area during the preparation of the EIA and SIA. The expressed views and comments of all stakeholders including vulnerable groups such as women, members of the low-income families, and students have been documented in the EIA and SIA.

54. The SIA and EIA in English have been disclosed since October 9 and October 11, 2020 respectively, on the websites of RHD^{3, 4} and AIIB⁵. The Executive Summaries

³ <https://rhd.portal.gov.bd/site/notices/23870782-ca6e-406b-a8ae-58634e2be482/Social-Impact-Assessment-for-Consultancy-Service-for-Feasibility-Study-and-Detailed-D>

⁴ https://rhd.portal.gov.bd/sites/default/files/files/rhd.portal.gov.bd/notices/110122b5_20ea_49cd_9ff9_85f59b56738b/2021-01-27-17-57-1fc1e82be882ba458a0b4d598895901b.pdf

⁵ <https://www.aiib.org/en/projects/details/2021/approved/Bangladesh-Mymensingh-Kewatkhali-Bridge-Project.html>

of the EIA and SIA in Bengali language have also been disclosed on the same websites^{6,7} and made available in hard copy in the Project area. Moreover, for enhanced dissemination of resettlement and compensation information, the PIU is conducting public consultation, using focus group discussions with stakeholders and project affected people as well as other modes of communication.

55. **Project Grievance Redress Mechanism.** A Grievance Redress Committee will be established to address grievances from project-affected people (PAP). The procedure and details of the Grievance Redress Mechanism (GRM) are included in the EIA and SIA. An IT-based system accessible both by the general public and PAP will be used for tracking grievances and their resolution. The PIU is also in charge of addressing any complaints from the local people or other stakeholders. A separate GRM for workers will also be established to address workplace related complaints. The GRMs will be established prior to the implementation of the project. The public consultation and disclosure process will be used to disseminate information about the GRM for PAPs.

56. **Project-Affected People's Mechanism.** AIIB's Project-affected People's Mechanism (PPM) will apply to this Project. The PPM has been established by the Bank to provide an opportunity for the independent and impartial review of submissions from PAP who believe they have been or are likely to be adversely affected by the Bank's failure to implement its ESP in situations when their concerns cannot be addressed satisfactorily through the Project-level GRM or the processes of the Bank's Management. Information on the PPM, is available at: <https://www.aiib.org/en/policies-strategies/operational-policies/policy-on-the-project-affected-mechanism.html>.

57. **Monitoring and Supervision Arrangements.** ES monitoring will be carried out by the Supervision Consultant and the PIU, who will prepare semi-annual ES Monitoring Reports. AIIB ES staff with assistance of local consultants will conduct supervision missions twice a year and there will be dedicated ES visits as needed during the implementation of the ES instruments.

E. Risks and Mitigation Measures

58. Overall project risk is rated as "High" based on the project team's risk assessment and due to the Environmental and Social safeguards "High" risk rating. Major risks are listed in the table below and the risk analysis is summarized in detail as follows.

59. **Political and Macroeconomic.** There is a "Medium" political and macroeconomic risk to the achievement of the objectives of the project.

- a. **Security.** The security situation in the country has a "Low" level risk for the achievement of the project objectives. Country overall security risk is rated as "Medium" by the United Nations with travel risk rated "High" in Dhaka and "Medium"

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https://rhd.portal.gov.bd/sites/default/files/files/rhd.portal.gov.bd/notices/110122b5_20ea_49cd_9ff9_85f5_9b56738b/2021-01-27-17-55-3cfb0ad80d6a79819609ef2a5827a727.pdf

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https://rhd.portal.gov.bd/sites/default/files/files/rhd.portal.gov.bd/notices/016ea26e_d01a_4dae_ae60_c3c_ad46c49d3/2020-11-03-17-57-cde06942ff2ffb73a0d7c419bd11bedb.pdf

at the project site. Based on the analysis to the risks identified, security risk may not have any impact to local communities, contractors, consultants or clients involved in the project. As a mitigation measure, AIIB normal security protocols are considered sufficient to ensure the security and safety of AIIB staff on mission travel.

b. **Macroeconomic.** There is a “Medium” risk that macroeconomic issues could affect project implementation. The overall macroeconomic outlook has been affected by the COVID-19 pandemic; however, the external public debt outlook remains stable. The project will be funded by a sovereign-backed loan. Land acquisition (estimated at USD64 million) will be financed by the government and the budget will be allocated for this purpose. The project will be revenue-generating and is expected to put less stress on the government’s budget during the operation and maintenance period. This will be further confirmed depending on the toll rates and revenue mechanism to be adopted. It is not foreseen that repayment of the project loan would bring about particular financial burden to the country.

60. **Institutional capacity.** There is a “High” risk that the existing institutional capacity will affect the implementation of the project. This relates essentially to the government’s lack of capacity on arch steel bridge maintenance, described earlier in this document. To mitigate such risk, the project will support the client to enhance RHD and the PIU capacity on general maintenance strategies, as well as on the use of Bridge Health Monitoring System. Additionally, qualified consultants will be hired to support the PIU’s operation. AIIB will also enhance implementation support services by hiring local consultants to provide timely client support to address quality control, safeguards, and fiduciary issues.

