ASIAN INFRASTRUCTURE INVESTMENT BANK

November 4, 2025

Sovereign-backed Financings

Approval Project Document
P000074 Pakistan: Lahore Wastewater and Drainage Management Project

Currency Equivalents

(As at July 31, 2025)

Currency Unit – Pakistani Rupee (PKR)
PKR1.00 = USD0.0035 = JPY0.525
USD1.00 = PKR283.87 = JPY150.00

Fiscal Year

July 1 – June 30

Abbreviations

AFD	Agence Française de Développement
AIIB	Asian Infrastructure Investment Bank
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
DA	Designated Account
DALY	Disability-Adjusted Life Years
EFF	Extended Fund Facility
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
EPC	Engineering, Procurement, and Construction
E&S	Environmental and Social
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
ESS	Environmental and Social Standard
FM	Financial Management
FX	Foreign Exchange
FY	Fiscal Year
GAP	Gender Action Plan
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoP	Government of Pakistan
GoPb	Government of Punjab
GRM	Grievance Redress Mechanism
IMF	International Monetary Fund
IUFR	Interim Unaudited Financial Report
JPY	Japanese Yen
km	Kilometer
kW	Kilowatt
LDA	Lahore Development Authority
LESCO	Lahore Electricity Supply Corporation
lps	Liter per second
LWASA	Lahore Water and Sanitation Agency
LRP	Livelihood Restoration Plan

MDB	Multilateral Development Bank
MIS	Management Information System
mm	Millimeter
MTBM	Micro Tunnel Boring Machine
O&M	Operations and Maintenance
OCCR	Operational Cost Coverage Ratio
OHS	Occupational Health and Safety
OHSMP	Occupational Health and Safety Management Plan
OPIR	Operational Policy on International Relations
PC-1	Planning Commission Form-1
PDS	Project Delivery Strategy
PIE	Project Implementing Entity
PMC	Project Management Consultant
PMU	Project Management Unit
POM	Project Operations Manual
PP	Procurement Plan
PPA	Project Preparation Advance
PPM	Project-affected People's Mechanism
PPSF	Project Preparation Special Fund
PSC	Project Steering Committee
RMF	Results Monitoring Framework
SCADA	Supervisory Control and Data Acquisition
SEP	Stakeholder Engagement Plan
TBM	Tunnel Boring Machine
UIP	Urban Immovable Property
WB	World Bank
WWTP	Wastewater Treatment Plant

Executive Summary

1. Lahore, with 14.8 million residents and annual growth of 3 percent, is expanding in an unplanned manner, placing severe stress on water supply, sanitation, and urban drainage systems.

2. Aligned with the Lahore Master Plan, which integrates water supply, sewerage, stormwater drainage, and wastewater treatment, the originally proposed Lahore Water and Wastewater Management Project (LWWMP) passed Appraisal Review in October 2022. However, political transitions over the past three years disrupted infrastructure priorities, delaying approval of the project. Inflation and design revisions further escalated costs, requiring preparation and approval of revised Planning Commission Form-1s (PC-1s).

3. The wastewater component of the LWWMP has received PC-1 approval from both provincial and federal authorities, while the water supply component remains under provincial review following scope changes. The Government has therefore proposed a phased approach: Phase 1—the Lahore Wastewater and Drainage Management Project—will deliver a modern trunk sewer system to safely convey sewage from central Lahore; Phase 2—the Lahore Water Supply Management Project—will augment supply with surface water to address declining groundwater levels. As each project independently addresses distinct and critical challenges, separation into phases will not create adverse impacts or interface issues.

4. The Asian Infrastructure Investment Bank (AIIB or the Bank) has supported project preparation through its Project Preparation Special Fund (PPSF) of USD505,000. The PPSF enabled Lahore Water and Sanitation Agency (LWASA) to finalize feasibility studies and address environmental and social safeguards requirements. Subsequently, AIIB approved a Project Preparation Advance loan, which facilitated the early completion of engineering designs, cost estimates, and tender documents, thereby significantly improving the Project's implementation readiness with the time savings of about 18 months in the overall implementation schedule. The Phase 1 Project will divert sewage from drainage channels and low-lying areas and safely convey wastewater to designated disposal and treatment sites, thereby reducing untreated discharges into open waterways, improving water quality, mitigating public health risks, and enhancing the urban environment.

Project No. and Name	P000074 Lahore Wastewater and Drainage Management Project		
AIIB Member	Pakistan		
Borrower	Islamic Republic of Pakistan		
Guarantor	Not Applicable		
Project Implementation Entity	Provincial Government of Punjab; Lahore Water and Sanitation Agency		
Proposed Amount of AIIB Financing (USDm)	USD160.00	**Instrument type (Instrument subtype)**	Loan (Direct Sovereign)
		Currency of financing requested	Yen
Sector (Subsector)	Water (Water supply, sanitation, and wastewater treatment)	**E&S Category and Comments (if any)**	A, The category A is due to large-scale construction activities to be carried out in densely populated areas and around the existing infrastructure with potential irreversible environmental and social impacts for medium to long period of time through design, construction, and operations of the Project.
Project Objective	To improve wastewater and drainage management services in Lahore, thereby enhancing the urban environment and reducing urban flooding.		
Project Description	The Project will build the modern wastewater management infrastructure in central Lahore to safely transport sewage and eliminate wastewater discharge into existing stormwater drains. The removal of sewage from city drains will improve the urban environment and reduce urban flooding, particularly during the monsoon rains. This will be achieved through implementing the following components:		

