



**ASIAN INFRASTRUCTURE
INVESTMENT BANK**

PD000240-BGD
March 25, 2020

**Project Document
of the Asian Infrastructure Investment Bank
Sovereign-Backed Financing
The People's Republic of Bangladesh
Dhaka Sanitation Improvement Project**

Currency Equivalents

(As at date, January 31, 2020)

Currency Unit – Bangladesh Taka (BDT)

BDT1.00 = USD 0.0118

USD 1.00 = BDT 84.82

Borrower's Fiscal year

July 1 – June 30

Abbreviations

AIIB; the Bank	Asian Infrastructure Investment Bank
ARP	Abbreviated Resettlement Framework
DB	Design and Build
DBO	Design, Build and Operate
DCC	Dhaka City Cooperation (North and South)
DSIP	Dhaka Sanitation Improvement Project
DoE	Department of Environment
DWASA	Dhaka Water Supply and Sewerage Authority
EMF	Environmental Management Framework
ESIA	Environmental and Social Impact Assessment
ERSMF	Environmental, Resettlement and Social Management Framework
GRCs	Grievance Redress Committees
GRMs	Grievance Redress Mechanisms
GRS	Grievance Redress Service (World Bank)
LGD	Local Government Division
MDB	Multilateral Development Bank
MoLGRD&C	Ministry of Local Government, Rural Development and Cooperatives
M&E	Monitoring and Evaluation
O&M	Operation and Maintenance
OCCR	Operating Cost Coverage Ratio
OP on IR	Operational Policy on International Relations
PMC	Project Management Consultant
PMU	Project Management Unit
PPM	Project-affected People's Mechanism
RAJUK	Rajdhani Unnayan Kartripakkha (Capital Development Authority)
SIA	Social Impact Assessment
RP	Resettlement Plan
SMRPF	Social Management and Resettlement Policy Framework
STP	Sewage Treatment Plant
WB	World Bank

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1. Summary Sheet

The People's Republic of Bangladesh
Dhaka Sanitation Improvement Project

Project No.	PD 000240-BGD
Borrower	The People's Republic of Bangladesh
Project Implementation Entity	Dhaka Water Supply and Sewerage Authority (DWASA)
Sector	Water
Subsector	Sanitation
Project Objective	To increase access to safely-managed sanitation services in select areas of Dhaka City and to improve DWASA's efficiency for sanitation service delivery.
Project Description	<p>The project comprises the implementation of the first phase of the Dhaka Sewerage Master Plan, which was developed during the previous WB supported Dhaka Water Supply and Sanitation Project. The project entails comprehensive investments in sanitation infrastructure combining sewerage systems, wastewater treatment, sewerage and pilot measures for improved non-network sanitation. The project has the following components:</p> <ol style="list-style-type: none"> 1. Institutional Support for Sanitation Services Delivery (USD7.08 million): Capacity enhancement to strengthen DWASA's capacity to manage sanitation services efficiently and increase citizens' engagement to connect to sanitation systems and technical assistance to support coordination in the sanitation subsector. 2. Sewerage and Wastewater Treatment (USD446.52 million): Reconstruction of two trunk mains, construction of new secondary and tertiary network as well as construction of a Wastewater Treatment Plant. 3. Non-Network Sanitation (USD8.46 million): Testing and demonstration of the feasibility of locally-adapted collection and treatment solutions. 4. Project Implementation and Management Support (USD20.94 million): Project management support to DWASA in implementing and monitoring all project-related activities. 5. Contingent Emergency Response (USD0 million): A provisional zero amount component to allow for rapid reallocation of loan proceeds for emergency response.
Implementation Period	Start Date: April 2020 End Date: December 2024
Expected Loan Closing Date	July 30, 2025

Cost and Financing Plan	<p>Project cost: USD483 million</p> <p><u>Financing Plan:</u> AIIB loan: USD170 million World Bank (WB) loan: USD170 million Government of Bangladesh: USD143 million</p>
Size and Terms of AIIB Loan	Fixed-spread loan with a final maturity of 20 years including a five-year grace period. The loan pricing will follow AIIB's standard terms for sovereign-backed loans.
Cofinancing (Size and Terms)	Fixed-spread loan of EUR 154.1 million equivalent to USD 170 million; WB IDA Scale-up Facility (SUF) terms.
Environmental and Social Category	A
Risk (Low/Medium/High)	High
Conditions for Effectiveness	<p>Establishment of the Project Management Unit (PMU)</p> <p>Cross-effectiveness of the WB Financing Agreement</p> <p>Execution of Co-Lenders Agreement</p> <p>Project Implementation Manual adopted by Implementing Agency</p> <p>Execution of the Subsidiary Agreement between the Government of Bangladesh and DWASA</p>
Key Covenants	<p>Establishment of a dedicated sewerage organizational unit for capital and operations management of the Sewage Treatment Plant (STP) and trunk mains, and organizational units for sewerage services delivery, within nine months of Project effectiveness.</p> <p>Development and approval of a water and sanitation tariff framework within six months of Project effectiveness.</p> <p>Establishment of the Project Implementation Committee within three months after the Effective Date to coordinate the Implementing Agency's planned activities in the city of rehabilitation and new construction of sewerage system, sewage treatment plant, and related operational matters.</p>
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
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Vice President	Konstantin Limitovskiy
Director General, Operations	Supee Teravaninthorn
Manager, Operations	Gregory Liu
Project Team Leader	Zacharias Ziegelhöfer, Infrastructure Sector Economist
Project Team Members	Somnath Basu, Principal Social Development Specialist Xiaowei Guo, Senior Procurement Specialist Jan Høybye, Senior WSS Specialist (Consultant) Liu Yang, Counsel Shonell Robinson, Financial Management Specialist Xiao Zhang, Project Assistant

2. The Project Description

A. Rationale

Country Context

1. Bangladesh is one of the most densely populated countries in the world (1,130 persons per square km), with a population of about 164.7 million over an area of 144,415 square km. During 2011-2016, its economy showed a GDP growth rate of an average 6.5 percent, and its per capita income in 2017 was USD1,480. In 2018, its growth rate accelerated to 7.7 percent. In view of this performance, the country was classified as a Lower Middle-Income Country by the World Bank (WB). According to the International Monetary Fund (IMF), Bangladesh has maintained a low risk of external public debt distress. Its macroeconomic performance has been strong despite facing recent global headwinds—inflation has decelerated to 5.6 percent, international reserves have risen, public debt-to-GDP ratio has remained largely stable at around 36 percent of GDP, and its medium-term economic outlook is expected to be positive and marked by continuing stability and high growth. The country's macroeconomic context and outlook are presented in Annex 4.

2. Despite high population growth, the absolute number of poor people decreased by 25 percent, and the depth of poverty was nearly halved from 2000 to 2010, enabling Bangladesh to achieve one of the Millennium Development Goal targets on poverty reduction five years ahead of schedule. Notwithstanding these achievements, large development challenges remain. Bangladeshi cities, including Dhaka, are characterized by an infrastructure deficit and poor service delivery, often resulting in poor living conditions. Sound planning, and urban development is still a challenge. Dhaka has over 3.5 million low income residents, for whom access to services such as water supply, sanitation, and health care is limited.

Sector Context

3. Inadequate sanitation causes a high economic cost to Bangladesh, estimated at an annual USD3.5 billion¹. Young children (below the age of 5) and poor households bear the highest burden of poor sanitation. The river network around Dhaka is one of the most polluted in the world, partly due to domestic sewage pollution. Thus, investing in the reduction of domestic pollution with improved sanitation systems is essential to provide Dhaka's residents with a better quality of life and for the overall improvement of the urban environment.

4. The existing sewerage system nominally covers 20 percent of Dhaka but is not functioning properly due to inadequate maintenance and damage to the system through construction works. About 30 percent of Dhaka's population disposes of its sewage by

¹ Water and Sanitation Program, 2014, Economic Impacts of Inadequate Sanitation in Bangladesh, <https://www.wsp.org/sites/wsp/files/publications/WSP-ESI-Bangladesh-Report.pdf>.

connecting to the drainage networks and open channels.² About half of the population relies on septic or holding tanks for sanitation. The remainder of Dhaka's population uses unhygienic on-site sanitation means, including pits and hanging latrines.

5. Even though a large proportion of Dhaka's residents use on-site systems, the city does not have a well-developed fecal sludge management system. The septic tanks are either directly connected to drains, manually cleaned, or not cleaned at all. Many of the septic tanks lack accessible manholes and soak pits and even where soak pits are available, they often leak, leading to problems of groundwater pollution. Septic tank effluent disposal is very sporadic, and as Dhaka is surrounded by rivers and inter-connected with canals, almost all domestic sewage enters the city's surface waters untreated.

Institutional Context

6. At the national level, the authority for regulating and overseeing the water and sanitation sector is with the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MoLGRD&C).³ For the four largest cities of Dhaka, Chittagong, Rajshahi and Khulna, dedicated bodies for water supply, sewerage and drainage services (WASAs) have been created.⁴

7. The Dhaka Water Supply and Sewerage Authority (DWASA)⁵ is responsible for providing water supply and sanitation services in Dhaka, including the construction, operation, improvement and maintenance of the necessary water supply, sanitation and drainage infrastructure. DWASA is administratively under MoLGRD&C. The WASA Act empowers DWASA to function as an autonomous commercial entity, but in practice it is dependent upon the government for most of its capital investments, key organizational appointments, and major policy decisions. At present, there is no water supply and sewer service regulator in Bangladesh.

8. The Dhaka City Corporation (DCC) North and South are responsible for solid waste management, fecal sludge management, and drainage. DWASA also has a responsibility for drainage; while DCC is responsible for fecal sludge management, it is planned that DWASA will treat the collected fecal sludge. The enforcement of environmental regulations and effluent standards lies with the Department of Environment (DoE), which is under the Ministry of Environment and Forests. In addition, the Rajdhani Unnayan Kartripakkha (RAJUK) is responsible for the overall urban planning in Dhaka. RAJUK has the mandate to develop, improve, extend and manage the city and the peripheral areas through a process of development planning.

² Households, which were connected to a dysfunctional sewer, have often connected to the drainage network.

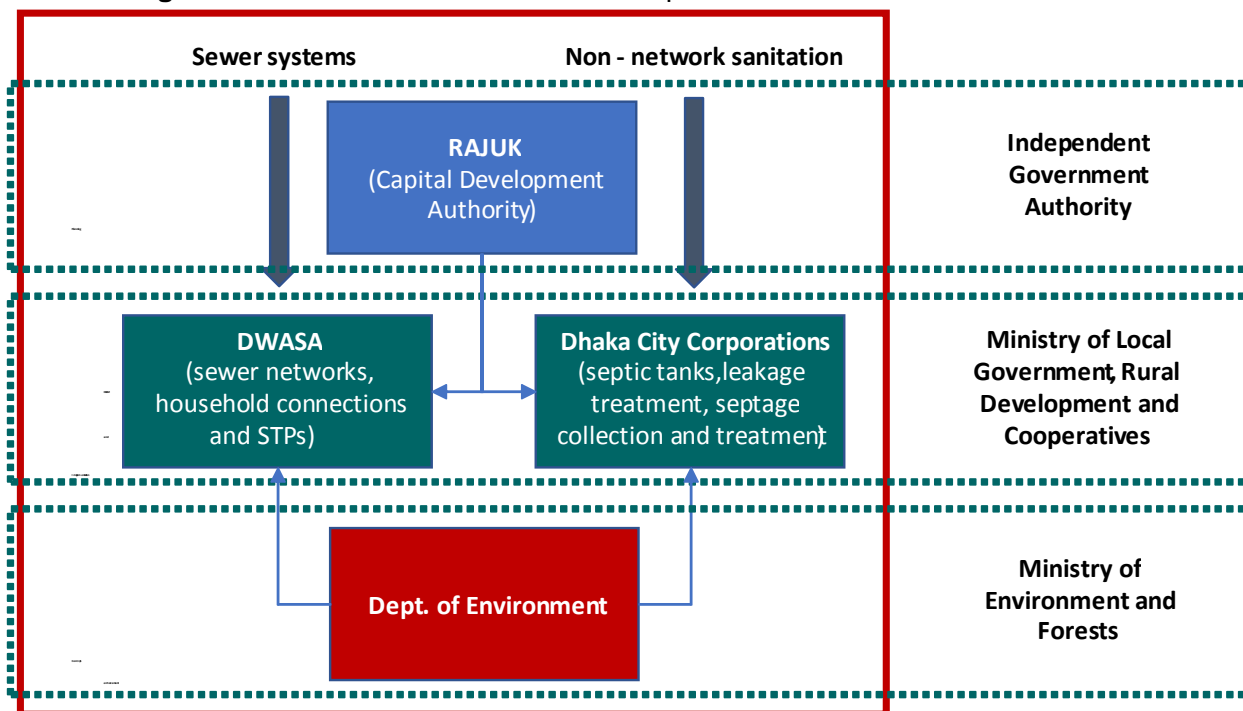
³ There is no separate regulatory body for the water and sanitation sector.

⁴ For the remaining municipalities in Bangladesh, the Department of Public Health Engineering (DPHE) is responsible for the technical planning and execution of the construction of new water supply infrastructure.