61. **Fiduciary.** Based on the capacity assessments carried out during preparation, the fiduciary risk is rated as “Medium.” This risk category is subject to change and will be reviewed during implementation. Major fiduciary risk identified includes lengthy procurement processes of usually about six months for large civil works contracts for which the mitigation measures include: (i) the detailed design and bidding document for the construction works will be prepared by the design consultants under the PPSF and procurement initiated at the earliest following the procurement methods, timelines, approaches and strategies as agreed in the PDS; and (ii) Financial Management (FM) guidelines to ensure the level of service to avoid any potential delays. AIIB will conduct an introductory session on AIIB Procurement Policy and Procurement Instruction for Recipients, frequent virtual missions and technical visits, when possible, to closely monitor system performance.

62. **Environment and Social.** The risk is rated “High” due to the amount of land acquisition and resettlement associated with the project. The project has been placed in Category A because of both environmental and social risks and impacts. To ensure the smooth implementation of land acquisition and resettlement processes, multiple layers of support and oversight have been integrated into the Project design, including implementation of the RP by a qualified consulting firm vetted by AIIB social staff; in-country oversight by a local social consultant hired to support AIIB ES staff; and the Bank’s own monitoring and supervision of the Project. Additional mitigation measures are proposed to ensure robust implementation, including: (a) enhancing the quality of safeguard documents, including an updated RP and improvement of the environmental

design with up-to-date design codes; (b) a wildlife management plan; and (c) arranging essential training for PIU staff.

Table 2: Summary of Risks and Mitigating Measures

Risk Description	Assessment (H, M, L)	Mitigation Measures
<p><i>Security and Macroeconomic</i></p> <ul style="list-style-type: none"> The security situation in the country could pose a risk for the achievement of the project objectives. Macroeconomic situation due to COVID-19 could affect project implementation. 	Medium	<ul style="list-style-type: none"> AIB normal security protocols are considered sufficient to ensure the security and safety of AIB staff on mission travel when flights restart. The team will continue to monitor the situation in coordination with RHD and the Ministry of Finance.
<p><i>Institutional Capacity for Implementation and Sustainability</i></p> <ul style="list-style-type: none"> Lack of proper capacity for arch steel bridge maintenance. 	High	<ul style="list-style-type: none"> RHD and PIU training on bridge maintenance measures and BHMS. Experienced consultants will be engaged to enhance the PIU's capacity. AIB will also hire local consultants to support the client in-situ.
<p><i>Fiduciary: Procurement</i></p> <ul style="list-style-type: none"> Lengthy procurement processes. <p><i>Financial Management</i></p> <ul style="list-style-type: none"> The FM risks includes the absence of an internal audit function within RHD, possible delay of payments due to the lack of periodic monitoring of budget against actual cash flow and contractual obligations. 	Medium	<ul style="list-style-type: none"> Construction works' contract bidding documents to be prepared by the design consultants under the PPSF and ensure compliance with the procurement strategies in the PDS. AIB to provide introductory session on Procurement Policy and Procurement Instruction for Recipients training on procurement. Assignment of an experienced Project Accountant and Accounts Officer supported by staff within the Division of Accounts. Independent internal audits; Enhanced budget arrangement including the execution of quarterly budget variance analysis and cash forecast.
<p><i>Environment and Social</i></p> <ul style="list-style-type: none"> Significant amount of land acquisition and resettlement. 	High	<ul style="list-style-type: none"> Independent consultant firm will be engaged to support the land acquisition and resettlement to ensure the transparency and imparity. Enhance the quality of ES documents, e.g., RP, with updated information and improve the design with up-to-date design codes. Provide essential training to PIU staff. ES monitoring semi-annual reports.
OVERALL	High	

Annex 1: Results Monitoring Framework

Project Objective:	The objective of the proposed project is to reduce congestion and improve mobility and connectivity by addressing the cross-river bottleneck between Mymensingh and Shambhugonj on the Dhaka-Mymensingh-India corridor.							
Indicator Name	Unit of measure	Base-line Data 2020	Cumulative Target Values			End Target	Frequency	Responsibility
			2021	2022	2023			
Project Objective Indicators:								
1. Average speed for passenger vehicles	Km/h	14.7	-	-	-	45	Before /After	RHD
2. Average speed for heavy vehicles	Km/h	12.2	-	-	-	45	Before /After	RHD
3. Daily motorized traffic on Kewatkhali Bridge	Vehicles/day	0	-	-	-	15,000	Before /After	RHD
4. NOx emissions	Tons	170.6	-	-	-	150.2	Before /After	RHD
Intermediate Results Indicators:								
1. Accounted works completion rate (accumulated)	Percentage	0	20	60	100	100	Yearly	RHD
2. Domestic employment created directly from the civil works per year	People	0	1790	2380	1790	N/A	Yearly	RHD
3. Operational GRM, following the requirements defined in the EIA and SIA	Y/N	N	Y	Y	Y	Y	Yearly	RHD
4. Number of Staff trained for O&M	People	0	0	5	10	15	Yearly	RHD

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Annex 2: Detailed Project Description

1. The Project Objective would be achieved through the implementation of the three project components described below. The total project cost is estimated at USD366.9 million, of which USD106.9 million comprise of RP implementation and utility shifting costs, duties and taxes. Financial costs including front end fee, commitment fee and interest charge during construction stage are expected to be covered by AIB loan.