	• Component A. Investment in Wastewater and Drainage Management: This component will invest in the: (i) construction of three modern trunk sewers with a combined length of about 32.3 kilometers (km) through underground tunneling using trenchless techniques and gravity-based conveyance; (ii) construction of a new pumping station consisting of 16 pumps increasing the total pumping capacity from the existing 15,300 liters per second (lps) to 39,300 lps; (iii) rehabilitation of about 7 km of surface drains to alleviate urban flooding in central Lahore, while also diverting sewage to free nearly 9 km of local surface drains from wastewater discharge; and (iv) clean energy support for wastewater disposal pumps through solar energy installation. Construction of the new trunk sewers will allow decommissioning of old pumping stations which will significantly reduce LWASA's operating costs. • Component B. Project Management: This component will support LWASA to engage Project Management Consultants (PMC) for design review, procurement of works and goods, and overall project management including construction supervision, managing environmental and social compliances, and ensuring quality assurance during construction.		
Implementation Period	Start Date: January 01, 2026 End Date: December 31, 2030	**Expected Loan Closing Date**	June 30, 2031
Co-financing type	Standalone	**Following other Financier's E&S Policy?**	No
Lead financier		**Following other Financier's Procurement Policy?**	No
Financing Plan	Project cost: USD177 million AIIB Loan: JPY24 billion (USD160 million equivalent) Government of Punjab (GoPb): USD17 million equivalent		
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that the proposed Bank Financing complies with the applicable Bank operational policies.		

Risk	
Key Risks	**Mitigation Measures**
i. Technical designs. The first ever use of	i. International PMCs having the required experience in design, tendering and construction supervision in similar operations to help

micro-tunneling technology for construction of trunk sewers in Lahore, for which there is a limited in-country experience poses significant risks	LWASA during all phases of implementation-Design-Build contract will be procured for construction of works which will shift the design and construction risks to experienced international contractors.
ii. Procurement of large and complex packages. Procurement processes and managing high value contracts through non-conventional (design-build and design-build-operate) methods could present challenges	ii. The preliminary tender documents have been furnished through international PMC expert. Scope of PMC work include performing comprehensive review of these documents, and assisting LWASA in tendering, evaluations, clarifications, and contact management.
iii. Environmental and Social (E&S) risks and impacts during construction and operation. Management of environmental and social impacts as the micro tunnel boring machine will be used for the first time	iii. E&S instruments including Environmental and Social Impact Assessment (ESIA), Livelihood Restoration Plan (LRP), Gender Action Plan (GAP), and Stakeholder Engagement Plan (SEP) have been prepared to manage E&S impacts. The contractors will also be required to prepare a site specific Environmental and Social Management Plan (ESMP) and an Occupational Health and Safety Management Plan (OHSMP).
Economic Capital (ECap) Consumption	48.92USDm 30.57%

Strategic Alignment				
Alignment with AIIB's thematic priorities		Green infrastructure		
Alignment with AIIB's strategies		Sustainable Cities Strategy		
Key Outcomes	**Indicator**	**Unit of measure**	**Baseline (Year)**	**Target (Year)**

Reduced wastewater discharges in stormwater drains	Trunk sewers constructed	Kilometers	0 (2025)	32.37 (2030)
New, efficient, and higher capacity pumping station capable of disposal of all the sewage constructed	Old pumping stations eliminated	Number	0 (2025)	22 (2030)
Substantial savings from the reduction of operations and maintenance (O&M) activities	Operating cost of the disposal pumps reduced	PKR million	0 (2025)	700 (2030)

Other Key Financing Requirements	
Conditions of Effectiveness	1. The Subsidiary Agreement has been executed, and all conditions precedent to its effectiveness (other than the effectiveness of the Loan Agreement) have been fulfilled; 2. The Project Operations Manual (POM), in form and substance satisfactory to the Bank, has been submitted to the Bank; and 3. The Project Management Unit (PMU) has recruited, under terms of reference satisfactory to the Bank: a project director, assistant manager for environment, assistant manager for social, manager, administration and finance, and manager, procurement and contracts.
Key Conditions for 1st Disbursement	None
Key Covenants	1. The Borrower shall cause GoPb and LWASA to ensure that the PMU shall: include the persons stated in the Project Operations Manual by the deadline(s) indicated therein. 2. GoPb shall make available in a timely manner, through budgetary allocations or other means, all counterpart funds required for the timely and effective implementation of the Project. 3. GoPb shall ensure that LWASA shall hire PMU staff with salaries competitive in the market satisfactory to the Bank. 4. LWASA shall carry out, design and deliver a comprehensive operational training program with the help of the Project Management Consultants and the contractors in form and substance satisfactory to the Bank operational training programs for LWASA itself and the PMU staff and

	implement operation manuals, throughout following the implantation of training schedule provided in the Project Operations Manual. 5. Punjab shall and, or shall cause LWASA to, ensure that all actions agreed under the ESIA including the ESMP, LRP, GAP and the SEP, required to be completed prior to the commencement of such relevant activity, have been implemented in accordance with said plans provisions. No update to the ESIA or any associated plans shall be initiated without the approval of the Bank. 6. GoPb shall, and shall cause LWASA to ensure, that the Project Steering Committee and the Project Implementation Progress Review Committee are maintained throughout the implementation period of the Project, with compositions and schedules as agreed with the Bank. 7. GoPb shall establish the Coordination Committee of the Project and the Agence Française de Développement (AFD)-financed Wastewater Treatment Plant (WWTP) Project, which shall follow the structure stated in Project Operations Manual, and meet quarterly or more frequently, as required, for consistent monitoring of the implementation progress of the WWTP Project. and promptly resolving any issue that may cause an implementation delay. 8. GoPb shall ensure that the AFD-financed WWTP Project is completed prior to the Closing Date of the Project. In the event of cost overrun and/or any implementation delay, Punjab shall provide financing for timely completion of the Babu Sabu wastewater treatment plant to safeguard environmental compliance.