⁵ DWASA was founded under a Special Act in 1963 and was reorganized in 1996 under the WASA Act, which governs DWASA today.

9. The roles and responsibilities of these organizations with respect to the sanitation sector are illustrated in Figure 1. DWASA, DCC, DoE, and RAJUK report to different ministries, and are governed by separate acts, rules and regulations. Currently, the institutional coordination mechanism for the sector remains ad hoc, and this institutional fragmentation exacerbates poor service delivery.

Figure 1: Overview of the Roles and Responsibilities in the Sanitation Sector



DWASAs Recent Success in Improving Water Supply Services and New Focus on Sewage

10. In the early 2000s, Dhaka’s population continued to grow rapidly, and the water and sanitation sector was increasingly confronted with three challenges: (i) the quantity of water supply was inadequate, and the quality was inconsistent, (ii) there was almost no systematic collection and treatment of sewage, and (iii) the sector was not financially sustainable. In 2006, DWASA began to address these challenges comprehensively, starting with water supply services. With support from the WB, Asian Development Bank, Agence Francaise de Developpement, Danida, European Investment Bank and KfW Development Bank, DWASA’s investments in water supply infrastructure enabled it to successfully extend its water supply coverage, and provide water to close to 100 percent of the households in Dhaka, through approximately 380,000 water supply connections, of which approximately 97 percent are now metered. Its overall nonrevenue water (NRW) declined from 29.6 percent in 2012 to 21.3 percent in 2017, which is a significant achievement considering the city’s rapid growth and aging infrastructure.

11. Having achieved progress in the water supply sector, DWASA has turned its attention to improving the city’s sewage service. Despite the urgent need for the safe management of

sewage in Dhaka given the city's large and fast-growing population, Dhaka does not currently have any functional sewer system and adequate treatment capacity. The existing sewer system is limited to a part of one of the five catchment areas; it is old, undersized, and has become nonfunctional. A recent survey revealed that less than five percent of the system can be rehabilitated, the remaining 95 percent need to be newly constructed. The city's only Sewage Treatment Plant (STP) was established in the 1970s in Dhaka's Pagla catchment area but is barely functioning at present. The STP can only handle sewage at a fraction of its capacity originating only from nearby industrial and residential users due to the broken-down sewerage network.

12. DWASA has the ambitious vision, based on its Sewerage Master Plan prepared with the WB's support, to develop sewerage systems with appropriate STPs for each of the five catchment areas of Dhaka by 2025. While the Sanitation Master Plan indicates that ideally sewerage services should cover all of Dhaka's urban areas, it also recognizes that 100 percent piped network coverage may not be realistic over the short term given the technical, socioeconomic, and financial constraints. Therefore, the Sanitation Master Plan provides for a phased intervention strategy to address Dhaka's sanitation challenges, with the first phase covering the Pagla catchment.

Alignment with Country Priorities.

13. The Government of Bangladesh has adopted the Sustainable Development Goals 2030 (SDG 2030)⁶. The Dhaka Sanitation Improvement Project (DSIP) is expected to directly contribute to the achievement of SDG 6 to "ensure access to water and sanitation for all", and more specifically Target 6.2 "to achieve access to adequate and equitable sanitation and hygiene for all and end open defecation".⁷ In Dhaka, the Government of Bangladesh has made substantial investments in the area of water supply, with the support of IFIs and bilateral donors. The service coverage in Dhaka with respect to sewerage services remains low.

14. By providing **sustainable and integrated sanitation infrastructure** to the most populated part of Dhaka, the Pagla catchment with, more than 4.2 million inhabitants (see map in Annex 2), the project will contribute to the government's key objectives of "providing safe water supply and sanitation facilities to all".⁸ The project will also help to control water- and excreta-related diseases, thus reducing morbidity and mortality rates among children and other vulnerable populations. The proposed project is well aligned to leverage ongoing urban and environment projects in Dhaka. Building on the results from previous WB projects in Dhaka and implementing a previously developed master plan in a phased approach, will help to realize

⁶ On Sep. 25, 2015, countries adopted a set of goals to end poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be achieved over the next 15 years. More information at <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

⁷ SDG 6. Targets and Indicators. <https://sustainabledevelopment.un.org/sdg6>

⁸ Government of Bangladesh, Local Government Division, [medium-term strategic objectives](#).

DWASA's vision of providing improved sanitation services to the entire service area of Dhaka City.

15. **Strategic fit for AIIB.** The project is aligned with the Bank's key priority area of promoting sustainable infrastructure. The investments foreseen under this project will address significant backlogs in sewerage systems, sewage treatment and sanitation infrastructure. By reducing the amount of sewage in the drainage system and by improving the quality of the discharge into the river systems surrounding Dhaka, the project directly contributes to public health and environmental protection. Further, DWASA will have support for the improvement of its business practices, including the establishment of an asset management system, and improvement of its billing and collection system, alongside the development of a tariff framework to achieve operational cost recovery.

Value Addition by AIIB

16. **Enhancing an integrated approach.** The Bank team has worked closely with the WB-team and the client on the conceptual design of the project and has supported: (i) the balancing of developing treatment capacity with appropriate sewer network extension focused on the service-coverage to the end-user, and (ii) the inclusion of pilot measures to identify adequate solutions for non-network sanitation for hard-to-reach areas, in order to test and demonstrate the feasibility of an integrated approach to sanitation services.

17. **Learning.** To avoid disruption in the most densely populated and congested areas along the trunk main alignments, micro-tunneling will be used. Contractors in China have been using micro tunneling in high-density urban areas for several years, because it minimizes the social disturbance during project implementation. An exposure visit to China is planned to demonstrate to DWASA the benefits and lessons from the application of micro-tunneling technology, which, for sewer system construction, is new to Bangladesh.

18. **Filling the financing gap.** In alignment with the Bank strategy, providing additional financing where such financing is not offered by other banks, or the private sector, will make it possible to support the sector and ensure that the project can be implemented according to the project plan.

Value Addition to AIIB.

19. This is the Bank's first investment in urban sanitation services in a mega-city. By working with the WB, which has been engaged in this sector in Bangladesh for a long time, the project will provide the Bank with an opportunity to gain related experience in Bangladesh and identify solutions to apply in other countries/cities under similar conditions. This will also position the Bank to independently process similar future projects in the sanitation sub-sector in South Asia, which is characterized by large investment needs and future project opportunities.

B. Project Objective and Expected Results

20. The **Project Objective** is to increase access to safely-managed sanitation services in select areas of Dhaka City and to improve DWASA's efficiency for sanitation service delivery.

21. The **Expected Results** are summarized with the Project Objective indicators listed below:

- (i) People provided with access to safely-managed sanitation services;
- (ii) People provided with access to safely-managed sanitation services – Female;
- (iii) Operating Ratio for DWASA for water and sewerage operations maintained below 0.7 (this corresponds to Operating Cost Coverage Ratio (OCCR) of above 1.43).

22. The Project team has worked with the WB team to develop a results monitoring framework and a set of intermediate indicators. The intermediate indicators will be used to track outputs and results and are therefore grouped according to the four project components. The results monitoring framework is presented in Annex 1.

23. **Expected Beneficiaries.** The project is expected to benefit about 1.5 million people, including about 50,000 people in low income communities, in the Pagla catchment area of Dhaka. While most of the beneficiaries will be connected to the central sewerage system, about 100,000 will benefit from improved non-network sanitation, which is being implemented as an interim solution in areas where sewers cannot be built in the short to medium-term.

C. Description and Components

24. The project comprises the implementation of the first phase of the Dhaka Sewerage Master Plan, which was developed during the previous WB supported Dhaka Water Supply and Sanitation Project. The project entails comprehensive investments in sanitation infrastructure combining sewerage systems, wastewater treatment, sewerage and pilot measures for improved non-network sanitation. The project also aims at strengthening DWASA's capacity and improving coordination for sanitation service delivery. The project components are described in more detail in the following sections.

25. **Component 1 – Institutional Support for Sanitation Services Delivery (USD7.08 million).** This component will provide institutional support to DWASA for sustainable sanitation service delivery. The component includes: (i) the establishment of a strengthened sanitation function in the DWASA's organizational structure and training and capacity building; (ii) commercial and financial strengthening of DWASA through improved business practices and a tariff framework; (iii) engagement with citizens to connect to sanitation systems, serving the low-income communities, customer orientation and improved grievance redressal; (iv) Technical Assistance to explore the feasibility of private sector financing options in future infrastructure development for DWASA; and (v) coordination with other stakeholders, comprising technical assistance to address coordination issues on sanitation between DWASA, the DCCs (North and South), DoE, RAJUK, and other agencies.

26. **Component 2 – Sewerage and Wastewater Treatment (USD446.52 million).** This component covers the majority of the investments in sanitation infrastructure. The length of the planned network and matching treatment capacity in the planned STP has been estimated and confirmed by the DB/DBO-Consultant according to final conceptual design and updated costing. The component includes:

- (i) **Rehabilitation/Replacement and new construction of sewers in the Pagla catchment**, including establishment of new sewer connections, to maximize connections to ensure last mile coverage (approximately 390 km new sewer lines serving approximately 1.5 million people);
- (ii) **Construction and replacement of the Eastern and Western trunk mains**, which carry sewage to the Pagla STP. Micro-tunneling technology to construct the trunk main in crowded/congested areas is the preferred option as it is considered less risky and can be implemented faster given Dhaka’s population density. In less congested sections, the open cut system will be used;
- (iii) **Construction of the Pagla sewage treatment plant (STP).** The new STP will be located at the site of the existing treatment plant and new technology with smaller specific footprint will be employed. Construction will take place in stages with a design capacity of 200,000 m³/d, which can be extended on a modular basis to match the future extension of the network. In order to utilize the energy potential of the sludge generated through the treatment process, the Pagla STP will include sludge digestors, a biogas holder, biogas treatment facilities, and combined heat power installations to produce electric and thermal energy;
- (iv) **Completion of feasibility studies, engineering designs and tender documents** for priority sewerage and sewage treatment interventions in the Uttara catchment, which will form the basis for a future project.

27. **Component 3 – Non-network sanitation (USD8.46 million).** This component will provide non-network sanitation services on a pilot basis in areas where sewers are not feasible, and/or where there are tenurial barriers such as in low-income settlements. This will include: (i) upgrading of unimproved toilets in poor households, (ii) provision of common septic tanks, decentralized sewage treatment facilities, and (iii) septage management including emptying services (leasing of emptying and transport equipment to private operators), decanting stations, and treatment of septage, including co-treatment in the sewage treatment plant and/or septage treatment plant. The objective of this component is to identify and demonstrate the technical feasibility of non-network sanitation solutions for hard-to-reach areas in Dhaka, which can be scaled-up subsequently.

28. **Component 4 – Project Implementation and Management Support (USD20.94 million).** This component will include project management and implementation support for DWASA in coordinating and executing project activities, including complying with fiduciary and environmental and social safeguards requirements. The component will include the financing of incremental costs for the Project Management Unit (PMU), project audits, selected individual consultants, and procurement of consulting firms such as Project Management Consultant

(PMC) and Design Review and Supervision Consultant (DRSC) to support efficient project implementation by the implementing agency.

29. **Component 5 – Contingent Emergency Response (USD0).** A provisional component is included under this project to allow for rapid reallocation of loan proceeds from other project components during an emergency, under streamlined procurement and disbursement procedures. In addition, the contingent component may also serve as a conduit for additional funds to be channeled to the project in the event of an emergency.

30. **Lessons from Previous Projects:** The WB has a long-standing experience in the water sector in Bangladesh in general and working with DWASA as a client in particular. The following lessons have been considered in the design of the components and implementation arrangements of the project:

- a. **Project readiness:** To mitigate delays during implementation, a Project Preparation Advance from the WB loan has been used to finance the technical preparation of the project. As a result, studies for at least USD140 million of investments, including design and bidding documents for the Pagla STP and the Eastern Trunk Main, shall be finalized before project approval.
- b. **Integrated sanitation planning:** Given the need for integrated sanitation planning and the fragmented roles and responsibilities in the sector, the project will support the establishment of a coordination mechanism to engage the relevant stakeholders for the planning and implementation of sanitation infrastructure.
- c. **Sustainability and institutional measures:** Past experience has shown that institutional capacity is crucial to ensure the sustainability of the investment. To increase institutional capacity, the project includes the following measures: (i) establishment of a strengthened sanitation function in the DWASA's organizational structure, (ii) commercial and financial strengthening of DWASA, and (iii) improved customer orientation and engagement.
- d. **Engaging the private sector to achieve low life-cycle costs:** Under a WB-supported wastewater management project in Ho Chi Minh City, the DBO mode allowed the utility to bring in a contractor with the lowest life cycle cost for wastewater treatment and provide training to the utility on efficient operations. DB/DBO contracts are an effective instrument to benefit from private sector know-how and develop the capacity and interest of the private sector to take a more encompassing role in the medium- to long-term.

D. Cost and Financing Plan

31. The Government of Bangladesh through its Economic Relations Division (ERD), Ministry of Finance, has requested the Bank to co-finance the project along with WB. WB and the Bank will provide sovereign-backed loans in the amount of USD170 million each.⁹ The Government of

⁹ Upon request of GoB, the WB is providing a EUR-denominated loan with the equivalent amount in EUR.