2. **Component 1. Bridge and Approach Roads Construction works (USD307 million inclusive of Government land acquisition costs for USD64 million and taxes of USD28 million).** This component will finance the construction of the Kewatkhalī Bridge (about 1100 meters in length) and approach roads (about six kilometers in length) including Road/Rail Overpasses. The component includes civil works construction, installation and procurement of goods and operations and maintenance. Other ancillary works also included to make the project bridge fully functional are:

- a. Installation for traffic management equipment and traffic surveillance
- b. Installation of state-of-the-art Bridge Health Monitoring System over the main Kewatkhalī bridge. This is proposed to increase the safety of the structure and provide early warnings for any unsatisfactory parameter of bridge component that is being monitored.
- c. Street Lighting and Landscaping
- d. Construction for O&M facilities and
- e. Tolling and communication systems

3. *Bridges.* The configuration of the bridges and viaducts has been chosen based on the cost, material availability, local competence and availability of standard drawing with RHD. Main Kewatkhalī Bridge, other railway overpass bridge and Ramp bridges were planned in consideration of the Railway Clearance and vertical slope. As a result, a total length of all bridges is planned to be 2,096m.

4. *Main bridge.* The Kewatkhalī Bridge will be a Steel Arch Bridge, planned with due consideration of navigation clearance, cost optimization, minimization of the negative environmental impacts on the river, dredging work plan for the Brahmaputra River, and construction condition for piers. The approach of the Kewatkhalī Bridge was envisaged to avoid the two existing railways and roads. The structural safety margin of the bridge has been evaluated by the AASHTO LRFD Standard and Allowable Stress Design Standard.

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Figure A2.1. Kewatkhali Main Bridge: A 3-D BIM model

5. *Interchanges.* There are three Interchanges in the project:
 - a. Interchange 1: at Approach to Dhaka, at the Bypass turn of Digarkanda;
 - b. Interchange 2: at Approach to Dhaka, to allow the U-turn and high-speed traffic volume without stopping; and
 - c. Interchange 3: at Road ramp after Kewatkhali Bridge to Netrakona, to serve as grade separation interchange with Ramp-A and Ramp-B.

6. Entry and Exit for interchanges 1 and 2 are designed to enable high-speed vehicles to move into Slow Moving Vehicles Traffic (SMVT) lanes. Interchange 3 is designed to ensure that vehicles travelling in the direction to Netrakona using 4 lanes would pass through without stopping.

7. *Construction materials.* Possible construction materials were collected from borrow pits, embankment, bricks source, sand (both fine and coarse) and stone. All these materials were tested at the Dhaka materials testing laboratory. Tests have been carried out to assess the suitability and usage is recommended. Aggregate and steel may need sourcing from outside the country while rest of the material can be sourced locally.

8. *Operation and maintenance.* After project completion (and subject to any defect liability period), RHD will be responsible for ensuring the quality efficiency of O&M, following the existing RHD Local Guidelines for operation and maintenance of roads and bridges. To achieve this, the proposed project will introduce modern maintenance technology appropriate to the main bridge, namely Bridge Health Monitoring System.

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9. Maintenance of the proposed Kewatkhali bridge comprises three components: (i) maintenance of the main part of the bridge, (ii) maintenance of the approach part of the bridge, and (iii) maintenance of the approach roads at both sides of the bridge. The maintenance of all components includes both annual routine maintenance (such as cleaning, routine repair, removal of obstacles, etc.) and periodic maintenance (such as small-scale repair, small scale replacement, partial painting, etc. In case of the bridge a 40 mm overlay may take place every 5 years. In case of the approach roads, some reconstruction works (75 mm partial reconstruction) may be necessary after every 10 years. Maintenance costs for approach bridge and approach roads were estimated following the RHD Needs Report 2019- 2020 while that for the main component of the bridge has been provided by the bridge engineer of the consultants.
10. *Bridge Health Monitoring System (BHMS)*. The BHMS seeks to obtain quantitative data about the structural behavior in order to confirm the design assumptions and to provide real-time feedback during the service period of the bridge. The Kewatkhali main bridge is a three-span steel arch type bridge, first of its kind in Bangladesh, and will require special maintenance. Therefore, this system is proposed to increase the safety of the structure and provide early warnings of any structural issues of the bridge that is being monitored. Alarms can be interfaced with a Bridge Rating system. The BHMS will be based on a common distributed data acquisition network with a fiber optic backbone. The collected data is captured in real-time and transferred to the main server in the maintenance office.
11. *O&M funding*. Assessment to the tolling mechanism at existing toll stations and the maintenance needs of the project bridge and approach road shows that with the proposed periodic adjustment of the toll, the toll revenue would cover the O&M costs. With a marginal toll rate increase (about 5 percent increase every five years), the operation and maintenance needs for the life cycle would be covered.
12. **Component 2. Consulting services (USD7.1 million)**, comprised of construction supervision services. The bridge and road civil works construction contract will include a one-year defect liability period after construction to bind both construction and initial maintenance responsibility to one contractor and therefore ensure quality and sustainability. The construction supervision consultant will be required to provide technical assistance to RHD divisional and district staff and support on the initial stages of O&M and BHMS implementation.
13. **Component 3. Project management support and capacity building (USD7.9 million)**. This component will include two subcomponents:
- (i) *Training, capacity building and institutional development*. This subcomponent will finance various types of training, institutional development activities to benefit RHD and its staff, with specific focus on operating, managing and maintaining the main bridge by using the latest available technologies, as the BHMS.
 - (ii) *Project management support*, including the incremental cost of the PIU's operation. Exclusive of PIU civil servant staff salary, the incremental cost includes operation cost incurred in the PIU.