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1. Context

1.1 **Country and Macroeconomic Overview:** Pakistan, the fifth most populous nation in the world, is a lower-middle income country with a per capita Gross Domestic Product (GDP) of around USD1,580.[1] Pakistan has experienced longstanding macroeconomic challenges, including recurrent fiscal and current account deficits, protectionist trade policies, low productivity growth, and a growing public debt burden. Because of these challenges, Pakistan's economy grew at an average rate of 3.5 percent over the last decade, much lower than growth rates of regional economies. The economy has remained vulnerable to external and domestic shocks including energy price shocks, supply chain disruptions, and fluctuations in the value of the Pakistani rupee. Fiscal management has been strained by low tax revenues (only about 10 percent of its GDP) and high government expenditures, particularly on debt servicing, defense, and subsidies. This has led to a persistent lack of investment in several important sectors including education, health, social protection, and infrastructure. Consequently, over one-third of school-age children across Pakistan are out of school, children stunting rates of 40 percent persist, and lower-middle income poverty rate (defined as USD4.20/day 2021 purchasing power parity per capita) remains around 44 percent.[2]

1.2 The confluence of global inflation shocks, political uncertainty and disastrous floods in 2022 led to deterioration of the economic situation in the country. To stabilize the economy, in July 2023, Pakistan signed the International Monetary Fund (IMF) Standby-Agreement (SBA) and began to restore exchange rate flexibility, relax import controls, and contain the fiscal deficit. Stabilization measures undertaken during the 9-month SBA led to Pakistan signing the 3-year IMF Extended Fund Facility (EFF) program. Tight fiscal and monetary policies enacted under the recent IMF program helped considerably with easing inflationary pressures. Stability in current account as well as foreign exchange markets have enabled the rebuilding of reserve buffers. Real GDP growth is estimated to be 2.6 percent in fiscal year 2025 (FY25), supported by strong private consumption and investment. While growth prospects are expected to strengthen in FY26 (3.6 percent) and FY27 (4.1 percent), overall long-term growth rates as well as wage and employment growth are expected to remain below potential due to tight macroeconomic policies focused on rebuilding fiscal space and buffering against risks to economic imbalances.

1.3 Progress under the EFF program has been strong: Pakistan has met key fiscal and reserve targets and successfully completed the first EFF review in May 2025. These achievements have boosted investor confidence, reflected in narrowing international borrowing spreads and successive sovereign rating upgrades. In 2025, all three major rating agencies revised Pakistan's rating upward – Fitch and Standard and Poor's (S&P) to B- (positive outlook), and Moody's to Caa1 (stable). However, the continuity of growth and positive economic outlook is conditional on successful implementation of the IMF-EFF program as well as broader and faster fiscal and economic reforms, including energy sector reforms, increase in the tax-to-GDP ratio, enhancing competitiveness and rationalization of subsidies, improving productivity, and building climate resilience.

[1] World Economic Outlook (April 2025). https://www.imf.org/en/Publications/WEO/weo-database/2025/april
[2] World Bank, Poverty and Inequality Platform: https://pip.worldbank.org/country-profiles/PAK

1.4 Pakistan's economy is also increasingly becoming susceptible to climatic change and the country consistently ranks among the most vulnerable countries to climate change in the world. The cost of climate adaptation and resilience in the context of Pakistan is estimated to be approximately USD348 billion by 2030.[3] However, fiscal constraints prevent meaningful investment in climate adaptation and mitigation. Thus, the appetite for and success of economic reforms undertaken during the current IMF program become even more critical in climate-proofing and improving Pakistan's economy over the long-term.

1.5 **Sector Overview:** Lahore is the capital city of Punjab, the largest province of Pakistan in terms of population. The city is the second largest in Pakistan after Karachi, and 27th largest in the world, with a population of about 14.8 million. It is a major economic hub and a significant contributor to Pakistan's economy representing 11.5 percent of the national GDP and 19 percent of the Punjab's economy. It is a major center for industries like textiles, pharmaceuticals, and information technology and a key transportation and logistics hub due to its strategic location. While the city population continues to grow at an annual rate of 3 percent and geography continues to expand, urban development is happening in an unplanned and uncoordinated manner, exacerbating the availability of basic services including water, sanitation, and urban drainage.

1.6 Lahore generates about 540 million gallons of wastewater every day, however it lacks a functional and modern wastewater management system, resulting in degradation of the urban environment. The formal sewerage network covers a major part of the city, but due to the absence of dedicated trunk sewer mains, domestic wastewater, which is collected through sewerage networks from different localities, is disposed into the open drainage channels and waterways, which are meant to carry stormwater only. This severely restricts the flow capacity of drains and leads to overflows, serious flooding, and increased risks of waterborne diseases during monsoon-induced rainfall. Flood events are, therefore, a recurrent challenge in Lahore, particularly in monsoon, with stormwater inundating roads, adversely affecting traffic and movement of people, damaging buildings, and other infrastructure leading to annual loss of lives and considerable economic disruptions. The use of stormwater drainage systems to carry untreated wastewater in Lahore poses a serious threat to the health of critical freshwater ecosystems. This practice leads to the degradation of aquatic habitats, loss of biodiversity, and the contamination of surface and groundwater resources. Moreover, communities residing along these drains and contaminated water ways face heightened risks of waterborne diseases and environmental hazards, significantly affecting public health and overall quality of life. Lahore currently lacks a city-wide functioning wastewater treatment system. The only Babu Sabu wastewater treatment plant (WWTP), once operational in the past, has been non-functional for years. The absence of wastewater treatment facilities in the city, coupled with the unchecked disposal of all sewage into the River Ravi—a major nearby water body—is causing severe environmental degradation, contamination of freshwater resources, and heightened public health risks.