Bangladesh will provide USD143 million as counterpart financing, including compensation, provisions for land acquisition (if needed), road-cutting charges, operation and maintenance expenditures, and custom duties/VAT. The total project cost is estimated at USD483 million.

32. **Co-financing arrangements.** The project will be financed in a joint co-financing arrangement with the WB as lead co-financer. The co-financing arrangements for the project will follow the co-financing framework agreement between AIIB and WB of April 2016, which has been extended until April 2020. WB's policies and procedures on safeguards, procurement, financial management, project monitoring, reporting and investigative services for harmonized sanctionable practices¹⁰ will be used for the project activities to be financed out of the loan proceeds (including activities to be financed by the Bank).

33. **Financing Terms.** The Borrower chose a fixed-spread loan with a final maturity of 20 years including a five-year grace period. The loan pricing will follow AIIB's standard terms for sovereign-backed loans.

Table 1: Project Cost and Financing (USD million)

Project Components	Project Cost	Financing					
		AIIB	Share	IDA	Share	GOB	Share
1. Sector Support for Sanitation Services Delivery	7.08	3.54	50.00%	3.54	50.00%	0.00	0.00%
2. Sewerage and Wastewater Treatment	446.52	154.30	34.56%	154.30	34.56%	137.92	30.89%
3. Non-network Sanitation	8.46	4.23	50.00%	4.23	50.00%	0.00	0.00%
4. Project Implementation and Management Support	20.94	7.93	37.87%	7.93	37.87%	5.08	24.26%
5. Contingent Emergency Response	0.00	0.00	0.00%	0.00	0.00%	0.00	0.00%
Total Project Cost and Financing	483.00	170.00	35.20%	170.00	35.20%	143.00	29.61%

E. Implementation Arrangements

34. **Project Implementing Agency.** DWASA will be responsible for the implementation of the project. At the ministry level, a Project Steering Committee will be established in the Local Government Division (LGD), chaired by the Secretary of LGD, to provide overall guidance and policy direction. The Project Steering Committee will meet at least twice a year for the first two years, or more frequently if required, to take stock of the project's progress and make course corrections. Within DWASA, a core **Project Management Unit** (PMU) has been established to coordinate the project preparation and implementation. The PMU will be fully established prior

¹⁰ The Bank will reserve its right to investigate any allegations on the non-harmonized sanctionable practices of "theft" and "misuse of resources".

to loan effectiveness and will be responsible for the implementation of all key aspects of the project, including environmental, social and fiduciary responsibilities. DWASA has previously implemented MDB-financed projects and is familiar with the WB's procedures and requirements. A **Design Review and Supervision Consultant** will conduct the supervision of works, primarily Components 2 and 3. Given the technical complexity and large scale of the investment, a **Project Management Consultant** (PMC) will assist DWASA in the implementation of the project to enable the PMU to manage the implementation of all components of the project on time and within budget. The PMC shall also provide specialized services and training to the PMU.

35. **Institutional Coordination.** DWASA will set up a Project Implementation Committee, chaired by the Managing Director of DWASA and comprising the following permanent members: the project director of the DSIP as a member-secretary, and representatives from relevant stakeholders, including ERD, MoLGRD&C, Planning Commission, the DCCs (North and South), Dhaka Metropolitan Police (DMP), Dhaka Transportation Coordination Authority (DTCA), RAJUK, DoE, and utilities operating in Dhaka.¹¹ The committee will address any coordination issues related to DWASA's planned activities for the rehabilitation and new construction of the sewerage system and STP, and other operational matters.

36. **Implementation period.** The project is expected to be implemented over a five-year period from April 2020 to December 2024. The DB and DBO tender documents will specify clear timelines and the contractors will be expected to adhere to these as the constructions of the trunk mains (DB Contract) will have an impact on the operation period of the STP (DBO contract).

37. **Monitoring and Evaluation.** Project progress and performance will be monitored based on the outcome indicators and intermediary outcome indicators, which are defined in the Results Monitoring Framework. The project-level monitoring and reporting will be conducted by the PMU, with support from the PMC. The project-level management information system will track implementation progress and project outputs. It will also be used to report on the progress and to facilitate learning through the project implementation cycle. The PMU will prepare semi-annual progress reports that will include complete information on procurement, contracts, disbursements, financial management, beneficiaries and other outputs. Annual independent audit reports will be prepared to monitor the use of funds. A common Monitoring and Evaluation (M&E) Framework will guide the M&E activities.

38. **The Bank's Implementation Support.** The Bank team will conduct regular joint supervision missions together with the WB team. The frequency of the missions will depend on implementation progress and complexity.

¹¹ Including, Bangladesh Telecommunications Company Limited, Dhaka Electric Supply Company Limited, Dhaka Power Distribution Company Limited, and Titas Gas Transmission and Distribution Company Limited, Dhaka Mass Transit Company Limited (DMTCL), and other utilities.

39. **Procurement.** The WB will play the leading role and cooperate with the AIIB team for procurement preparation and implementation in accordance with the Co-financing Framework Agreement between the WB and AIIB. Procurement will be performed in line with the WB's Procurement Regulations for Investment Project Financing (IPF) Borrowers of July 2016, revised November 2017 and August 2018, which is materially consistent with the AIIB Procurement Policy. DWASA shall be responsible for all project procurement. DWASA has prepared a draft Project Procurement Strategy for Development (PPSD) along with a draft procurement plan. The WB reviewed the PPSD and provided comments, and DWASA has revised the PPSD and procurement plan accordingly.

40. Under this project, works, goods and consulting services will be procured. Tendering of works will be generally based on Design and Built (DB) and Design, Built and Operation (DBO) contracts. The DB approach will be applied to all sewer lots and to the two trunk main lots, including facilities for connections among planned households. The payments to the contractors will be linked to outputs (e.g. number of households or properties connected). The DBO approach is widely used for the wastewater treatment plant construction. Goods to be procured would include the sewage emptying vehicles and cleaning equipment, etc. Consulting services will be procured for construction supervision and supporting of DB and DBO contracting. The tender documents used for DB and DBO procurement will be prior reviewed and agreed to by the WB. The annual integrated fiduciary reviews/procurement post reviews of a sample of contracts selected based on the associated risks will be carried out jointly with the WB team during project implementation. The Bank agrees to the WB procurement arrangement for this project.

41. **Financial Management (FM).** DWASA has previously implemented five WB funded projects and has experience with WB financial management requirements. The existing financial management arrangements will be applied, particularly:

- **Budgeting.** A budget will be prepared and maintained for the entire term of the project and detailed budgets for each fiscal year will also be produced based on the Procurement Plan and activity schedule, to provide a framework for FM purposes.
- **Reporting and internal control.** The project will submit the interim unaudited financial report within 45 days from the end of each quarter. The IUFRR shall be prepared according to an agreed format and supported by an appropriate set of documents and evidences.
- **Internal audit.** The internal audit for the project will be conducted by a private chartered accountant firm twice during implementation based on an agreed terms of reference (ToR).
- **External audit.** DWASA will submit the entity audited financial statement to the Bank and WB, not later than six months from the end of a fiscal year. The entity financial report shall incorporate a project specific statements presenting project transactions in a format agreed and deemed acceptable by the Bank and WB.
- **Staffing.** An FM specialist will be recruited for the PMU based on the ToR agreed with the WB. One accounts officer and one accountant will be deputed to support the FM specialist in carrying out day-to-day accounting and bookkeeping functions.

- **Governance and oversight arrangements.** Policies governing the WB funds including on anticorruption will apply to the entire block of funds. The project will be audited by the Foreign Aided Project Audit Directorate (FAPAD) under Controller and Auditor General (C&AG) each year to meet the legal and financial management requirement. The audit report will be submitted to the Bank within six months from end of each financial year and shall be made available for public disclosure.
- **Audit committee.** To ensure that the project audit issues raised by the internal audit and entity audit are reviewed and to ensure robust follow-up of the audit recommendations, a Project Audit Review Committee (PARC) will be constituted. The PARC will meet twice a year to review the audit reports and follow up on audit recommendations.

42. **Disbursements.** The loan will adopt a combination of direct payment, advance and reimbursement methods for payments. The Borrower will submit the withdrawal applications to the WB with appropriate documentation. WB will review the requests and forward them to the Bank for further processing. The Bank will disburse the loan proceeds to the Borrower. The expected disbursements are presented in Table 2.

Table 2: Expected Disbursements in USD million

Fiscal Year	2020	2021	2022	2023	2024	2025
Annual	7	17.5	30.0	41.5	49.0	25.0
Cumulative	7	24.5	54.5	96.0	145.0	170.0

3. Project Assessment

A. Technical

43. **Dhaka Master Plan.** The Project is based on the comprehensive Dhaka Sewerage Master Plan (2013), which prioritized investments according to need and technical linkages. Within the DWASA service area the following priorities regarding sanitation services and treatment facilities were recommended under the Master Plan: (i) focus on new infrastructure to service the greatest number of people per unit of investment, which typically requires giving priority to the high-density urban center and priority to sanitation for low income communities. This also tends to be the environmental priority due to the fact that the sewage is currently discharged untreated into lakes and drainage canals; (ii) rehabilitate the existing sewerage system, (iii) availability of land the provision of pumping/lifting stations and sewage treatment plants.

44. **Pagla Catchment.** Based on the Master Plan, the Pagla catchment, including the Pagla sewage treatment plant, was identified as the Phase 1 priority catchment. The backbone of the Pagla catchment sanitation system is: (i) the Eastern plus Western trunk main sewers, and (ii) the Pagla sewage treatment plant. These two elements are closely related and must be

designed jointly. Once these are in place, the secondary (and tertiary where possible) sewer systems in the districts where access is directly possible can be constructed and connected to the main trunk sewers. Household connections are included in the project. In hard-to-reach areas, non-network sanitation services will be tested and introduced for the interim period until the sewer system has been extended to cover the whole catchment.

45. **Project Design Update.** Based on the Master Plan, a Consultant has been working on a revision of the system design and preparation of tender documents for: (i) Design-and-Build (DB) contracts for the sewerage network; and (ii) the Design-Build-and-Operate (DBO) contract for the Pagla STP. During the mission, the Bank team has worked closely together with the WB-team, DWASA and the DB/DBO-Consultant to fine-tune and finalize the updated the project design to match the approved project cost budget while ensuring that project objectives are maintained. The final concept design is well documented and contains reliable cost estimates based on detailed Bill of Quantities and current schedules of rates. The Project Team has evaluated the feasibility of the project implementation plan, taking into account: (i) technology options (micro-tunneling in densely populated/build-up areas and open-cut trenching where possible), and (ii) working hours and multiple location constraints imposed by the Dhaka City Corporation. The resulting project timeframe is thus judged to be realistic.

46. **Effluent Requirements for the Pagla STP.** DoE has revised the current effluent standards and submitted it to the Ministry of Environment for review and subsequent approval. Under the new standards, a total ammonium nitrogen threshold (TAN < 15 mg/l) was introduced for the first time. DoE has advised DWASA to continue to follow the 1997 effluent standard without the nitrogen threshold for the time being. Nevertheless, in anticipation of the regulatory change, DWASA may follow the new standard based on TAN for the Pagla STP. This is expected to increase STP capital expenditure by USD 5-10 million, which will be accommodated within the available project budget.

47. **Project Design.** The technical project outline of the infrastructure components is summarized in Table 3. The concept design is assessed to be of high quality and the approach to be feasible.

Table 3: Project Design Summary

No.	Main Infrastructure Components	Existing Facility (Capacity/Type)	Project Measure
1	Pagla Sewage Treatment Plant (STP)	Installed capacity of 96 MLD, operating at 30–40 MLD (primary treatment plus ponds)	200 MLD (primary and secondary treatment + biogas utilization). Will be constructed at the site of the existing treatment plant, which will be gradually decommissioned. Two appropriate standard technologies will be defined in the tender documents.

2	Eastern Trunk Main (Madhubagh - Pagla STP)	12.8 km DN 900-1,350 mm	12 km new trunk mains (micro-tunneling and open-cut), diameter 900–2600 mm, including one main pumping station
3	Western Trunk Main (Hazaribagh-Narinda PS)	6.6 km DN 600-900 mm	6 km new/rehabilitated trunk main, including one lifting station and one pumping station
4	Pagla Sewer Network	~ 360 km, 11 sewer lifting stations (SLS)	392 km sewer lines rehabilitation /reconstruction /new construction, including house connections (approximately 57,000 connections)

48. **Non-network Sanitation.** The construction of trunk mains and extension of the sewer system is likely to cover incrementally a substantial portion of households in the Pagla catchment area. However, there is a proportion of households in hard-to-reach areas and extending sewer coverage to these households during the project period may be difficult. Sanitation options for the difficult-to-reach-households are standard and will include the provision of: (i) shallow /small bore sewers with decentralized sewage treatment; and (ii) a common septic tank for a row of houses, and existing households with septic tanks. Land availability will guide the above choices, and the objectives of Component 3 is to pilot-test non-network sanitation solutions, which can be scaled-up subsequently.