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Annex 3: Economic and Financial Analysis

A. Introduction

1. A Cost-Benefit Analysis (CBA) was conducted to calculate the economic internal rate of return (EIRR) and economic net present value (ENPV) of the bridge project based on a standard methodology for appraisal of road investments. The scope of the Project comprises a four-lane bridge connecting the road towards Dhaka at one end and the road towards Netrokona on the other end. The proposed bridge (investment) is located on the Brahmaputra river at Kewatkhali - the southeast side of Mymensingh city. The road construction project is expected to reduce severe congestion on the existing bridge, i.e., Shambhuganj bridge, which has reached capacity, and improve road connectivity for other roads on both sides of the proposed bridge. The construction of the proposed Bridge is expected to lead to diversion of a substantial portion of traffic from the existing bridge to the new bridge, thereby easing the movement of traffic through both bridges.

2. *Background of the existing bridge.* The Shambhuganj bridge accommodates the traffic movement between south, south-west, north and northeast of Mymensingh city. The bridge and the connecting approach roads on both sides are narrow with only two-lane pavement width. As such, this bridge cannot accommodate increasing vehicular traffic of all types including huge number of three wheelers. Hence, there is often severe congestion in and around the bridge area resulting in vehicles waiting for some long time on Shambhuganj bridge as well as on the both- side approaches of the bridge. This causes huge loss of valuable passenger time and also vehicular time.

B. Methodology and Key Assumptions

3. The economic evaluation covers the 33-year life cycle period. Road construction will occur over the first 3 years (20/40/40) and it is assumed that road operations and maintenance will continue for 30 years. The economic analysis is based on comparisons of costs and benefits under the without-project and with-project scenarios. Costs and benefits are valued based on economic prices. Specifically, the standard conversion factor of 0.85 for construction and maintenance was used to convert financial costs to economic costs. The social discount rate used is 12 percent. The analysis is expressed in terms of EIRR and ENPV.

C. Estimating Economic Benefits

4. Traffic forecast. The economic analysis starts with analyzing current traffic demand and making traffic forecast during the project life. Traffic volume counts (TVC) were carried out according to vehicle type on several road segments around the location of the proposed bridge in October 2019. The average volume of motorized traffic of all types (truck, bus, cars, motorcycles) moving per day around the surrounding area of the project location is about 13,200. Three-wheelers occupy 67 percent while all other vehicle types constitute about 33 percent. The average daily volume of non-motorized traffic (bicycle, rickshaw, pushcart) is 497.

5. Annual Average Daily Traffic (AADT) was estimated based on October 2019 traffic surveys along the Shambhuganj Bridge, as the main source of traffic for the proposed investment is the diversion from the existing bridge after the construction of the proposed bridge. Based on traffic data, AADT in 2019 was 21,359 motorized vehicles and 785 non-motorized vehicles per day. To estimate

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the traffic in 2023, annual average growth rate (AAGR) of 6 percent has been applied, as explained below.

6. To estimate the distribution of traffic between the two bridges, an origin-destination survey of vehicular traffic crossing the bridge at both ends of the existing Shambhuganj Bridge was conducted. To estimate the volume of vehicular traffic for the Kewatkhali Bridge a 'willingness to use' survey at both ends of the existing bridge was undertaken. Traffic data was analyzed using 'Cube' transport model application. Based on total traffic for Shambhuganj bridge in 2023 under a without-project situation, Table A3.1 shows estimated traffic for the proposed bridge and remaining traffic for the existing bridge in 2023. On aggregate, 19,998 vehicles (74 percent) are expected to cross the Kewatkhali Bridge daily, whereas 6,967 vehicles (26 percent) are to remain on the existing bridge in 2023.

Table A3.1. Estimated Motorized Daily Traffic for Shambhuganj and Kewatkhali Bridges in 2023

Survey Days	HT	MT	ST	LB	MB	Micro	Utility	Car	CNG/AR	MC	Total	AAGR
Day-1	219	2352	1135	1261	81	355	274	759	15019	1198	22653	
Day-2	207	2156	1012	1207	76	323	267	714	13373	1363	20698	
Day-3	220	2113	1052	1136	82	383	293	730	13312	1404	20725	
Average (ADT in 2019)	215	2207	1066	1201	80	354	278	734	13901	1322	21359	6%
2020	228	2339	1130	1273	84	375	295	778	14735	1401	22640	
2021	242	2480	1198	1350	90	397	312	825	15620	1485	23999	
2022	256	2629	1270	1431	95	421	331	875	16557	1574	25439	
2023	272	2786	1346	1517	101	446	351	927	17550	1669	26965	
Estimated Traffic for Kewatkhali Bridge (Model Produced)	222	2026	941	1178	87	357	290	716	12991	1190	19998	
ADT Retaining on the Existing Bridge in 2023	50	760	405	339	14	89	61	211	4559	479	6967	

Note: HT= heavy truck, MT= medium truck, ST= small truck, LB= large bus, MB= medium bus, micro= micro bus, utility= jeep/pickup/SUV, CNG/AR=auto-tempo/auto rickshaw/auto-van, MC=motorcycles