1.7 The existing sewerage system of the city spans approximately 4,000 kilometers (km), the majority of which comprises lateral and sub-main sewers (225 millimeters (mm) to 525 mm diameter) but lacks well-connected trunk sewers for the ultimate conveyance of wastewater to designated treatment locations. Although Lahore Water and Sanitation Agency (LWASA) has

[3] FCDO (2024). Bridging Pakistan's Adaptation Financing Gap: Developing Evidence-based Climate Adaptation and Resilience Solutions

achieved comprehensive sewerage coverage of over 98 percent in its 278 square kilometer coverage area, the inadequacy of trunk sewers has significantly impeded the efficient and environmentally friendly disposal of sewage, precipitating substantial operational challenges. Historically, Lahore's sewerage system discharged untreated wastewater directly into the River Ravi through 12 major disposal stations. However, with rapid population growth and the aging of trunk sewer infrastructure, the system has become increasingly inadequate, leading to frequent overflows, blockages, and environmental degradation. The inability of the existing network to cope with rising demand has effectively resulted in systemic collapse in many parts of the city. To provide interim relief, 110 intermediate lift stations were constructed along existing drains, which originally functioned as stormwater carriers but were repurposed as sullage conveyors. This makeshift arrangement underscores the pressing need for a comprehensive trunk sewerage system that can effectively segregate sewage from stormwater drainage, thereby mitigating the serious environmental and operational repercussions of the current setup.

1.8 The city's drainage system consists of a 76-km network, including six primary drains, which are named as (i) Shalimar Escape Channel; (ii) Upper Chota Ravi; (iii) Lower Chota Ravi; (iv) Shahdara Drain; (v) Cantonment Drain; and (vi) Sattukatla Drain. The system is insufficient to cope with storm water runoff of even two to five years return period. With the passage of time and continuous disposal of wastewater into these drains for several years, these drains have become sullage carriers, most of these passing through the center of main urban areas.

1.9 LWASA, the government-owned agency established under Lahore Development Authority Act 1975, is mandated to provide safe water supply and environmentally sound sewerage and drainage services to about 8.7 million people of Lahore in its coverage area. The agency is mainly responsible for (i) construction, rehabilitation, operation and maintenance of water, sewerage, and drainage infrastructure; (ii) treatment and bulk distribution of water, and sewage collection/treatment; (iii) billing and revenue management for water, sewerage, and groundwater extraction (aquifer) charges; (iv) enforcement of regulations; (v) implementation of water-conservation projects like rainwater harvesting; and (vi) long-term planning and development for tapping additional water sources, treatment and disposal station for sewerage lines to meet the increasing demands for water supply and sewerage services demands due to urbanization.

1.10 LWASA has historically struggled with financial sustainability, operating under a chronic working capital deficit and persistent reliance on government subsidies. Between 2004 and 2017, revenues increased by 327 percent, while operational expenditures rose by 575 percent—driven primarily by infrastructure expansion and escalating energy costs. Key financial constraints in earlier years included operating losses and negative cash flows, electricity and energy costs (40–45 percent of total expenditures), stagnant tariff structures particularly, for domestic consumers, and low revenue recovery ratios (67–73 percent). Despite some tariff revisions for commercial users in 2017, the cost recovery gap continued to widen until 2021.

1.11 From 2021 to 2025, the Government of Punjab (GoPb) took some drastic measures towards financial sustainability and institutional strengthening which transformed LWASA from a financially strained utility to a fiscally disciplined, technology-driven public service provider.

With these measures, the internal revenues jumped from PKR6.9 billion (USD24.3 million equivalent) in FY2021–22 to PKR19.7 billion (USD69.3 million equivalent) in FY2024–25, and a fiscal surplus exceeded PKR3.7 billion (USD13.01 million equivalent). LWASA now stands as a model urban utility in Pakistan and competes well with successful regional water and sewerage service providers in Asia. Key initiatives included: (i) tariff reforms and biannual indexation under which a landmark tariff revision took place in July 2023, impacting both domestic and commercial consumers, and introduction of a biannual indexation mechanism allowed automatic revisions of tariff slabs based on electricity tariff fluctuations and changes in petroleum product prices; (ii) revenue and financial reforms which included the introduction of e-billing and multi-platform digital payment options, recovery application for real-time collection enforcement, and crackdown on unauthorized connections; (iii) cost rationalization that included outsourced operations, solar power integration, energy audits and rationalization of tubewell operating hours, and paperless digital processes; (iv) digital and technological advancements which have enabled LWASA to undergo a comprehensive digital transformation, significantly enhancing its operational efficiency, transparency, and public service delivery.[4] An updated Business Plan & Future Outlook of LWASA emphasizes full metering of consumers, Management Information Service (MIS) deployment for data-driven decision-making, and continued enforcement of tariff indexing policy for ensuring cost-revenue alignment.

1.12 LWASA prepared its first Master Plan in 1975[5] with planning horizon of 25 years for improvement of water supply, sewerage and sanitation needs of the city. The Master Plan identified six sewerage districts, out of these, the Project area falls under the Central Lahore District. In addition to Master Plan, LWASA has also conducted comprehensive studies pertaining to improvement of sewerage and drainage systems of central, south, and southwest Lahore for separation of sewerage from storm water drainage system for the major LWASA's administered drains including Cantonment Drain, Sattukatla Drain, Hudiara Drain etc. and for facilitating the treatment of wastewater after its collection from the drains before disposal into River Ravi. LWASA also prepared an updated Master Plan of Lahore District with planning horizon of 2019-2040 focusing on grey areas of city including but not limited to zoning of water supply distribution system, improvement of sewerage system, separation of sewerage and stormwater water drainage system.

1.13 As per Punjab Growth Strategy 2023 section 2.2 "Targets for the Punjab Growth Strategy 2024", it has been planned to extend sewerage system lines to provide 70 precent coverage in cities and towns and 40 precent coverage in rural area, which is directly correlated with the objectives of this Project which has been formulated to provide effective sanitation facilities to about 2.35 million People of Central Zone of Lahore City.