49. **Operational Sustainability.** DWASA has shown considerable improvement in the management of its water supply infrastructure and services over the last decade, including the reduction of leaks, improved operational performance, delivery of services to the poor, and implementation of water treatment plants. Its management of sewerage services has had a mixed record. In recognition of the technical complexities involved in the design and implementation of sewerage infrastructure, DWASA has agreed to adopt a DB/DBO approach to design and implementation. The DBO approach will enable a professional contractor to design, construct, operate and maintain the STP for three years.

50. The O&M arrangements are different for the two main parts of the system. The sewer network is considered standard and DWASA has both the capacity and experience to maintain the network (pipes, manholes, pumps) and operate the system (pumping stations and controls). Therefore, a DB-contract approach has been selected for the sewer network and trunk mains. The Pagla STP will include facilities and technology that are new to DWASA. The Contractor will operate and maintain the STP for a period of three years after completion and end of defect and liability period. An initial period of O&M for the STP will be financed under the project. Targeted training courses will be included in the DBO-contract with the purpose of training DWASA-staff so that DWASA can take over the O&M after the three-year DBO O&M period.

B. Economic and Financial Analysis

51. **Project Costs and Benefits.** A Cost-Benefit Analysis (CBA) was carried out by the Bank team in close collaboration with the WB team to assess the economic viability of the project comparing “with-” and “without-project” scenarios. The considered project costs include initial construction costs and annual O&M costs for the sewerage network and sewage treatment plant. The expected project benefits include: (i) an overall reduction of public health risks for the urban population by reducing exposure from untreated sewage, (ii) increased dignity and quality of life of residents (decreased incidence of disease, reduced smells), and (iii) environmental benefits through reduced pollution load in water bodies in Dhaka and its surroundings. For the CBA only direct benefits to the connected households were considered. The direct benefits were estimated through the tariff revenue, which was used as a proxy for the lower bound of the direct benefits to connected households. The payment reveals the minimum valuation of the service by the connected households.

52. **Results and Sensitivity Analysis.** The Economic Internal Rate of Return (EIRR) was estimated at 14.5 percent and Economic Net Present Value (ENPV) at USD220 million based on a 10-percent discount rate. Given that only direct benefits to connected households were considered, the EIRR can be interpreted as a lower bound estimate. The EIRR exceeds the social discount rate demonstrating the economic viability of the project. A sensitivity analysis has been carried out to assess the impact of a 20 percent increase in investment cost, a 20 percent increase in O&M cost, a 20 percent decrease in benefits, a reduction of asset lifetime to 20 years and a worst-case scenario combining all of the aforementioned scenarios. The EIRR remains above the social discount rate of 10 percent for all of the scenarios, except for the combined worst-case scenario under which the EIRR falls to 9.5 percent. The approach and detailed results are presented in Annex 3.

53. **Financial Analysis.** A comprehensive financial analysis of DWASA was carried out and a financial projection model was developed to assess the long-term financial impact of current operations and future investments. The financial analysis was conducted by the WB team and reviewed by the Bank team. To strengthen the financial sustainability of DWASA in the medium-term three actions are foreseen under the project: (i) a sewerage connection strategy to increase the client base of DWASA, (ii) an awareness campaign to increase the willingness to pay of clients, and (iii) a tariff framework to adjust the water and sewage tariff towards a justified tariff based on sector benchmarks and a tariff rationalization. The assessment and proposed measures to strengthen the financial sustainability of DWASA were reviewed by the Bank team and assessed as appropriate. The detailed analysis is reported in Annex 3.

54. **Cost Recovery.** With an Operating Cost Coverage Ratio (OCCR) above 1.3 during the last six years, DWASA is able to cover its operating expenses through tariff revenue but is performing below sector level benchmarks for well-performing water sector utilities. The analysis of the past six-year period revealed a mixed performance. DWASA has improved its performance in several operational parameters. It has been able to decrease its Non-Revenue Water from 29.6 percent to 21.33 percent while increasing its customer base from 311,100 connections in 2012 to 371,767 in 2017 and almost doubled its billed operating revenue from BDT 5,972 million in 2012 to BDT 10,633 million in 2017. However, the increase in operating

expenses from BDT 4,051 million to BDT 7,975 has outpaced the increase in operating revenue translating to a negative trend in DWASA's OCCR, which decreased from 1.47 in 2012 to 1.33 in 2017.

55. **Tariff Analysis** An analysis was carried out to determine a justified tariff and comparing it to the current average tariff charged to consumers. The analysis assumes that a justified tariff should fall between an OCCR of 1.5 and 2.0, and shall achieve returns like other well-performing utilities [e.g. Manila Water Company (MWC) and Bangkok Water Authority (BWA)]. For DWASA to achieve a 1.5 OCCR, the average tariff needs to be set at BDT 16.28 per cubic meter (m³), while BDT 21.72 per m³ would be needed to achieve a 2.0 OCCR like MWC. The justified tariff should fall between these two points. Even with the higher tariff that equates to an OCCR of 2.0, DWASA will fall short of the benchmark returns of both MWC and BWA. Given DWASA's extensive capital investment program, depreciation costs will increase substantially once the new assets are operational. At the minimum, DWASA needs a tariff adjustment of approximately 10 percent to BDT 13.9 per m³ net of cost increases that, under current debt servicing conditions, will eliminate the net losses in the four years and reduce them thereafter. DWASA will then be able to maintain some profit over operations and increase cash flow for repaying the principal on the sizeable debt burden.

C. Fiduciary and Governance

56. **Procurement Capacity and Risk.** DWASA will be responsible for all procurement under the project. A detailed procurement capacity assessment has been carried out for DWASA by the WB, which indicates high (substantial in WB categorization) risk in procurement operations and contract management. Even though DWASA has experience in contract management and WB procurement, it lacks experience in procuring and managing DBO contracts which may lead to delays. To minimize procurement-related risks, the following mitigations measures will be undertaken:

- a) Training project officials including evaluation committee members on the WB Procurement Regulations, country procurement laws, STEP, and other aspects of procurement,
- b) Forming bid/proposal evaluation committees satisfactory to the WB and having the necessary expertise depending on the type of contract and with the mandatory membership of a procurement consultant;
- c) Appointing experienced procurement consultants for entire project period based on a ToR acceptable to the WB;
- d) Using the WB's SPDs and standard/model procurement documents satisfactory to the WB;
- e) Other due diligence measures including: (i) verification of recommended bidders' post-qualification information during bid evaluation; (ii) making bidders aware about fraud and corruption issues in writing and/or at pre-bid/proposal meetings, as applicable; (iii) preserving all procurement-related documents to facilitate smooth post procurement reviews; and (iv) publishing contract award information at the Central Procurement Technical Unit and the websites of the respective agencies within two weeks of the

contract award and on United Nations Development Business Online for international contracts.

57. The Bank Team has reviewed the WB's procurement assessment and agrees with the risk rating and the proposed measures to mitigate procurement-related risks.

58. **Financial Management.** The WB carried out a financial management capacity assessment of DWASA during the project appraisal. DWASA has a well-structured financial management organization headed by a Deputy Managing Director (Finance) (DMD-Finance). A Commercial Manager reporting to the DMD-Finance oversees the accounting functions carried out by the accounts department headed by a Chief Accounts Officer (CAO). DWASA has previous experience in managing WB funds and is therefore well conversant with MDB's financial management and disbursement requirements. DWASA's financial statements are prepared and audited in a timely manner and the audit reports are uploaded on the DWASA website.¹² In the latest audit report for FY16, the auditor gave a qualified opinion on the financial statements. Despite existence of a robust financial management structure, there have been lapses on the part of management in the proper execution of financial management activities. The overall financial management risk of the project is assessed to be high (Substantial in WB categorization). Necessary measures such as strengthening internal audit procedures were discussed and will be carried out during the implementation of the project.

59. **Institutional Capacity.** DWASA has implemented several MDB-financed projects in the water and sanitation sector and is familiar with the WB's procedures and requirements. An evaluation of the recently completed WB-financed Dhaka Water and Sanitation Project has found DWASAs implementation capacity lower than expected. To increase institutional capacity, this project includes technical assistance and capacity enhancement for DWASA. In addition, individual experts will be appointed under the project to strengthen the PMU, which will also be supported by a PMC in coordinating and overseeing all project activities.

60. **Reporting and Monitoring.** The PMU will be staffed with requisite experts to ensure quality to the monitoring and reporting on implementation progress. Designated experts in the PMC team will assist the PMU in reporting and monitoring.

D. Environmental and Social and International Waterways Aspects

61. **Environmental and Social Policy and Categorization.** Since this Project will be cofinanced with the WB, the Bank has agreed with the WB to use the WB's Environmental and Social Safeguard Policies (Safeguard Policies) because: (i) these Safeguard Policies are consistent with the Bank's Articles of Agreement and materially consistent with the provisions of the Bank's Environmental and Social Policy and relevant Environmental and Social Standards;

¹² DWASA's audit reports are available at <http://dwasa.org.bd/audit-reports/>

and (ii) the monitoring procedures that are in place are appropriate for the Project. Under the WB's Safeguard Policies, the Project was assigned Category A.

62. The joint Bank and WB due diligence process for environmental and social aspects during project preparation has resulted in the application of WB's Operational Policies (OP) on Environmental Assessment (OP 4.01), Natural Habitats (OP 4.04), Physical Cultural Resources (OP 4.11) and Involuntary Resettlement (OP4.12).¹³

63. An Environmental, Resettlement and Social Management Framework (ERSMF) and an Environmental and Social Impact Assessment (ESIA) have been prepared for the project. Since a Design, Build and Operate (DBO) approach has been proposed, this may require an updating the ESIA, and will require site-specific Environmental Management Plans (ESMPs), before the commencement of works for individual project segments. The ESIA has focused on land acquisition and resettlement, safe disposal of sludge, contaminated soils, debris, spoils and solid waste, traffic disruption and other construction-related impacts in dense built-up areas and along narrow roads, risks of soil and water pollution from construction and routine maintenance activities, workers' health and safety risks mainly due to exposure to untreated sewage and its odor, community health safety risks mainly due to exposure to construction activities and labor influx, disposal of solid and liquid effluents from the treatment facilities and their impact on the receiving environment.

64. **Environmental Aspects.** The project will build a new STP on the same land of the current Sewage Treatment Plant, rehabilitate/renovate two of the existing Trunk Mains, and build/rehabilitate necessary lifting pump stations (LPS). Although the locations have been largely identified, the project will follow the DBO approach, possibly requiring updating of the ESIA before commencement of the relevant works. The project will also involve construction/improvement of collection networks in the Pagla catchment area, however, the exact location of the networks has not been finalized. Consequently, DWASA has prepared an Environmental Management Framework (EMF) for the Pagla catchment's collection network according to Dhaka Sewerage Master Plan. The ESMPs developed under the ESIA for the individual sites will be included in the respective bidding documents. Under the bidding documents, the Contractors will be required to submit a Construction Environmental Action Plan for PMU approval prior to mobilization. In addition, the Contractor will be required to submit a Job Safety/Hazard Analysis at the beginning of construction works at each new site addressing the measures associated with various hazards at those sites. These reports will be reviewed and approved after ensuring that mitigation and monitoring measures proposed in the analysis are in place at the work sites.

65. **Social Aspects.** The project involves the rehabilitation and construction of trunk mains from Madhubagh to Pagla STP, as well as along other alignments as suggested by design consultants. The rehabilitation/new construction is broadly along the existing alignments, through densely populated parts of the old city. While micro-tunneling technology is being

¹³ See subsection on Occupational Health and Safety, Labor and Employment Conditions.

proposed for works to be done underground, the construction process is likely to displace encroachers and non-titled holders/ households who may have been living along the Trunk Main alignment and/or cause temporary closure of businesses operated from private premises affecting people employed in these establishments as well. Others affected include vendors and those who operate small-scale trading activities on the sidewalks and road shoulders. If land is required for the construction of trunk mains and related facilities, in addition to such land available in existing lift pumping stations, DWASA may have to acquire the required lands from private owners. However, the actual need for acquisition and the amount thereof, as well as their locations would only be known after the designs are finalized. In view of the potential impacts, OP/BP 4.12 on Involuntary Resettlement applies to the project. DWASA has prepared an Environmental, Resettlement and Social Management Framework (ERSMF), which includes a Social Management and Resettlement Policy Framework (SMRPF). As and when necessary, the SMRPF guidelines will provide the basis to identify the social safeguard issues under a given contract package and prepare and implement impact mitigation plans like Resettlement Plans / Abbreviated Resettlement Plans (RP/ARP).

66. Occupational Health and Safety, Labor and Employment Conditions. To ensure safe and hygienic conditions in the “labor camps/sheds”, DWASA and the contractors will address the following issues, as applicable for male and female workers:

- Identifying alternative locations where labor camps could be set up during the implementation of the civil works under each contract/work packages. Wherever possible, labor camps should be away from residential neighborhoods, to avoid potential discord and confrontations with the local residents;
- Ensuring hygienic living conditions with clean drinking water, sanitation and washing and other facilities (drinking water from shallow tube-wells must be tested for contamination such as the presence of arsenic, etc., and the test results must be preserved for inspection);
- Ensuring measures required for the safety and dignity of female workers with respect to living accommodations, sanitation and washing facilities, etc.;
- Ensuring that the contractors do not employ child labor (i.e. children under 14 years of age);
- Preventing the confrontation of workers with the local communities who might adversely react to the presence of non-local laborers; and preventing exposure to health risks, especially those linked to Sexually Transmitted Diseases (STDs).