7. *Forecasted future traffic is based on the growth of registered vehicles.* Based on data from the Bangladesh Road Transport Authority, vehicle registrations saw significant increases during the last 7 to 8 years: bus and truck have grown at the rate of 6.7 percent and 6.7 percent per annum respectively, while jeep and passenger cars have grown at the rate of 7.4 percent and 6.0 percent respectively. Likewise, microbus and pickup have grown at the rate of 5.6 percent and 17.7 percent annually. Based on this data, traffic forecast has been made for 30 years onward from 2023. A linear rate of 6 percent growth per annum has been applied over the whole of project life. It may be mentioned that annual growth for various types of registered vehicles is much higher, i.e., the overall growth rate of vehicles of all types taken together is about 12 percent per annum. As such, the rate of growth applied at 6 percent per annum is rather conservative. Table A3.2 shows the forecast of motorized vehicular traffic in some selective years over the project life.

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Table A3.2. Forecast of Kewatkhali Bridge Traffic in Selective Years, Motorized Traffic

	HT	MT	ST	LB	MB	Micro	Utility	Car	CNG / AR	MC	Total
2023	222	2026	941	1178	87	357	290	716	12991	1190	19998
2033	398	3628	1685	2110	156	639	519	1282	23265	2131	35813
2043	712	6498	3018	3778	279	1145	930	2296	41664	3816	64136
2053	1275	11636	5405	6766	500	2050	1666	4112	74614	6835	114858

8. The passenger-carrying capacity of various vehicles include the following: 3 passengers per trip for heavy/medium trucks, utility vehicles and cars; 2 passengers for small trucks; 47 passengers for large buses; 35 passengers for medium buses; 7 passengers for micro buses; 7.5 passengers for auto rickshaw/vans; and 1.5 passengers for motorcycles. These assumptions are used in calculating the economic benefits.

9. The major economic benefits considered for this proposed investment include the following: (i) time savings for passenger traffic that will be diverted to the proposed bridge; (ii) time savings for passenger traffic still using the existing bridge; (iii) VOC savings for traffic that will be using the proposed bridge; (iv) VOC savings for remaining traffic on the Shambhuganj bridge due to removal of present congestion; (v) VOC savings for traffic on the approach roads/connecting roads of the project bridge; and (vi) reduction in NOx emissions. Except for emissions cost savings, 10 percent of the aggregate economic benefit for motorized traffic is assumed as the economic benefit for non-motorized traffic.

(i) *Travel time savings for passenger traffic on the proposed Kewatkhali bridge.* These savings are based on the difference between time required on the existing bridge (including time on the approach roads) and on the proposed bridge (including time on the approach roads). Time savings considered both route distance and vehicle speed and these vary by vehicle type. Time saved by these vehicles is around 40 minutes (0.66 hours). The estimated economic value of time varies depending on vehicle type, ranging from 39 taka per passenger-hour for trucks to 102 taka per passenger-hour for cars.

(ii) *Travel time savings for remaining passenger traffic on the existing Shambhuganj bridge.* Time savings benefit emerges from the reduction of traffic congestion on the existing bridge and its approach roads after the proposed bridge is constructed and opened to traffic. Two-thirds of the time saved by passenger traffic on Kewatkhali Bridge and its approach roads has been assumed for passenger traffic still retaining on the existing Shambhuganj bridge. Therefore, time saved by these vehicles is assumed to be 26 minutes (0.44 hours).

(iii) *Time-related VOC savings for vehicular traffic on the proposed Kewatkhali bridge.* Time-related VOC occurs when vehicles do not move or move too slowly on the road due to traffic congestion or any other obstructions. The factors taken into consideration in this analysis for measuring time-related VOC are vehicle purchase costs and overhead costs. With the proposed bridge, stagnancy of a vehicle on the road is reduced thereby increasing its mobility and saving vehicle time. The aggregate time-related VOC on the existing bridge under a without-project scenario varies by type of vehicle, ranging from 4 million taka for medium-sized buses to 222.5 million taka for auto rickshaw/vans. With the project, such costs are expected to reduce to 0.08 crore taka for medium-sized buses and 35.8 million taka for auto rickshaw/vans on the proposed

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bridge.

(iv) *Time-related VOC savings for remaining vehicular traffic on the existing Shambhuganj bridge.* Time-related VOC savings also accrue to the vehicles still retained on the existing bridge since they also save on journey time due to diversion of about three-fourths of traffic to the proposed bridge. For the vehicular traffic retained on the existing bridge, time savings considered is assumed to be two-thirds of the time savings estimated for the vehicular traffic that shifted to the proposed bridge.

(v) *Use-related VOC savings for vehicular traffic on the approach roads/connecting roads of the project bridge.* This is the saving in economic VOC related to the use of vehicles along the new approach roads versus the existing approach roads. The approach road-related VOC saving occurs due to the difference in surface roughness in the with-project scenario (VOC on old connecting roads) and without-project scenario (VOC on new connecting roads). Variables considered for this analysis include route distance and international roughness index (IRI) per kilometer. It is assumed that the project will reduce IRI from 10 under the without-project scenario to 2 under the with-project scenario. The route distance considered is the length of Shambhuganj Bridge including its approach roads and the length of Kewatkhalil Bridge including its approach roads.