1.14 The GoPb's recent and ongoing initiatives include (i) Greater Lahore Sewerage Plan – a long-term initiative to expand and modernize sewer infrastructure, which includes efforts to separate stormwater and sewage systems; (ii) Ravi Riverfront Urban Development Project (RRUDP), which aims to revitalize the Ravi River through improved sewage treatment and

[4] Key initiatives include: Supervisory Control and Data Acquisition (SCADA) System leading to real-time monitoring of the water and sewerage networks, rain dashboard enable effective flood management with predictive analytics, Geographic Information System (GIS) mapping & geotagging to allow infrastructure tracking and billing accuracy, live invoicing dashboard for real-time revenue analytics, Complaint Management System (CMS) which resulted in reduced resolution time, implementation of International Organization for Standardization (ISO) 50001 Energy Management System, and Vehicle Tracking & Medical Application which has enhanced human resource and fleet visibility.

[5] Master Plan for Water Supply, Sewerage & Stormwater Drainage system of Lahore District (2019) by M/s MMP-JERS JV

green urban planning; (iii) launching of 65 development schemes in Lahore which are worth over PKR80 billion (about USD282 million). Out of this, 26 schemes of over PKR113 million aim at replacing the decades-old trunk/major sewer lines with new ones in various parts of the city, 9 schemes of PKR5.40 billion related to rainwater/drainage management, and 15 schemes worth PKR4.39 billion aim at procuring machinery for sewer/drains cleaning in the areas of LWASA zones. Furthermore, the World Bank (WB)-financed Punjab Cities Program and the Asian Development Bank (ADB)-financed Punjab Intermediate Cities Improvement Investment Program support improvements in sewerage and wastewater systems in Lahore and nearby cities. While the Asian Infrastructure Investment Bank (AIIB or the Bank) plans to focus on backbone infrastructure in Lahore, WB and ADB projects would contribute to service delivery improvements at the secondary and tertiary network levels. Institutional reforms and capacity-building components under WB and ADB projects aim at strengthening the operating environment for the successful implementation and sustainability of major infrastructure investments such as those financed by AIIB under the Project. The GoPb has also approved a major Public-Private-Partnership (PPP) project for a new WWTP at Shadbagh/Rakh Dhulla to treat around 200 million liters/day of wastewater.

1.15 In Punjab, WASA reforms are also underway. The GoPb, through its Urban Unit and with the support from international partners (e.g., WB, ADB, Japan International Cooperation Agency (JICA)), has recently started preparing business plans for major WASAs (e.g., Lahore, Faisalabad, Rawalpindi, Gujranwala, Multan), institutionalizing performance-based contracts, creating a Punjab Water and Sanitation Regulatory Authority, developing digital asset management systems and customer grievance redressal platforms, and promoting PPPs for wastewater treatment and sludge management.

1.16 Based on these developments and city's needs, GoPb proposes to develop a project that will also address the interrelated challenges of wastewater management and urban drainage, aiming to protect surface drains and groundwater from contamination through the separation of sewage and stormwater flows. Guided by the LWASA's updated master plan for the management of water supply, sewage, and stormwater, the proposed project will construct trenchless trunk sewers across central Lahore along three major alignments, utilizing micro tunneling and tunnel boring machine (TBM) technology to minimize surface disruption. These trunk sewers will divert wastewater away from open drainage channels and enable its safe conveyance for ultimate treatment and disposal at the proposed Babu Sabu WWTP. This intervention will significantly reduce the discharge of untreated sewage into waterways, mitigate water pollution, improve public health conditions, and enhance the overall urban environment in the vicinity of these drains. The Agence Française de Développement (AFD) intends to finance the main WWTP at Babu Sabu, which is expected to treat around 170 million gallons per day (MGD) of sewage before discharging it into the Ravi River. AFD has offered EUR120 million financing support for the main plant. The GoPb approved the Planning Commission Form-1 (PC-1) on 13 August 2025, which is being submitted for approval to the Central Development Working Party of the Planning Commission at the Federal Government.

1.17 **Addressing Key Development Challenges: Project Contributions:** Provision of an effective sewerage system and management of drainage without mixed flows will have significant developmental impacts on the city, including improved environment and public health, reduced urban flooding and consequent economic growth and investments, improved urban livability, and enhanced climate resilience to handle extreme weather events and

increased rainfall due to climate change. Furthermore, the Project will reduce the risk of waterborne diseases by preventing sewage contamination of stormwater and public spaces.

1.18 The Project is consistent with and supports Pakistan's climate change strategies, including the National Water Policy (2018), the National Climate Change Policy (2021), the National Adaptation Plan (2022), and the Nationally Determined Contribution (2021). The Project will contribute to the priorities laid out in the National Adaptation Plan Pakistan 2023-2050, including: (i) improving municipal service delivery for coping with droughts and other water-related challenges; (ii) strengthening municipal financial capacity through the improvement of cost recovery; and (iii) improving human capital (Health) by reducing disease incidences through the expansion of Water, Sanitation, and Hygiene (WASH) services.

2. Rationale

2.1 **Project Objective.** The Project objective is to improve wastewater and drainage management services in Lahore, thereby enhancing the urban environment and reducing urban flooding.

2.2 **Expected Beneficiaries.** The Project will benefit an estimated 2.35 million people residing in central Lahore, primarily within the defined catchment areas of the proposed trunk sewers and existing drains. They will benefit from averted flood losses (including reduction of damages to properties, infrastructure, businesses and services caused by monsoon induced urban flooding) and improved urban environment as a result of construction of modern wastewater infrastructure. Clean and well-managed urban environments due to separate wastewater and stormwater systems will result in more attractive businesses and tourism in the city. Improved urban drainage will significantly enhance real estate market stability and lead to increased property values by reducing flood risk, improving livability, and stimulating private investment. Approximately 47 percent of the beneficiaries are females. LWASA will benefit through increase in its net income through reduction in operating costs of inefficient pumping stations. All 22 pumping stations, constructed between 25 to 60 years ago and currently incurring substantial operation and maintenance (O&M) costs, will be decommissioned as they will no longer be required following the construction of three new, modern, and gravity-based trunk sewers extending about 32.34 km.