67. Stakeholder Consultation and Information Disclosure. Consultations were undertaken with local people during the preparation of the ESIA. Participants included various stakeholder groups, such as business owners and others in permanent buildings, titled and non-titled holders/households living by the trunk main alignments; roadside vendors selling vegetables, fruits and various other perishables, sitting in groups and alone in the open; male and female pedestrians; and the like. The issues highlighted in these consultations by community representatives included compensation, potential employment opportunities, cleanliness of the city, problems associated with dirty water, the importance of this project, and the role of DWASA. The participants were also informed of the grievance redress mechanism

(GRM) and grievance redress committees (GRC) and, if needed, how they could lodge grievances and complaints to the GRCs.

68. The ERSMF and ESIA were translated into Bengali and were published on the DWASA website, and hard copies of these documents were made available at the local DWASA offices for public access. The ESIA has been disclosed by DWASA in English and Bengali on its website on May 27, 2019, and by the WB in English on June 3, 2019, on its website. The ERSMF has been disclosed by the client in English and Bengali on April 9, 2019 on its website and by the WB in English on April 25, 2019, on its website.¹⁴ The quarterly monitoring report will also be disclosed on the DWASA website during implementation.

69. **Gender.** The Project has been designed to encourage DWASA to employ women and especially for the new jobs that the project creates. The project will provide technical training and on-the-job opportunities for female employees including engineers to enhance their professional growth. The detailed areas to be covered by the training will be determined in consultation with DWASA.

70. **Grievance Redress Mechanism.** DWASA will establish two Grievance Redress Mechanisms (GRMs), one of which will deal with complaints / grievances about any irregularities in applying the provisions adopted in the ERSMF, as well as other issues arising from the project activities. The second GRM will address occupational health and safety, labor and employment conditions. Complaints/grievances under these GRMs may range from land and displacement-related issues, compensation payment, to various inconveniences created by rehabilitation or construction of sewers and other works (e.g., open-cut channels), for pedestrian and vehicular movements. Multiple Grievance Redress Committees (GRCs) will be constituted at the local level taking into consideration ease of accessibility by the people who will be affected by the project. All unresolved cases shall be referred to PMU and then to the Local Government Division (LGD) of the Ministry. Based on consensus, the GRCs will attempt to resolve grievances / complaints amicably and quickly, to facilitate implementation of the civil works.

71. **Use of WB's Accountability Mechanism** In view of the fact that the WB's Safeguard Policies will apply to this project, and pursuant to AIIB's agreement with the WB, AIIB will rely on the WB's corporate Grievance Redress Service (GRS) and the independent Inspection Panel (IP) to handle complaints relating to environmental and social issues that may arise under the project. Consequently, in accordance with AIIB's Policy on the Project-affected People's

¹⁴ DWASA. <https://dwasa.org.bd/notices-2/>; The World Bank. 2018. Dhaka—Sanitation Improvement Project: Environmental Assessment: Environmental, Resettlement, and Social Management Framework (English). <http://documents.worldbank.org/curated/en/907421556252234929/Environmental-Resettlement-and-Social-Management-Framework>; The World Bank. 2019. Bangladesh—Dhaka Sanitation Improvement Project: Environmental Assessment: Environmental and Social Impact Assessment of Pagla STP and Trunk Mains (English). <http://documents.worldbank.org/curated/en/507721559627554397/Environmental-and-Social-Impact-Assessment-of-Pagla-STP-and-Trunk-Mains>

Mechanism (PPM), submissions to the PPM under this project will not be eligible for consideration by the PPM. The WB GRS is designed to ensure that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaints to the WB's independent IP at any time after concerns have been brought directly to the WB's attention, and its management has been given an opportunity to respond. For information on how to submit complaints to the WB's corporate GRS, please visit: <https://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the WB's Independent IP, please visit: <http://www.inspectionpanel.org>.

72. **Monitoring and Supervision Arrangements.** The project will be monitored through the Environmental and Social professionals engaged by the PMU (Project Management Unit). A Third-Party Monitoring Agency will be engaged to conduct bi-annual monitoring of the project. The WB has also engaged additional resources to supervise and guide the process of temporary displacement of non-title holders. Bank staff will also conduct periodic site visits.

73. **International Waterways.** The Bank's Operational Policy on International Relations (OP on IR) applies because the project involves the use of the Buriganga River, a tributary of the Meghna River, flowing through India and Bangladesh. Pursuant to Section 2.3 of the OP on IR, the Bank may, instead of carrying out its own assessment, rely on the assessment of the co-financier if the Bank is satisfied with the assessment capacity and process of the co-financier, as well as the assessment itself. The WB's OP/BP 7.50 on International Waterways was applied by the WB to this Project. The WB in its assessment concluded that the Meghna River and its tributary are international waterways for the purposes of the WB's policy on international waterways. The WB has concluded that the project will have no impact on any of the riparians considering that sewage and septage will be collected, transported to the Pagla Treatment Plant (with some septage treated at decentralized sites), treated to a quality better than or equal to Bangladesh effluent discharge quality standards and discharged into the Buriganga River. The Buriganga River is the only international waterway to which the project has a connection. Consequently, the WB applied the exception under the WB's OP/BP 7.50 to the riparian notification requirement on the basis that the project has no impact on the other riparian states. The Buriganga River flows only in Bangladesh – the most downstream state of the combined Ganges-Brahmaputra basin. The Bank's OP on IR provides that riparian notification is not required if the project is expected to have minimal or no effect on any of the other riparians. Since the Bank concurs with the WB's assessment, notification under the OP on IR is similarly not required under paragraph 3.3(c)(i) of the OP on IR.

E. Risks and Mitigation Measures

In line with the WB's assessment, the project team has assessed the overall project risk as "High".

Table 4: Summary of Risks and Mitigating Measures

Risk Description	Assessment Ratings (High, Medium, Low)	Mitigation Measures
<p>Sector Policies Overlapping roles and low tariffs Unclear roles and responsibilities as per current sector policies and governance may lead to lack of ownership for identifying solutions for non-network sanitation and scale-up.</p> <p>Current tariff structure poses risk for financial sustainability.</p>	Medium	<p>The technical assistance under this project (Component 1) aims at clarifying roles and responsibilities in the sanitation sector in Dhaka and to establishing a coordination mechanism. The Secretary of LGD, MoLGRD&C, will chair the Project Steering Committee and oversee the overall project coordination, including for identifying solutions for non-network sanitation.</p> <p>A tariff framework will be developed and approved within six months of project effectiveness to improve financial sustainability.</p>
<p>Technical Risk</p> <p>Construction The proposed project includes complex interventions in dense parts of the city, including building and expanding the sewer network, including house connections.</p> <p>O&M Inadequate O&M due to limited capacity of DWASA in operating STPs.</p>	High	<p>The trunk mains are proposed to use micro-tunneling in the most densely populated parts of the alignment by procuring experienced international contractors on a DB basis with expertise and experience in similar Asian cities.</p> <p>A dedicated sanitation unit will be created in DWASA for capital assets creation for sanitation (STP and trunk mains), and this will provide a template for similar sanitation investments in other catchments of Dhaka.</p> <p>DWASA has agreed to adopt a DB/DBO approach to design and implementation. The DBO approach will enable a professional contractor to design, construct, operate and maintain the STP for 3 years.</p>

<p>Household connections Low ownership or interest by households could lead to the sewer network being built, but households may choose not to connect for various reasons (e.g. existing septic tank, low interest and awareness).</p>		<p>The DBO contractor will develop standard operating procedures for the O&M of the STP. The PMC will provide training to DWASA personnel. The contractors and the PMC will strengthen DWASA in developing capacity and skills in operations management of assets.</p> <p>DWASA will implement a comprehensive connection promotion strategy, which will be complemented by an outreach, communication and stakeholder engagement action plan during construction.</p>
<p>Implementation Coordination with other agencies on key aspects of the project, particularly on septage collection and transportation, drainage, and road cutting is essential for smooth implementation. The risk is high, given that there are limited coordination mechanisms in place.</p> <p>Implementation capacity DWASA has a limited capacity to ensure the implementation of the planned construction activities within the budget and planned time.</p> <p>DWASA staff have largely been focused on producing and supplying water and have had little experience in managing sanitation.</p>	<p>High</p>	<p>Under the TA component, the roles and responsibilities with regard to drainage and septage management will be clarified. In addition, a Project Implementation Committee, headed by the Managing Director of DWASA and including representatives from relevant stakeholders will be established.</p> <p>A PMU will be fully established in DWASA prior to effectiveness. The PMU will be supported by a PMC. A Design Review and Supervision Consultant will conduct the supervision of works.</p> <p>The project will include training measures to ensure adequate O&M of the sanitation infrastructure.</p>

<p>Environmental and Social</p> <p>Risks pertaining to construction related environmental safeguard are moderate.</p> <p>While no land acquisition is required for the Pagla STP and no major resettlement is expected in this phase of the project, the construction of networks will be in highly dense areas, which may have substantial social impacts.</p> <p>The two trunk mains traverse old parts of the city that are densely populated residential areas and crowded with various commercial activities. The construction activity may cause temporary closure of some businesses operated from private premises. This will also affect people employed in these establishments. Others who may be temporarily affected include vendors who operate small-scale trading activities on the sidewalks and road shoulders.</p>	High	<p>All Social and Environmental risks will be managed, in compliance with Bank requirements, through capacity building of the project's PMU.</p> <p>The use of pipe-laying technology (micro-tunneling versus open cut) and the pace of construction works will be determined based on the severity of impact on pedestrian and vehicular movements.</p> <p>DWASA will establish two GRMs, one of which will deal with complaints/grievances about any irregularities in applying the provisions adopted in the ERSMF (see the section on ERSMF for details) and other issues arising from the project activities. It is a three-tier mechanism and will have multiple Grievance Redress Committees (GRCs) at the local level, taking into consideration the ease of accessibility by the people who will be affected by the project. All unresolved cases will be referred to the PMU and then to the LGD.</p>
<p>Procurement and Financial Management</p> <p>Weak implementation capacities in procurement due to lack of experience in procuring and managing DBO contracts which may lead to delays.</p>	High	<p>The WB has defined a range of appropriate mitigation measures to minimize these risks during the implementation of the project. Adequate staffing for procurement needs will be placed for internal control, documentation, information dissemination, administration of contracts, payments, and handling of complaints.</p>
<p>Financial Sustainability</p> <p>With the current tariff and</p>	High	<p>A tariff framework is being developed, to</p>

<p>DWASA's current business practices, financial sustainability may be weak.</p> <p>There is a risk that DWASA will not be able to levy and collect tariffs for any additional sanitation services as it is already charging a nominal tariff.</p>		<p>be approved within six months of effectiveness by the appropriate authorities; further, the project will support DWASA in strengthening its commercial orientation.</p> <p>A communications and public engagement strategy will be implemented to help build understanding around the change in service quality, tariffs and connection charges, apart from coordinating with other stakeholders in Dhaka. In addition, a connection strategy will be developed and applied to rapidly increase the consumer base of DWASA for sanitation services.</p>
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Annex 1: Results Monitoring Framework

Project Objective:	The Project Objective is to increase access to safely-managed sanitation services in select areas of Dhaka City and to improve DWASA's efficiency for sanitation service delivery.										
Indicator Name	Unit of measure	Base-line Data Year	Cumulative Target Values ¹						End Target	Frequency	Responsibility
			YR1	YR2	YR3	YR4	YR5	YR _{n-1}			
Project Objective Indicators:											
1. People provided with access to safely-managed sanitation services	No.	0							1.5 million	Quarterly, Year 3 Onwards	PMU. Administrative Data from DWASA and Private Operator
1.1 People provided with access to safely-managed sanitation services - Female	No.	0							0.75 million	Quarterly, Year 3 Onwards	PMU. Administrative Data from DWASA and Private Operator
2. Operating Ratio for DWASA combined Operations (Water and Sewerage) maintained below 0.7 (Yes/No)	Yes/No	No							Yes	Once a year, from Year 2	PMU. Revenue and cost numbers from the accounting database maintained within DWASA's accounts division.
Intermediate Results Indicators:											

¹¹ Annual target values will be determined jointly with WB during the inception phase of the project.