(vi) *Emissions cost savings.* Total nitrogen oxide and carbon dioxide emissions costs per annum are derived for both with- and without-project scenarios and the difference of such costs constitutes the cost savings. In line with traffic demand growth, a 6 percent year-on-year growth rate is assumed for these emissions.

10. A possible economic benefit that is not quantified due to data limitations is accident cost savings. Research has shown that the economic value of annual road accident costs is around one percent of the country's GDP. To measure the impact of road accidents to the economy, it is vital to know the number and severity of accidents on the existing bridge for the last several years. Similarly, it is important to know the number and severity of accidents on the proposed bridge for the next several years, which is not possible to calculate with the available data and counting methods.

D. Estimating Economic Costs

11. The project's costs include: (i) construction costs, including pavement works, structures, among others; (ii) engineering and supervision fee; (iii) socio-environment mitigation measures; and (iv) physical contingencies. These financial costs are converted into economic costs at the Standard Conversion Factor (SCF) of 0.85. The total investment project costs have been broken down into a construction period of 3 years – 20 percent in 2021, 40 percent in 2022 and 40 percent in the final year, 2023. The whole scenarios of the breakdown of project investment costs (both financial and economic) are presented in Table A3.3.

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Table A3.3. Breakdown of Project Investment Costs in Bangladesh Crore Taka

Construction Period/Year	Percent of Cost Per Annum	Financial Costs	Economic Costs
Year 1 (2021)	20%	608.8	479.18
Year2 (2022)	40%	1217.67	958.35
Year3 (2023)	40%	1217.67	958.35
Total	100%	3044.18	2395.88

Note : Construction cost increased by 5% itemwise in financial value due to one year delay in construction period

12. Maintenance of the proposed Kewatkhali bridge comprises three components, as mentioned in Annex 2, including annual routine maintenance and periodic maintenance. Maintenance costs for approach bridge and approach roads were estimated following the RHD Needs Report 2019-2020 while that for the main component of the bridge has been provided by the bridge engineer of the consultants. Maintenance costs start from 2024 and ends in 2054.

E. Results of Economic Analysis and Sensitivity Analysis

13. Table A3.4 presents the results in the form of EIRR and ENPV. The EIRR is estimated at 18.08 percent and ENPV at USD174.08 million (or 1,479.67 crore Taka) based on a 12 percent discount rate. The EIRR is well above the opportunity cost of capital and the project is considered economically viable.

Table A3.4. CBA Results

Year	Project Investment Cost (Crore Taka)	Project Maintenance Cost (Crore Taka)	Total Project Costs (Crore Taka)	Total Project Benefit	Net Benefit (Crore Taka)
2021	479.18		479.18	0.00	-479.18
2022	958.35		958.35	0.00	-958.35
2023	958.35		958.35	0.00	-958.35
2024		1.15	1.15	346.70	345.55
2025		1.15	1.15	367.51	366.36
2032		1.15	1.15	552.59	551.45
2046		1.15	1.15	1249.36	1248.21
2047		14.80	14.80	1324.32	1309.52
2048		1.15	1.15	1403.78	1402.64
2052		1.15	1.15	1772.24	1771.10
2053		8.17	8.17	1878.58	1870.41
2054		1.15	1.15	1991.29	1990.14
				EIRR	18.08%
				NPV @ 12%	1479.67

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14. A sensitivity analysis was conducted considering the possibility that traffic demand increases of 6 percent per annum may eventually lead to reduced time savings (in light of possible congestions) as well as increases in GHG emissions. Considering a gradual reduction in time savings and emissions savings (i.e., 1 percentage point reduction in savings every 5 years), the resulting EIRR is a robust 17.12 percent.

15. Further, sensitivity analysis was conducted to test the robustness of the project's economic viability based on the following scenarios: (1) 10 percent increase in project costs; (2) 10 percent decrease in project benefits; and (3) combination of both scenarios. The results of the sensitivity analysis are shown in Table A3.5. In all scenarios, the EIRR is well above the hurdle rate of 12 percent. This shows that the project investment is robust to withstand variations in both cost and demand shocks.

Table A3.5. Sensitivity Analysis

Scenarios	EIRR
Scenario 1: 10% increase in costs	16.68%
Scenario 2: 10% decrease in benefits	16.81%
Scenario 3: 10% increase in costs and 10% decrease in benefits	15.73%

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Annex 4: Member and Sector Context