2.3 **Expected Results.** The Results Monitoring Framework (RMF) is included in Annex 1. It consists of Project Objective Indicators and Project Intermediate Results Indicators formulated during project preparation. The Project Objective Indicators are measured/calibrated once the Project becomes operational. The Project Objective Indicators are:

(i) Direct project beneficiaries benefitting from averted urban flooding/improved drainage (Number of people, disaggregated by female beneficiaries)
(ii) Wastewater safely collected and transported in the Project area (Percentage)
(iii) Reduced wastewater discharges in stormwater drains (Percentage)
(iv) Flood-prone locations resolved in target area (Number)

2.4 The Intermediate Results Indicators will be measured periodically during implementation to ensure that the Project is progressing in accordance with the implementation plan. The proposed key Project Intermediate Results Indicators are:

(i) Trunk sewers constructed (km)
(ii) Old pumping stations eliminated (Number)
(iii) Operating cost of the disposal pumps reduced (PKR million)
(iv) A new disposal station constructed and operational (Yes/No)
(v) Stormwater drains rehabilitated (km)
(vi) 450 kilowatt solar energy installation at the Gulshan-e-Ravi Disposal Station completed (Yes/No)
(vii) Change in commercial property values in upgraded areas (PKR/square feet)
(viii) Change in residential property values in upgraded areas (PKR/square feet)
(ix) Resident satisfaction on urban services through annual survey of a representative sample of households focused on perception of improved drainage and flood reduction (Percentage)

(x) Biological Oxygen Demand (BOD)/ Chemical Oxygen Demand (COD) levels in main drainage canals within Punjab Environmental Quality Standards (PEQS) limits (Yes/No)
(xi) Grievances redressed within stipulated time (Yes/No)
(xii) WASH and Gender-Sensitive Training Sessions held for females residing in the Project area (Number)
(xiii) Project Management Unit (PMU)/LWASA staff trained on O&M (Number)
(xiv) Semi-annual progress reports submitted on time (Yes/No)

2.5 **Strategic Fit for AIIB.** The Project is aligned with AIIB's thematic priority of Green Infrastructure which promotes green infrastructure and supports economies to meet their environmental and social goals. The Project aligns with the Water Strategy and addresses Principle 1 by delivering safe collection and disposal of wastewater, incorporating climate-adaptive measures and by improving wastewater service delivery. It also addresses Principle 4 (Adopting innovative technology) by integrating clean energy support for wastewater pumps through installation of solar energy system. The Project also supports AIIB's Sustainable Cities Strategy objectives of "Green: protect and enhance environmental sustainability", by safe collection and disposal of domestic wastewater and eliminate energy-intensive intermediate pumping stations and thereby significantly reduce electricity consumption and associated greenhouse gas (GHG) emissions; "Resilient: develop the ability to withstand sudden shock", by incorporating climate-adaptive measures in design of infrastructure, and "Accessible: provide households easier access to infrastructure and social services" by improving delivery of wastewater services for the residents and businesses of Lahore. The Project also addresses key Priority Areas for Investment, including: (i) Basic Infrastructure: enhancing access to sanitation and other essential services by ensuring the safe disposal of wastewater and stormwater, and (ii) City Resilience: strengthening infrastructure and systems to withstand climate change impacts, natural disasters, and other hazards. This includes improving the capacity of the drainage system to manage annual floods that frequently disrupt the city and enabling sewage to safely flow underground through trenchless trunk sewers. Additionally, the Project will continue to support Lahore's economic (commercial, industrial, and financial) as well as socio-economic development activities—while promoting an environmentally sustainable and livable city. The Project also supports the progress toward achieving the targets for SDG 6 (Water and Sanitation) and the key priority areas of Pakistan's 2018 National Water Policy.

2.6 **Paris Agreement Alignment (PAA) and Climate Finance.** In line with AIIB's methodology for assessing alignment with the mitigation and adaptation goals of the Paris Agreement, the Project is assessed as aligned under both mitigation (BB1) and adaptation (BB2). For mitigation, the Project is classified under the Universally Aligned List for "Water supply and wastewater" operations, including gravity-based sewerage systems, rehabilitation of drainage networks, and integration of solar energy solutions. These interventions reduce electricity consumption, eliminate reliance on diesel generators, and support clean energy use, resulting in an estimated reduction of nearly 77,270 tonnes of CO_2 over the project period. For adaptation, the Project addresses the growing climate risks facing urban Lahore, particularly recurrent monsoon flooding and infrastructure vulnerabilities. Climate-resilient design principles, such as separation of wastewater and stormwater flows, drainage upgrades, and centralized pumping, help mitigate flood impacts, ensure reliable service delivery, and improve public health outcomes during extreme weather events. In accordance with the joint

Multilateral Development Bank (MDB) methodology for tracking climate finance, it is estimated that approximately 85.4 percent of AIIB financing qualifies as climate finance, amounting to USD136.57 million, of which USD54.27 million is for climate mitigation, USD82.30 million for adaptation, and USD131.35 million represents dual benefits. More detailed information on the Paris Agreement Alignment assessment and Climate Finance estimates is provided in Annex 3.

2.7 **Value Addition by AIIB.** AIIB's value addition involves providing critically needed financial resources to fill the investment gap for the Project to improve the sanitation services in Lahore. AIIB has also supported the project preparation through its Project Preparation Special Fund (PPSF) grant (PPSF Grant) of USD505,000, which enabled LWASA to review the feasibilities and engineering designs of the Project components to ensure adequate technical rigor in the engineering reports. The PPSF Grant especially assisted LWASA in addressing safeguard issues by mobilizing experienced consultants for due diligence and preparation of Environmental and Social Impact Assessments, Resettlement Plans and Environmental and Social Management Plans. The PPSF Grant also helped LWASA in carrying out a thorough financial management assessment and developing a modern financial management information and reporting system. Later, at the request of the Borrower, AIIB approved the project preparation advance loan (PPA), which helped in advance completion of the engineering design, cost estimates, PC-1, and tender documents. The PPA significantly improved the implementation-readiness of the Project and resulted in time savings of about 18 months in the overall implementation schedule. AIIB is not only financing the Project's capital costs but its commitment will also help in attracting reputed international contractors for constructing three trunk sewers through state-of-the-art tunneling technology, which has been recommended over conventional excavation techniques to limit environmental and social impacts in congested urban areas. This will be the first application in Pakistan which will pave the way for its replication in other major cities for improving environmental conditions.