Component 1: Institutional Support for Sanitation Service Delivery											
DWASA sewerage GIS strengthened	Yes/No	No							Yes	Once a year, starting Year 2	PMU. Data from the DWASA GIS/Mapping unit.
Sewerage Connection Strategy and Plan developed and implemented under DWASA's oversight according to plan	Yes/No	No							Yes	Once, in Year 2.	Third-Party Agency. Household survey on Project Information conducted by third-party communication agency.
Component 2: Sewerage and Wastewater Treatment											
Experienced STP operator contracted for a minimum of 3 years	Yes/No	No							Yes	Once in Year 3	PMU. Administrative and procurement data collected and maintained by DWASA.
Length of Trunk Mains completed	Km	0							18	Quarterly, Year 2 Onwards.	PMU. The constructed length will be measured by the

											contractor and provided as a part of regular progress reports.
Household sewer connections resulting from project interventions	No.	26,000		26,000			46,000		50,000	Quarterly, from Year 3.	PMU. Household connection database maintained within the billing collection system.
Volume of sewage collected from the Pagla catchment and flowing to Pagla STP	Million liters/day	0							150	Quarterly, from Year 2.	Operational data collected and maintained by the DBO contractor at the Pagla STP and verified by DWASA. ²
Quality of effluent discharge from the Pagla STP	% of control samples where all effluent concentrations (key WQ-parameters) are	0							70	Quarterly, from Year 2.	PMU. Operational data (SCADA and third-party water samples from inflow and outflow) collected by the DBO contractor and verified by DWASA.

² Data will be collected by the Supervision Consultant during the project period. After that, the Pagla Catchment Unit in DWASA will continue supervision of the performance of the STP.

	below the DOE standard										
Component 3: Non-network Sanitation											
People benefitting from safely-managed sanitation in Pagla Catchment	No.	0							100,000	Quarterly, Year 3 Onwards.	PMU. Household connection database maintained within the billing collection system and record of septage collected and deposited at the Pagla STP.
People in low-income settlements provided with sanitation services	No.	0							50,000	Quarterly, Year 2 Onwards.	PMU. Database maintained within the billing collection system and record of septage collected and deposited at the Pagla STP.
Component 4: Project Implementation and Management Support											
DWASA maintaining a	Yes/No	No							Yes	Quarterly, Year 2	PMU. GRM database

Grievance Redressal Mechanism										Onwards.	maintained at DWASA.
Percentage of female DWASA employees provided with technical, leadership and orientation trainings	No.	0							60%	Once a year, starting in Year 2.	PMU. Post-training will be administered by the PMC under the supervision of the PMU.
Percentage of beneficiary households that expressed satisfaction with service provision	%	0							50	Once a Year.	Third Party Agency. Sample household surveys conducted by Third Party agency.
Percentage of female-headed beneficiary households satisfied with services	%	0							50	Once a Year.	Third Party Agency. Sample household surveys conducted by Third Party agency.
Percentage of complaints redressed within stipulated redressal period	%	0							70	Quarterly, Year 2 Onwards.	PMU. GRM database maintained at DWASA.
Percentage of female staff who achieve career progression	%	0							5	Once a year, starting Year 2.	PMU. Data from DWASA annual report.

through getting relevant placement after receiving technical, management, leadership and orientation training (percentage)												
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Annex 2: Detailed Project Description

A. Overall Approach

75. According to the DWASA Water Supply and Sanitation Master Plan, investments in sanitation and sewage treatment in Dhaka must follow a step-wise approach. The first step is to divide DWASA's service area into sub-catchments. The second step is to implement: (i) trunk main sewers, (ii) secondary and tertiary feeder networks, and (iii) the STP. Trunk main sewers are the back-bones of the entire system and shall be designed and constructed first and to full capacity while the lower-order sewer networks are implemented gradually over a longer period. Once the trunk main sewers are laid and covered, enlargement is very difficult and costly.

76. The secondary and tertiary networks and the STP can be constructed gradually over time in a balanced way. The first consideration is that it is economically and financially sub-optimal to construct a large sewer network without having the capacity to treat the sewage – or vice versa. Secondly, both BOD over- or underloading of a STP will result in a reduced treatment capacity which, in turn, may lead to a contravention of the DoE's effluent standards. For this reason, the STP shall be designed to accommodate for a modular extensions (e.g. modules with a treatment capacity of 50.000 MLD) that matches the gradual increase in household connections as the sewer network system is extended to cover new areas.

77. About 10-15 percent of the Pagla sub-catchment cannot be reached by sewer networks. Although a new policy directive places the responsibility for non-network sanitation management with DCC (South), it has been agreed that the project will pilot locally-adapted septage collection and treatment solutions that can be scaled up later as DCC(South) develops its capacity.

B. Project Components

78. **Component 1 – Institutional Support for Sanitation Service Delivery. (Total Cost USD 7.08 million including contingencies USD 0.17million; IDA USD 3.54 million; AIIB USD 3.54 million)** This component will support operational and financial strengthening of DWASA to manage sanitation services, organized in five main activities:

- a) **Establishing an operational sanitation directorate.** DWASA is currently in the process of assessing options for changes in its organization structure for sanitation, and planning and construction of capital assets (treatment plants, trunk mains, sewers, etc.); as well as for operations management of the above assets, and providing front-line services to customers. Activities will include: (i) training of DWASA Personnel in STP operations, Trunk Mains Maintenance management, O&M management of sewers, (ii) procurement and contract management, (iii) training on climate change and improving operational efficiencies in sanitation systems, (iv) strengthening of DWASA's Information Systems (MIS and GIS) for sanitation, and (v) preparation and implementation of a Gender Action Plan for DWASA.

b) **Commercial and financial strengthening of DWASA.** As sanitation infrastructure is constructed along-side an already ballooning water supply capital investment program, DWASA's financial sustainability shall come under considerable pressure. It is expected that DWASA's operating costs will increase with the operations and maintenance (O&M) of new sewers and sewage treatment plants. The capital investments are very high compared to DWASA's current revenues. This sub-component will provide support to: (i) tariff framework rationalization and development, (ii) development and implementation of a sewerage connection strategy, (iii) support to improved commercial management of DWASA billing and collections operations, reporting and auditing, (iv) development and implementation of a sound financial operating plan to account for the O&M of new and existing water and sanitation assets and services.

c) **Citizen Engagement:** To improve service delivery, DWASA needs to strengthen its strategy for public engagement. The Project will support development of strong communication package and help DWASA strengthen services to customers and for the low-income communities and excluded households, improving citizens' and stakeholders' participation and engagement, and improving grievance redressal mechanisms. The activities shall include: (i) engagement with citizens to encourage them to connect to sanitation systems, customer orientation and improved grievance redressal including implementing mobile and IT enabled complaint redressal systems, (ii) the development of a Communication Strategy and Citizens' Engagement, (iii) the improvement of the Grievance Redress System improvement including that for compliance to Bank rules; and (iv) Citizens' Report Card Surveys to collect citizens' feedback.

d) **Financing Options:** In line with programmatic support for the implementation of the Dhaka Sewerage Master Plan, exploring the feasibility of private sectors financing options in future infrastructure provisions for DWASA will help to mobilize financing for investments and improve the efficiency of future operations in the future along with tariff structure rationalization. This sub-component, through a separate consultancy package, will include a study of financing options such as Build-Operate-Transfer and Design Build Operate Transfer.

e) **Stakeholder Coordination:** This last sub-component will provide technical assistance to address coordination issues on sanitation between DWASA and the DCCs (North and South). It will also help clarify the role that the DoE plays as a regulatory body for effluent standards and pollution control. Specifically, this sub-component will help set up a policy and coordination mechanism among these agencies that potentially can be a long-term institutional mechanism. Studies and consultations will be carried out to improve the overall urban environment, management of canals and embankments (for floods), and storm water drains and public health linkages.

79. **Component 2 – Sewerage and Wastewater Treatment (Total Cost USD 446.52 million including contingencies USD 9.01 million; IDA USD 154.3 million; AIIB USD 154.3 million; GoB USD 137.92 million).** The existing Sewerage Treatment Plant at Pagla is located on a 110 ha site approximately 8 km from the city center southeast of Dhaka City and approximately 1 km north of the Buriganga River. A condition assessment was undertaken of

the treatment plant during the preparation of the Master Plan. The assessment pointed to major problems in the plant's functioning including little inflow (mostly industrial effluent from nearby), dysfunctional components and limited treatment.

Table 5: Component 2 Project Activities and Estimated Cost^a

No.	Project Items	Existing Facility (capacity/type)	Project Measure	Estimated Cost (USD, millions)
1	Pagla sewer network and sewer connections	360 km sewers, 11 sewer lifting stations (SLSs)	392 km sewers, 2 SLSs—serving about 1.5 million people (approximately 56,962 connections)	126.0
2	Eastern Trunk Main (Madhubagh-Pagla STP)	12.8 km with a diameter of 900–1,350 including 2 SLSs	12 km new trunk main with a diameter of 900–2,600 including one SPS	73.2
3	Western Trunk Main (Hazaribagh-Narinda PS)	6.6 km diameter 600–900 including one SLS and one SPS	6 km new/rehabilitated trunk main including one SLS and one SPS	26.6
4	Pagla STP	Installed capacity of 96 MLD, operating at 30–40 MLD (primary treatment plus ponds)	200 MLD (primary + secondary treatment)	82.0
5	Uttara Catchment	Draft sanitation design and bidding documents	Review and revision of draft sanitation design and bidding documents	2.5
	Total Infrastructure Investment			310.3

Note: a. Based on the DB/DBO consultant's information. The above costs are exclusive of contingencies and of land acquisition costs and road-cutting charges, which will be borne by Government of Bangladesh.

80. The new Pagla STP shall be constructed at the site of the existing treatment plant. The proposed plant will employ technology with a smaller footprint than the existing ponds, as is common global practice for such large municipal STPs. The planned approach is that of a DBO contract. Mandatory key input and output parameters for STP design are:

- a) Required STP flow and load capacity: initial capacity of 200 MLD (final capacity of 800 MLD) and peak hourly flow of 12,500 m³/h; with influent pollution load of 70,000 kg BOD/d and 150,000 kg COD/d and 80,000 kg SS/d;
- b) Maximum land area permitted for first construction phase: 20 ha out of the total land area available (110 ha);
- c) Minimum dry solids in dewatered sludge: of 25 percent;
- d) Receiving water body for treated sewage: Buriganga River;
- e) Construction of sludge digestors, biogas holder, biogas treatment, combined heat power installations to produce electric and thermal energy from biogas.

f) The STP shall, as a minimum, meet the current 1997 discharge standards for treated sewage in Bangladesh that are: BOD₅ ≤ 30 mg/L, COD ≤ 200 mg/L, SS ≤ 100 mg/L, TAN ≤ 15, Coliform ≤ 1,000 MPN/100 mL.

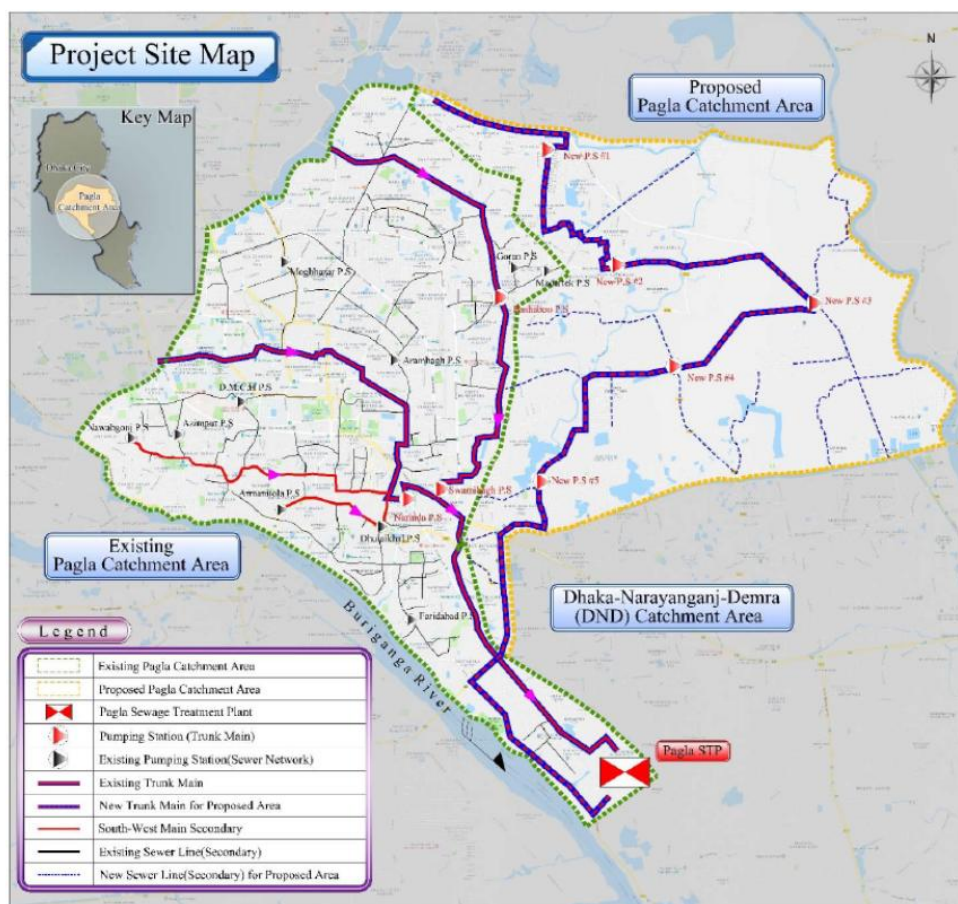
81. Based on the above basic criteria, several permitted technology options have been costed in connection with the ongoing conceptual design undertaken by the DB/DBO-Consultant. The analysis indicates that while capital expenditures do not vary much for different technologies, operating expenditures can vary substantially. The DBO tendering will thus try to give strong weight to operating expenditures and use the combination of capital expenditures and operating expenditures for the definition of the best bid. To permit for a strong weight on operating expenditures, the quoted bid prices for the planned three-years operation phase will thus be applied to a period of 15 years in the bids' financial evaluation.