A. Rationale

1. **Country Priority.** Bangladesh averaged a gross domestic product (GDP) growth of 6.5 percent over the ten years before the COVID-19 pandemic.¹ The country achieved lower middle-income country status in 2015; such progress, along with increased demand for services, revealed various infrastructure challenges, like road congestion, pollution, and rapid urbanization. Between 1960 and 2019 for example, the country's urban population grew at an average annual rate of more than five percent, and the share of the urban population grew significantly from 5 to 37 percent.² The country also faces structural vulnerabilities (e.g., climate change and vulnerabilities to natural disasters including floods, tornadoes, tidal surges and major cyclones) and new economic dilemmas brought about by the COVID-19 pandemic, such as weaker exports, remittances and private investments.
2. Despite these challenges, Bangladesh remains a strategic location for regional economic connectivity. The country facilitates the movement of people between several surrounding countries, like India and the Northeastern Region states. It also facilitates trade flows between South Asia and Myanmar and the rest of East Asia. Therefore, unlocking the transport infrastructure bottlenecks is key to enable the country and the region to grow and become well integrated.
3. To meet its growth aspirations and improve connectivity, the Government of Bangladesh (GoB) recognizes the importance of boosting infrastructure investments and addressing infrastructure backlogs. The GoB has identified five transformational priorities – most of which are related to infrastructure – connected to the areas where the country's performance is lagging, namely: (i) energy, (ii) inland connectivity, (iii) regional and global integration, (iv) urbanization and (v) adaptive delta management.³ Likewise, the GoB puts emphasis on the rapid implementation of mega infrastructure projects which are considered of strategic importance.⁴
4. **Sector Context.** In the transport sector, roads remain the dominant mode of transport in Bangladesh, serving more than 70 percent of passenger and 60 percent of freight traffic. The country's road network spans 271,000 kilometers (km) including about 22,000 km of major roads. Other transport modes include perennial inland waterways (3,800 km or 6,000 km during the monsoon season), railways (2,835 km), two major deep-sea ports, and airports.
5. Bridges play a strategic role in Bangladesh's transport network given its geography; like other river delta environments, its land is divided by numerous rivers and wetlands. Eighty percent of the country consists of floodplains created by more than 300 rivers and channels, including three major rivers (the Ganges, the Brahmaputra and the Meghna). As regions are physically disconnected by these waterways and flooding, bridges are an important element for an

¹ World Bank, World Development Indicators.

² Ibid.

³ See the World Bank Group's Systematic Country Diagnostic (SCD).

⁴ See the 8th Five Year Plan during 2020-2025 of GOB.

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integrated and multimodal transport solution to achieve connectivity. Bridges are also needed to connect communities and towns to the major corridors and integrate the regions. Strategic bridges such as the Jamuna bridge and Padma bridge have played critical roles in linking the different regions to the economic center in Dhaka.

6. The proposed investment, the Kewatkhali bridge, will connect the landlocked north-central and northeast Bangladesh with Dhaka, the country capital city. Currently, the population in the north-central districts on the eastern side of the Brahmaputra River is connected to Dhaka by the existing Shambhuganj Bridge, through Mymensingh city.⁵ The Shambhuganj Bridge is a two-lane, 455 meters long and 11 meters wide bridge. The increase in vehicle traffic and expansion of towns towards the existing bridge have resulted in major congestion around the crossing point.

7. The Kewatkhali Bridge will be part of the Dhaka-Mymensingh-India border corridor, which is strategically important for both regional and local connectivity. The bridge will facilitate the flow of traded goods to and from three land ports located along the northeast Indian border in the Mymensingh Division, namely Nakugaon Land port in Sherpur district, Gobrakura Land Port and Haluaghat Land Port in Mymensingh District. These goods⁶ must cross the Brahmaputra River at Mymensingh City to reach Dhaka and other parts of Bangladesh (and vice versa).

8. The proposed bridge is a substantial attempt to ease traffic congestion in Mymensingh City by diverting traffic from the city's busy central area, which has expanded with fast urbanization since the 1980s and serves as the transportation and educational center in the region. Currently, cross-border traffic is mixed with inner-city traffic, causing delays in crossing the Brahmaputra River.⁷ A new Mymensingh town is planned for construction on the other side of the Brahmaputra river which would also require an improved river crossing to maintain seamless transport linkage with the N3 highway to Dhaka.

9. **Institutional Context.** Multiple government ministries and authorities have been involved in the transport sector. The Ministry of Road Transport and Bridges (MRTB) is responsible for planning, construction and maintenance of the major road and bridge network in the country. However, under the ministry's supervision, the Roads and Highways Department (RHD) is responsible for the construction of major roads, highways, ferries and short bridges⁸; while the Bridge Authority oversees long and technically sophisticated bridges. Land ports, large ferries, water ports and inland waterways are managed by the Ministry of Shipping. The Planning Commission is responsible for coordinating investment planning and policies and approve investment projects.

10. Although RHD is the implementing agency for other AIIB funded road projects and is

⁵ Mymensingh city is located on the side of Brahmaputra River and is the capital of Mymensingh Division of Bangladesh. The city has a population of approximately 400,000 and is the second most densely populated city and fourth most populous urban agglomeration in Bangladesh. The density of Mymensingh City is 44,458/sq km.

⁶ Main import items are limestone, boulder, stone, glass sand, coal, fruits and raw hides. Main export items include food and beverage items, plastic goods and bricks.

⁷ The Brahmaputra river flows along the north side of Mymensingh city whereas Shambhuganj is situated on the other side of the Brahmaputra and is connected by the Shambhuganj Bridge with the city center area.

⁸ Bridges shorter than 1,500 meters.

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already familiar with AIIB policies and procedures during preparation stage, it is still lacking capacity and experience during implementation stage.⁹ For this Project, involving the construction of a bridge and its approach roads, internal RHD coordination will be needed, between the Bridge Management wing, in charge of bridge design and management, and the Technical Services wing, in charge of road design and services and Environmental and Social (ES) matters. Furthermore, given the Kewatkhali Bridge will be the first arch steel bridge in the country, further capacity strengthening of RHD Bridge Management wing will be required.

⁹ The Sylhet-Tamabil Road Upgrade Project was approved in April 2020, and its Loan Agreement was signed in October 2020.