2.8 **Value Addition to AIIB.** Being a high visibility project and the second stand-alone operation in the country, it projects AIIB as a reliable partner for mobilizing financial and technical resources for environmentally sound and sustainable solutions in the sanitation sector. The Project also provides valuable opportunities for the Bank's Project Team to gain experience with such state-of-the art sewerage projects as well as learn from the successful financial and institutional reforms implemented at LWASA by the GoPb.

2.9 **Lessons Learned.** The preparation of this Project has benefited from AIIB's and other MDBs' experience in similar projects in the country and region. Key lessons learned show that:

(i) Investment in infrastructure development is not sustainable without parallel, targeted, and implementable institutional reforms, including (a) deployment of additional experienced human resources and allocation of the additional O&M funds for operating the newly developed infrastructure; (b) tariff rationalizing with the provision of improved services; and (c) effective monitoring and evaluation (M&E) measures for continued improvements based on the M&E findings. As recently learned from the Karachi Water and Sewerage Improvement Project-1 (KWSSIP-1), which is cofinanced by AIIB and WB, institutional reform requires sustained commitment from borrowers over the long term. Similarly, in the case of LWASA, GoPb took drastic measures over the last 5 years towards financial sustainability and institutional strengthening, which transformed LWASA from a

financially strained utility to a fiscally disciplined, technology-driven public service provider. LWASA now stands as a model urban utility in Pakistan which is due to the continued implementation of institutional and financial reforms.

(ii) Many past projects financed by MDBs for the construction of water and wastewater treatment facilities could not be completed in time either due to inadequate procurement strategy – for example unnecessarily breaking down large components into small procurement packages, thus creating sequencing and interface problems – or lack of technical rigor – where the complex designs were not validated independently, eventually leading to poor performance. A WB (analytical) study of contract-level delays across WB and Islamic Development Bank projects, emphasizes that poor up-front package design and weak PIU skills lead to downstream retendering and contract delays, and recommends rigorous procurement risk assessment and right-sized packaging. Lessons from the Dhaka sanitation and sewerage programs financed by the WB and ADB indicate that delays in contract awards and start-up could be mitigated by adopting large integrated procurement packages or Engineering Procurement and Construction (EPC) options for complex WWTP components, coupled with mandatory independent design reviews prior to tendering Similarly, the large procurement packages were used in the AIIB-financed KWSSIP-1, which helped in completing the contracts in time, and same practice has been proposed for this Project. For the proposed Project, a single large EPC contract has been adopted to cover the construction of trunk sewers, a new pumping station, rehabilitation of surface drains, and installation of solar energy systems to support clean energy use for wastewater disposal pumps. This integrated contract approach enhances implementation efficiency and minimizes coordination issues that typically arise when multiple contractors are involved. By assigning interconnected components to a single contractor, the planning and management of interdependent activities are streamlined, ensuring better synchronization and timely execution. AIIB cleared the Project Delivery Strategy (PDS), General Procurement Notice (GPN), and Procurement Plan (PP) in July 2025, that address the overall procurement outlays, market availability, system constraints, procurement competencies, and implementation aspects of the Project.

(iii) One of the major causes of project implementation delays and associated low disbursements is the frequent turnover of project staff, particularly the Project Director, who is often replaced by candidates lacking the required experience. This disrupts continuity, slows decision-making, and undermines institutional memory. To mitigate this issue, it is essential that qualification criteria be agreed upfront with the financier(s) of the project, including the Bank, and that evaluation and selection remain subject to their approval. Accordingly, a legal covenant will be included to enforce adherence to the agreed qualification requirements and best efforts are made to cause transparency in staff selection. Furthermore, the Borrower, GoPb and LWASA should make every effort to retain project staff in their roles throughout the implementation period. In the event that replacement of any key staff becomes necessary, the Borrower, GoPb and LWASA shall promptly identify and appoint, subject to AIIB's prior written approval, replacement key project staff with

substantially equivalent qualifications and experience, and on terms similar to those of the former staff.

(iv) AIIB PPSF grants consistently financed feasibility studies, detailed engineering, E&S instruments, and procurement packaging—bringing projects to implementation-ready status faster (e.g., Cambodia Urban Infrastructure Development; Uzbekistan Public-School Infrastructure; Lahore Water & Wastewater Management). Based on these positive lessons learned from the use of PPSF, AIIB offered both PPSF grant and a PPA to support the PMU. With this support, the PMU successfully achieved key preparatory milestones, recruited in advance the Project Management Consultant (PMC), and completed the engineering design and bidding documents for the Project which translated into measurable efficiency gains, shortening the implementation period by about 18 months. This proactive planning will also help to minimize implementation start-up delays.

3. Project Description

3.1 The Project will address the interrelated challenges of wastewater management and urban drainage in central Lahore. Guided by the Lahore Master Plan—which covers water supply, sewerage, stormwater drainage, and wastewater treatment—the Project will support the construction of modern wastewater infrastructure to divert sewage from drainage channels and low-lying areas that are currently contributing to environmental degradation due to the absence of well-connected trunk sewers. This infrastructure will ensure the safe conveyance of wastewater to designated disposal and treatment sites. As a result, the Project will help mitigate the discharge of sewage into open waterways, reduce water pollution, address public health risks, and improve the urban environment in the surrounding areas.

3.2 **Components:** The Project components are detailed below.

3.2.1 **Component A: Investment in Wastewater and Drainage Management.** This component will construct priority wastewater transport sewers to separate storm water from sewage, reduce huge operating costs of intermediate pumping stations, improve environmental conditions by cleaning up the stormwater drains and reduce flood-related impacts.