82. The current Eastern Trunk Main (Madhubagh – Pagla) is of 12.8 km in length and has a diameter ranging from 900 mm to 1,350 mm. The trunk main is routed through the lift stations of Bashabo and Swamibagh. Its alignment is following relatively narrow roads, which are mostly just 6 to 8 m wide and very crowded by street vendors and traffic. The remaining length of the trunk sewer to Pagla will be rehabilitated under the project. The current Western Trunk Main leads from Nilkhet to Narinda PS, which connects to the Eastern trunk main. Its length is approximately six km and diameter ranges from 600 mm to 900 mm, with a short final section of 1,800 mm. The roads, where trunk main is laid, vary from wide to narrow, and are all very crowded with much traffic and many commercial areas.

83. In the Pagla catchment, as shown by the detailed analysis during the concept design phase, about 95 percent of the existing sewers are unfit for future use, mainly due to insufficient hydraulic capacity, a slope into the wrong direction, and/or diameters smaller than the minimum permitted 200 mm. In addition, the analysis showed that most sewers are completely silted up, and the sewage is only conveyed into the groundwater or open drains but does not reach proper treatment facility. The little flow arriving at the Pagla STP are primarily industrial effluents discharged into the very last gravity sewer sections upstream of that facility. For these reasons, it was decided to reconstruct the entire sewerage system since the cost of rehabilitating existing sections far exceeds the cost of new constructions.

84. The sewer blockages cannot be easily eliminated, since their exact location and extent are unknown. Hence, the identifying of the investments in pumping stations are best to be based on studies conducted and designs proposed by the DB/DBO-Consultants. Micro-tunneling technology has been identified as the preferred choice to construct the trunk mains as it is considered less risky given the narrow roads, traffic congestion, numerous commercial enterprises, high population density and poorly constructed settlements in the affected parts of old Dhaka city. The Project will use the Design-Build (DB) approach for trunk mains to ensure that: (i) only one contract will be involved leading to potential cost savings, reduced change orders, and shorter project schedules; (ii) risks for design and construction will remain with one single contractor.

Figure 2: The Planned New Sewer System and Treatment Infrastructure in the Project Catchment Area (delineated by the green dotted line)



85. **Component 3 – Non-Network Sanitation (Total Cost USD 8.46 million including contingencies USD 0.2 million; IDA USD 4.23 million; AIIB USD 4.23 million).** Households with no access to a sewer network and dependent on septic tanks, will require septage management services. Decentralized sewage treatment systems will be explored in areas where road width restricts the entry of small emptying trucks, and should space be available. This component will include piloting of four service options:

- a) Communal Septic Tanks to connecting household toilets
- b) Decentralized Sewage Treatment (DEWATS) to treat liquid effluent from Septic Tanks collected via small-bore shallow sewers
- c) Desludging trucks to empty private and communal septic tanks and transport sludge to the new Decanter-stations
- d) Conversion of decommissioned pumping stations along the main trunk sewer to decanter-stations for the reception of septage sludge from the nearby areas. The sludge will then be drained directly into the sewer network and further to the STP where it is co-treated. Solid matter will collected and transported to designated composting sites

86. **Upgrading of Unimproved Toilets.** The project will support upgrading of poor households' unimproved toilets. NGOs will assist in the identification of poor households in low-income communities that require upgrading and will also present technical and implementation options to households. Households provided with improved toilets will, wherever possible, be connected to sewers or provided with alternative sanitation as detailed above. Between 3,600 and 6,000 poor households will be provided with financial assistance to upgrade unimproved toilets.

87. Under the Water Services for the Urban Poor Project (WSUP), DWASA has piloted a privately-operated fecal sludge emptying service in Dhaka. Operating under a tri-partite agreement between DWASA, WSUP and the private operator, the operator pays a monthly lease fee of BDT 15,000 to DWASA and is permitted to provide emptying services and collect charges for emptying (30% of customers need to be poor households) and dispose emptied septage at designated DWASA sites. This model has been operating successfully and there are plans to expand the business as potential exists. While this model will be scaled up in the project to serve Pagla areas, other options will also be explored.

88. **Component 4 – Project Implementation and Management Support (Total Cost USD 20.94 million including contingency USD 0.25 million; IDA USD 7.93 million; AIIB USD 7.93 million; GoB USD 5.08 million).** This Component will support the strengthening of DWASA's capacity in coordinating and executing project activities, including complying with MDB fiduciary procedures and safeguards. It will also contribute to the acquisition of equipment and the project team's operating costs, as well as: (i) finance selected consultants and training to ensure efficient project implementation by the implementing agency; (ii) finance for audits of project internal processes; (iii) support sound environmental and social management of the project, including gender focus and social inclusion, the preparation of safeguard documents and their monitoring, as well as financing of compensation, if required.

89. DWASA's PMU will be responsible for overall project management including procurement, financial management, safeguards, public communication, and Monitoring and Evaluation (M&E) and reporting. A Project Management Consultant (PMC) will assist in the implementation of the project to enable the PMU to manage all components of the project on time and within budget, including organizing all related training. A Design Review and Supervision Consultant (DRSC) will conduct the technical review of DB/DBO designs and supervision of physical works, primarily Components 2 and 3.

90. **Component 5 – Contingent Emergency Response (USD0).** A provisional zero amount component is included under this project to allow for rapid reallocation of loan proceeds from other project components during an emergency, under streamlined procurement and disbursement procedures. In addition, the contingent component may also serve as a conduit for additional funds to be channeled to the project in the event of an emergency.

Annex 3: Economic and Financial Analysis

Economic Analysis

91. **Methodology and approach.** A cost-benefit analysis was carried out to assess the economic viability of the project comparing “with-” and “without-project” scenarios. The Economic Internal Rate of Return (EIRR) and Economic Net Present Value (ENPV) of the project was estimated based on a discounted cashflow analysis considering costs and benefits. A sensitivity Analysis was performed taking into consideration: (i) increased investment costs¹, (ii) increased O&M costs² and (iii) decreased benefits³, (iv) reduced economic lifetime of assets⁴ and (v) a worst-case scenario, which combines the four scenarios above.

92. **Data.** Primary information on project cost, households’ current water consumption and related wastewater quantity was collected during the preparation of the concept design through engineering consultants and the PMU. The primary data was complemented with demographic information, public health data, other household characteristics, and technical assumptions. Secondary sources include a representative socioeconomic household survey⁵ and expert opinions on technical assumptions. A data verification process was jointly conducted by the Bank and WB team.

Key assumptions:

- Urban population growth is 3 percent per annum
- Household size is 4.48
- Standard Conversion Factor was assumed to be 0.95.
- Project duration is assumed to be 30 years.
- Project implementation period is assumed to be six years.
- The discount rate is 10 percent.

93. **Project Benefits.** The expected project benefits include: (i) an overall reduction of public health risks for the urban population due to reduced fecal exposure from untreated sewage, (ii) increased dignity and quality of life of residents (decreased incidence of disease, reduced smells), (iii) environmental benefits through reduced pollution load in water bodies in Dhaka and its surroundings. In addition to the benefits to the households connected to the sewerage network, people, who would not be connected to the sewerage network at this point, will also benefit from the positive externalities of the intervention (e.g. improved public health).

94. **Quantifiable Benefits.** Given the widespread presence of untreated sewage in the drainage system of Dhaka and the high pollution load in the nearby river system, which this project will reduced, though not completely eliminate, it is not possible to estimate the

¹ Unforeseen complications and delays during construction.

² Increased O&M cost could be caused by an increased cost of chemicals or labor beyond expectations.

³ A lower than expected connection rate would lead to lower benefits.

⁴ A reduced life-time of assets could result if O&M is not performed appropriately.

⁵ Household Income and Expenditure Survey (HIES) 2016.

magnitude of health impacts or environmental improvement that can be achieved and attributed to this project. For this reason, only the direct benefits to the connected households were considered. The benefits were estimated by considering the revealed payment for the sanitation services as a proxy for the minimum valuation of the provided sanitation service that will be provided to the connected households.⁶

95. **Project Costs.** The total project cost is estimated at USD483 million. For this cost-benefit analysis, only the capital investment cost for the sewerage system and related treatment facilities under Component 2 is considered⁷. The costs of the pilot projects for non-network sanitation,⁸ the institutional component⁹ and project management have been excluded. The lifecycle O&M cost for the sewerage system and sewage treatment plant has been included in the project costs. To convert financial costs to economic costs, a standard conversion factor has been applied to correct for other taxes and distortions in the economy. The economic lifetime of the project is assumed at 30 years.

96. **Results.** The Economic Internal Rate of Return (EIRR) was estimated at 14.5 percent and the Economic Net Present Value (ENPV) at USD220 million. The results are reported in Table 6. Given that the presence of positive externalities, including public health and environmental benefits, was not considered, this analysis establishes an overall lower bound of the economic viability of this project. The actual economic benefit, and hence, EIRR and ENPV is expected to be considerably higher.

97. **Sensitivity analysis** has been carried out with respect to: a (i) 20-percent increased investment cost, (ii) 20-percent increase in O&M cost, (iii) a 20-percent decrease in benefits, (iv) reduction of asset lifetime to 20 years, and (v) a worst-case scenario combining all of the beforementioned scenarios. The EIRR remains above the social discount rate of 10 percent for all of the scenarios, except for the combined worst-case scenario under which the EIRR falls to 9.5% percent (see Table 6).

Table 6: Results of Cost Benefit Analysis

NPV (USD million)	Base Case	20 percent Increase in Capex	20 percent Increase in Opex	20 percent Decrease in Benefits	Asset Lifetime Decreases to 20 Years	Worst Case Scenario
Project cost	339	402	344	339	339	407
Construction	312	375	312	312	312	375
O&M	27	27	32	27	26	32

⁶ The tariff revenue was projected jointly by the WB and DWASA teams.

⁷ Excluding the non-network sanitation pilot, the institutional component, and project management consultant.

⁸ The non-network component was excluded due to its pilot character and small size. The benefits for the non-network component cannot be estimated disregarding the immediate environment to the pilot areas.

⁹ While the institutional component contributes to improving the effective delivery of water supply services, the benefits are difficult to quantify. For this reason, the costs and benefits of the institutional component were not considered.

Project benefits	560	560	560	448	479	384
Economic Assessment of the Project						
Net present value	220	158	215	108	141	-23
Economic Internal Rate of Return (%)	14.5%	12.9%	14.4%	12.4%	13.5%	9.5%

A. Financial Analysis of DWASA

98. The objective of the Financial Analysis was to assess the overall financial sustainability of DWASA from a consolidated perspective, inclusive of the implementation of the DSIP. The financial aspects of the project and all other programmed investments are combined into a consolidated financial presentation and projection. This approach to financial analysis of the project is appropriate because the DSIP proposes to replace an existing treatment facility and network that are no longer operational, but where subscribers are already paying a sewerage tariff. The financial sustainability of DWASA is assessed with respect to whether the operations result in positive annual cash flows throughout the projected period. The consolidated approach is particularly important because DWASA's tariffs do not fully recover all costs of the enterprise as is the case with a great majority of water utilities in the developing world; while DWASA has been able to cover its O&M costs, it still requires significant assistance from the government for capital expenditure. An integrated financial model was developed to assess the financial implications of the various policy options for tariff revisions, operating performance, phasing of investments, development of reasonable and achievable financing plans, and other factors that may affect the financial sustainability of DWASA.

B. Operating Performance

99. For water supply, domestic, community, and LIC customers are charged BDT 11.02 per kL (USD0.14 per kL), whereas commercial, industrial, and government customers pay BDT 35.28 per kL (USD0.44 per kL). More than 97 percent of the connections are metered, but customers are charged on a single-consumption slab, that is, one tariff for any amount of consumption. Water supply generated BDT 8,883 million (USD111 million) as revenue for DWASA¹⁰ (DWASA 2017–2018). DWASA levies sewerage charges from a holding with a physical connection and also from properties that are not connected but located within 100 feet of a sewer line. Thus, sewerage connections number more than 84,000 in DWASA records (2018), and these properties yield BDT 3,079 million (USD38.5 million) revenue annually (2017–2018). The tariff for sewerage is the same rate as water supply that is, BDT 11.02 per kL and BDT 35.28 per kL of water consumption (e.g., a property with water and sewer connection pays double the water bill).

100. In recent years, DWASA has improved its performance in several operational parameters, notably in NRW that declined from 29.6 percent in 2012 to 21.3 percent in 2017, or

¹⁰ DWASA. 2017-2018. Audited Financial Statements. Bangladesh.

an overall decrease of 28.0 percent. Water customer connections have increased from 311,100 in 2012 to 371,767 in 2017 and 382,272 in 2018, or a cumulative increase of 23 percent. The total billed operating revenue, inclusive of water and sewerage subscribers, increased by a 78 percent increase over the same period, due to an increased tariff and number of water connections.