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Annex 5: Sovereign Credit Fact Sheet.**A. Recent Economic Development**

1. Bangladesh is a lower-middle income country with GDP per capita at USD 1,856 and a population of 163.0 million.¹ Bangladesh's economy has performed exceedingly well with growth steadily increasing from 7.2 percent in 2016 to 8.2 percent in FY2019.² However, Bangladesh's growth in FY2020 declined to 3.8 percent, as per IMF's estimates in October 2020, due to disruptions related to ongoing COVID-19 pandemic. COVID-19 pandemic impacted the economy in primarily two ways: a reduction in domestic economic activity due to lockdown and a drop in exports of ready-made garments.

2. With the government increasing spending to counter the impact of COVID-19 pandemic, the fiscal deficit increased in FY2020. Recurrent expenditure grew significantly as the government rolled out various relief measures including scaling up of social protection schemes and supporting payroll of manufacturing sector. Some of the rise in recurrent expenditure was offset by reprioritizing spending on development projects. A downturn in economic activity adversely impacted tax collections. Consequently, the deficit inched over 6.0 percent of GDP, above the customary ceiling of 5.0 percent. Public debt inched up because of higher deficit.

3. In FY2020, inflation is estimated to be around 5.6 percent, which was around the intended level. A drop in commodity prices and higher agricultural production offset the cost increases due to supply chain disruptions. CPI inflation in June 2020 was slightly higher than the average for FY2020, due to flood-inflicted disruption of supply chain and damage of crops. To offset the impact from the pandemic, the central bank reduced policy repo rates by 75 basis points in the fourth quarter of FY2020 and another 50 basis points in July 2020.

4. Current account deficit is estimated to have decreased slightly in FY2020. Even prior to the pandemic, exports had experienced a decline. This decline was exacerbated by the pandemic as demand for garment exports, which account for more than 80 percent of exports, fell considerably globally. Similarly, strong remittance growth in the first 8 months of the fiscal year and a recovery in June led to a modest decline in the current account deficit.

B. Economic Indicators**Selected Macroeconomic Indicators - Bangladesh (FY2016-FY2021)**

Economic Indicators	FY 2017	FY 2018	FY 2019	FY 2020*	FY 2021*
Real GDP growth	7.3	7.9	8.2	3.8	4.4
CPI Inflation (% change, average)	5.4	5.8	5.5	5.6	5.9
Current account balance (% of GDP)	-0.5	-3.5	-1.7	-1.5	-2.8

¹ The income group classification for Fiscal Year 2019 is based on World Bank criteria, details seen: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>; Population and GDP per capita data are sourced from World Bank 2019 data.

² In Bangladesh, the fiscal year starts on 1 July ending on 30 June. FY2021 started on 1 July 2020 and will end on 30 June 2021.

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Central government overall balance (% of GDP)	-3.3	-4.6	-5.4	-6.8	-6.1
Nominal gross public debt (% of GDP)	33.4	34.6	35.8	39.6	41.9
Public gross financing needs (% of GDP) ¹	8.2	8.0	9.0	10.9	11.5
1. External debt (% of GDP) ¹	18.0	20.0	18.5	18.0	17.1
Gross external financing need (% of GDP) ¹	3.6	6.8	5.7	4.5	4.4
Gross official reserves (USD Billions)	33.5	32.9	32.7	35.9	
Exchange rate (BDT/USD, EOP) **	80.6	83.7	84.5	84.8	84.8

Note: * denotes projected figures.

FY2020 ran from July 2019 to June 2020.

** Reserves and FX data from Bangladesh Bank; FY2021 FX rate as of January 26, 2021

¹ For FY2020 AND FY2021, AIIB staff estimates based on IMF Data

Source: IMF WEO October 2020 and IMF Country Report 20/187

C. Economic Outlook and Risks

5. According to IMF's estimates, the economy is expected to grow at 4.4 percent in FY2021, but the extent of the growth could be lower given the lingering impact of the pandemic. Growth is likely to be fueled by the increase in private and public investment and consumption because of the government stimulus packages (about 3.7 percent of GDP), particularly for the export-oriented industries. Agriculture growth is likely to be fueled by government subsidies for seed, fertilizer, innovation, farm mechanization, and central bank refinancing facilities for SME farms while industrial growth is expected to improve due to better consumer demand, stronger export growth and improvement in private investment.

6. Fiscal deficit is expected to remain over 6 percent as most of the fiscal stimulus for COVID-19 is expected to be spent in FY2021. The deficit may widen if the revenue collection target of 11.9 percent of GDP is not met. Most of the deficit is expected to be financed domestically. In the case of a higher fiscal deficit, Bangladesh may tap into external credit lines. Bangladesh has a favorable debt profile as majority of the public debt is denominated in domestic currency and held by residents. External public debt is also expected to remain around current levels. Overall, Bangladesh exhibits a low risk of debt distress.

7. Inflation is expected to remain broadly stable although a rise in food prices could give rise to inflationary pressures. Low commodity prices, on the other hand, are expected to support price stability. Inflationary pressures could dissuade the government from lowering interest rates further.

8. The current account deficit is expected to widen in FY2021. Exports continue to remain weak due to globally suppressed demand; and imports are expected to increase, propelled by a rise in domestic consumption and accelerated implementation of large infrastructure projects. However, the deficit might decrease if global demand of Bangladesh's exports, especially readymade garments, pick up.