Table 7: DWASA Operating Performance Highlights

(as of year-end June 30 for each reporting year)

	2012	2013	2014	2015	2016	2017
Water production capacity (MLD)	2,180	2,420	2,420	2,420	2,420	2,428
Annual water production (mm³)	723.5	737.5	789.2	826.3	851.6	883.6
System losses (%)	29.61	26.66	26.58	25.58	23.22	21.33
Estimated consumption (mm³)	509.3	540.9	579.4	614.8	653.9	695.2
Number of water connections (thousands)	311.1	325.8	334.4	350.8	361.1	371.8
Annual consumption/connection (m³)	1,637	1,660	1,733	1,753	1,811	1,870
Billed revenue water (BDT, millions)	4,284	4,919	5,382	5,815	6,526	7,865
Billed revenue sewerage (BDT, millions)	1,642	1,924	2,084	2,189	2,383	2,768
Billed operating revenue (BDT, millions)	5,972	6,891	7,517	8,066	8,917	10,633
Average tariff (m³) as provided	9.08	9.54	10.11	10.23	10.20	12.04

Table 8: DWASA Financial Performance Highlights

(As of year-end June 30 for Each Reporting Year, BDT Million)

	2012	2013	2014	2015	2016	2017
Total Income	6,964	7,972	8,564	9,112	9,714	11,554
Operating Revenue	5,972	6,891	7,517	8,066	8,917	10,633
Operating Expenses	4,051	4,985	5,738	6,161	6,826	7,975
Operating Cost Coverage Ratio (OCCR)	1.47	1.38	1.31	1.31	1.31	1.33
Contribution Margin	41.8%	37.5%	33.0%	32.3%	29.7%	31.0%
Net Profits	70	105	111	160	190	226
Net Profit Margin	1.0%	1.3%	1.3%	1.8%	2.0%	2.0%
Total Assets	66,838	69,617	82,072	86,057	93,327	96,072
Return on Assets	0.11%	0.15%	0.14%	0.19%	0.20%	0.23%

101. The OCCR was calculated at just over 1.3 during the last six years but declined over time from 1.47 in 2012 to 1.33 in 2017. The growth in total operating expenses has exceeded the growth in operating revenue over the six-year period. The result is that the contribution margin also declined steadily from 41.8 percent in 2012 to 31 percent in 2017. An 11-percentage point difference equates to a loss of BDT 1.3 billion to the bottom line for 2017. The steady downturn in the contribution margin over the years could be due to several factors, especially given that consumption per connection has increased over the same period. These include the following:

- Annual tariff increases are not keeping up with inflation, affecting DWASA's operating costs.
- While DWASA should be commended for the steady decline in NRW over the six-year period, such reductions are not effectively reducing pumping costs.
- The collection ratio during 2013–2016 has improved from 2012 but has not surpassed 95 percent. For the reporting year 2017, the ratio dropped to 91.4 percent.
- DWASA has not made the proper provisions for bad debts. By the end of FY2016, the balance for the provision for bad debts amounted to only BDT 277 million; given the continuing increase in the receivables balance, the annual provisioning should be much more than the current BDT 25 million of provisioning taken each year.
- CAPEX expansion. During the six-year period between 2012 and 2017, fixed assets increased by 44 percent by adding to the plant the equivalent of USD365 million. A review of DWASA's planned CAPEX investment for 2018–2022 shows a significant expansion of its plant and equipment totaling BDT 116.6 billion, or an equivalent of USD1.5 billion, including the proposed DSIP.

Table 9: DWASA Capital Investment Program

5-year Investment Program (BDT, millions)	2018	2019	2020	2021	2022
Saidabad Water Treatment Plant Phase 3 (450 MLD)	400	200	700	1,500	—
Dhaka Water Supply Network Improvement Project	1,137	4,487	5,500	4,200	—
Padma Water Treatment Plant (450 MLD)	8,636	7,613	—	—	—
Well Field Construction Project (47 wells)	1,549	966	—	—	—
Dhaka Environmentally Sustainable Water Supply Project	4,200	5,252	8,410	4,846	—
Development of LIC	270	200	—	—	—
DSIP	20	300	5,624	3,956	7,316
Interim Water Supply Project	2,000	2,000			
Dasherkandi STP	670	4,400	9,000	11,200	4,000
Land Acquisition and Excavation of Canals		3,500	2,572		
Total CAPEX Program	18,882	28,918	31,806	25,702	11,316
In USD, millions	236	361	398	321	141

C. Assessment of Future Financial Performance

103. The financial statements were projected for 2018–2030, based on constant cost and revenue assumptions. It was further assumed that the Government of Bangladesh will continue to assume the financial obligations of loan servicing as it currently does. Projections show that DWASA may be in a difficult situation from a presentation perspective as the current assets come on line and the new fixed assets start depreciating. Once the current investments are fully operational, the depreciation expense will balloon to almost BDT 5.1 billion in 2022, almost doubling from BDT 2.6 billion in 2020.

104. Most planned CAPEX investments will not materially increase revenues throughout the projected period. The continued net losses in the projected period will have a profound effect on financial ratios namely, returns on revenue, assets, and equity. All three ratios will likely turn negative starting in 2020. After 2022, DWASA must pay close attention to likely increases in O&M expenses associated with the planned CAPEX program as they could seriously jeopardize cash flow beginning in year 2023. Such heavy losses on the income statement combined with positive cash flows are highly unusual. Despite the extremely poor results on the income side, DWASA will have sufficient cash flow over the projected period to sustain its future financial obligations, although this is not in any way a favorable financial picture.

D. Tariff Adequacy

105. While tariffs need to recover costs, it is also important to ensure that the tariff can be justified in that consumers only pay a tariff that is commensurate with the actual services being provided—not for excessive inefficiencies or on an irrational basis. The difference between cost recovery tariffs and justified tariffs is that in the latter, the tariff is calculated under performance standards that affect costs, working capital management, and collections. In other words, the approach determines the tariff that consumers should legitimately pay for the service they receive. The analysis shows that DWASA should carry out a tariff rationalization with an assessment of justifiable tariff adjustments to ensure tariff adequacy. The adjustment process should then be utilized rigidly for ensuing rate increases. An initial assessment was carried out to determine DWASA's justified tariff and compared it to the current average tariff charged to consumers. The analysis assumes that a justified tariff should fall between an OCCR of 1.5 and 2.0 that should raise returns like comparable well-performing utilities such as the Manila Water Company (MWC) and the Bangkok Water Authority (BWA).

106. In the case of DWASA, the justified tariff was calculated in constant terms for 2022, the year in which most of the current capital projects will become operational. The current tariff yields negative returns both on assets and on revenues and an OCCR of 1.2. For DWASA to achieve a 1.5 OCCR, the average tariff should be set at BDT 16.28 per m³, while BDT 21.72 per m³ would be needed to achieve a 2.00 OCCR like the MWC's performance. The justified tariff should fall between these two points. As Table 10 shows, even with the higher tariff that equates to an OCCR of 2.0, DWASA still falls short of the benchmark returns of both the MWC

and BWA. The most startling difference is in the return on assets clearly indicating an overextended CAPEX program.

Table 10: Summary of Current Tariff to Justified Tariffs

Indicator	Current Tariff						Benchmarks	
	Constant at Year 2022		Justified Tariff				Bangkok Water Authority	Manila Water Company
Average Tariff (per/m ³)	cu/m ³	USD/m ³	cu/m ³	USD/m ³	cu/m ³	USD/m ³		
	12.64	0.156	16.28	0.201	21.72	0.268		
Cash from Operations (millions)		960		7259		12508		
OCCR		1.17		1.50		2.00	1.56	2.13
Operating Ratio		0.85		0.67		0.50	0.64	0.47
Return on Assets		-1.20%		0.60%		3.10%	10.70%	9.90%
Return on Revenues		-18.50%		7.60%		27.60%	36.50%	35.70%

107. Given the difficulty in understanding the sewerage component of DWASA's revenue, and especially whether many paying customers are receiving service, this calculation simply assumed that sewerage billings are justified but with the caveat that this should be investigated further. At minimum, the government should consider an upward tariff adjustment by DWASA, of approximately 10 percent to BDT 13.90 per m³ net of cost increases, which under the current debt servicing conditions will eliminate the net losses in the first four years of the projection period and reduce them in subsequent years. With this adjustment, DWASA will still not be able to adequately service all debt but will be able to maintain a profit over its operations and increase cash flow for repaying the principal only on the sizable debt burden.

Annex 4: Sovereign Credit Fact Sheet

A. Recent Economic Development

108. Bangladesh is a lower-middle income country with GDP per capita at USD1,517 and a population of 164.7 million.¹ The country's economy continues to perform well with robust and stable growth. Growth accelerated to 7.7 percent in 2018 due to higher public investment² and stronger private consumption buoyed by a recovery in remittances.³ However, the current account deficit widened from 2.1 percent of GDP in 2017 to 2.8 percent in 2018 with surging imports of capital goods, food grains, and intermediate goods despite revived remittances. Inflation remained moderate at 5.6 percent, close to the central bank's 5.5 percent average inflation target⁴.

109. Bangladesh's fiscal deficit increased from 3.3 percent of GDP in 2017 to 4.1 percent in 2018, within its budget target of 5 percent, mainly due to the implementation of the government's priority development projects. The government continues to prefer concessional external borrowing, especially to finance infrastructure projects.⁵

B. Economic Indicators

¹ The income group classification for the fiscal year 2019 is based on WB criteria, details are as below: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>; GDP Per Capita and population use WB 2017 data.

² Bangladesh public investment rose from 7.4 percent of GDP in 2017 to 8.0 percent in 2018, reflecting substantial progress in implementing large infrastructure projects, notably the Padma Bridge and Dhaka Metro Rail.

³ Remittances rebounded to grow by 17.3 percent to \$15 billion in 2018, reflecting an increase in the number of workers going abroad in the past few years, a more favorable exchange rate, and measures to foster money transfer through official channels.

⁴ Central Bank of Bangladesh Monetary Policy July-December 2017 <https://www.bb.org.bd/openpdf.php>

⁵ ADB Asian Development Outlook 2019 Strengthening Disaster Resilience, April 2019

Selected Macroeconomic Indicators - Bangladesh (2015-2020)

Economic Indicators	2015	2016	2017	2018*	2019*	2020*
<i>Real GDP growth</i>	6.8	7.2	7.6	7.7	7.3	7.0
<i>CPI Inflation (% change, average)</i>	6.2	5.7	5.6	5.6	5.4	5.4
<i>Current account balance (% of GDP)</i>	1.9	0.6	-2.1	-2.8	-1.9	-1.7
<i>General government overall balance (net lending/borrowing, % of GDP)</i>	-4.0	-3.4	-3.3	-4.1	-4.2	-3.7
Nominal gross public debt (% of GDP)	33.7	33.3	33.2	34.0	35.2	36.1
Public gross financing needs (% of GDP)	7.8	6.5	9.2	9.8	8.5	7.2
External debt (% of GDP)	19.1	18.5	18.5	17.5	17.2	17.2
Gross external financing need (% of GDP) **	-0.1	1.5	3.7	6.6	6.0	5.1
Foreign Direct Investment (% of GDP)	0.9	0.6	0.7	0.7	0.8	0.7
Gross official reserves (months of imports)	6.5	7.2	7.0	6.4	5.7	5.2
Broad money (M2, % change)	12.4	16.3	10.9	12.9	--	--
Exchange rate (BDT/USD, EOP) ***	78.1	79.1	82.7	83.6	84.5	--

Note: * denotes projected figures. Italic data from IMF WEO April 2019

** Staff calculation based on gross external financing need and GDP in USD provided by IMF

*** FX rate from Thomson Reuters, 2019 FX rate as of June 11, 2019

EOP: end of the period.

Source: IMF Country Report No. 18/158.

C. Economic Outlook and Risks

110. Looking ahead, Bangladesh's GDP growth is projected to stabilize around 7 percent, driven by strong domestic demand. Inflation is expected to ease to an average of 5.4 percent in 2019, with price pressures largely contained by a good harvest and lower global food and oil prices. The current account deficit is projected to narrow to around 2 percent, with trade tensions between China and the US possibly increasing Bangladesh's attraction as an alternative base for manufacturing. This could boost export growth. The main downside risks include failure to boost revenue to support priority projects implementation, the rise of global oil prices, further increasing of the nonperforming loans⁶, and adverse weather.

⁶ There are concerns about the increases in nonperformance loans and the concentration of nonperformance loans in the state-owned large banks. <https://www.thedailystar.net/business/news/high-npls-slow-growth-1694863>

111. Bangladesh's risks of external and overall debt distress continue to be assessed as low. Over the medium term until 2023, debt ratios are projected to remain on a sustainable path. The external debt to GDP ratio is projected to remain stable around 18 percent in the medium term, while public debt to GDP ratio is expected to gradually increase from 35.2 percent in 2019 to 40.5 percent in 2028, before trending down over the long term. External risks include contracting large amounts of short-term debt, a protracted slowdown in key export markets, a rapid build-up of non-concessional debt, or a combination thereof.⁷

⁷ International Monetary Fund (IMF), 2018 Country Report No.18/158 2018 Article IV consultation – Press release; staff report; and statement by the executive director for Bangladesh, Jun. 2018.