3.2.1.1 **Sub-component A.1: Construction of Trunk Sewers.** This subcomponent will finance the construction of three new trunk sewers (about 32.3 km) through underground tunneling (a trenchless technique which minimizes excavation). This will safely transport domestic sewage, serving an area of about 63 square kilometers (sqm) in central Lahore. The construction of a gravity-based wastewater infrastructure will also eliminate the need for intermediate pumping at 23 different locations, thus reducing LWASA's O&M costs by about PKR 700 million (USD2.46) million annually.

3.2.1.2 The first trunk sewer and its laterals measuring about 12.3 km will be constructed from Karachi Phathak to Ferozepur Road in central Lahore. The second trunk sewer and its laterals measuring about 12.8 km will carry the sewage flow from Gurumangat in Gulberg area to Ferozepur Road. The two lines will join at Qartaba Chowk from where the wastewater will be carried through a combined pipeline of 7.2 km to Gulshan-e-Ravi pumping station for final disposal. Some households in Gulberg and other areas that are currently not connected to LWASA's sewerage network will be integrated into the system through the construction of conventional sewer lines, which will connect them to the newly built trunk sewers.

3.2.1.3 **Sub-component A.2: Construction of Pumping Station.** The sewage from the trunk sewers will flow to the Gulshan-e-Ravi pumping station which has an existing installed capacity of 15,300 liters per second (lps). This subcomponent will finance the construction of a new pumping station consisting of 16 pumps with associated infrastructure, which will increase the total pumping capacity to 39,300 lps. The construction of pumping station will result in the safe disposal of all the sewage.

3.2.1.4 **Sub-component A.3: Rehabilitation of Stormwater Drains.** The Project will also rehabilitate stormwater drains and associated infrastructure, thereby not only providing environmental and public health benefits but also addressing the urban flooding problems. Upon completion of the trunk sewers, about 9 km of surface drains in the locality will be freed from sewage disposal while 7 km of surface drains will be rehabilitated and restored under this subcomponent. This will enhance the capacity of surface drains and provide significant relief from recurring annual flooding during the monsoon season, thereby reducing associated economic losses and social disruptions. The Project will also address chronic flooding at key low-lying locations such as Gulberg, Shah Jamal, Sultan Ahmad Road (Ichra), Lakshmi Chowk, Shimla Hill, Cooper Road, Qartaba Chowk, and Chauburji Chowk. By alleviating inundation in these areas during heavy rains, the Project will improve traffic mobility and help prevent substantial losses to businesses and local residents.

3.2.1.5 **Sub-component A.4: Clean Energy Support for Wastewater Disposal Pumps**. The 450 kW solar energy installation at the Gulshan-e-Ravi Disposal Station will play a vital role in reducing carbon emissions by powering operations through renewable energy. By decreasing reliance on fossil fuels, the system will lower GHG emissions and support a cleaner environment. Additionally, the solar pump system, integrated with a battery-hybrid backup, will enable extended or even uninterrupted operation, ensuring continued functionality during nighttime or overcast conditions when solar energy is unavailable. In addition to environmental benefits, solar energy will reduce operating costs by minimizing energy expenses up to USD0.15 million per annum, providing long-term savings and strengthening the station's sustainability. This initiative showcases a commitment to environmental stewardship and efficient resource management.

3.2.2 **Component B: Project Management.** This component will support LWASA to engage PMC for design review, procurement of works and goods, and overall project management including construction supervision, managing environmental and social compliances, and ensuring quality assurance during construction.

3.3 **Cost and Financing Plan**. The Project cost is estimated to be USD177.0 million to be financed as follows: (i) a sovereign backed Loan of JPY24 billion (USD160.0 million equivalent) from AIIB, and (ii) USD17.0 million equivalent counterpart financing by GoPb, which include taxes and duties, incremental operating expenditures relating to PMU, environment and social costs, and operation and maintenance cost of the Project for the first (1st) year of operation. Table 1 provides the summary of project cost and financing.

Table 1. Project Cost and Financing Plan[1/]			
Item	Project Cost (USD m)	Financing (USD m and %)	
		AIIB*	GoPb
Component A: Investment in Wastewater and Drainage Management	172.4	155.4 90.14%	17.0 9.86%
Component B: Project Management	4.6[6]	4.6 100%	-
Total	**177.0**	**160.0** **90.4%**	**17.0** **9.6%**

[1/] Note: Project cost and financing is stated in USD m for ease of presentation. During the Loan Negotiations, the Borrower Delegation requested and the Bank Delegation agreed to change the loan currency from the indicative Dollar denominated loan discussed during earlier processing stages into the 24 billion JPY (USD160 million equivalent). The Bank Delegation made the necessary changes in the draft Loan Agreement.

3.4 Government of Pakistan (GoP) will onlend the Loan to GoPb under a Subsidiary Agreement under terms and conditions approved by AIIB. GoPb will make the loan proceeds available to LWASA for implementing the Project.

3.5 **Implementation Arrangements and Readiness**

3.5.1 **Implementation arrangements.**

(i) **Project Implementing Entity (PIE)**: The GoPb has constituted a Project Steering Committees (PSC) to provide oversight and planning and strategic guidance during project preparation and implementation stages. The PSC is chaired by Chairman Planning and Development Board and comprises Secretary of the Housing, Urban Development & Public Health Engineering Department (HUD&PHED), Secretary of Finance, Secretary of Environment Protection and Climate Change Department (EPCCD), Commissioner Lahore, Director General Punjab Water and Sanitation Authority (PWASA), and Managing Director LWASA, as members. The representation of wider stakeholders in PSC is expected to help in streamlining inter-departmental coordination needed for smooth project implementation. The PSC meetings will continue to convene quarterly or earlier when required.

(ii) **Project Management Unit**: LWASA is the Implementation Agency for all components of the Project. Within LWASA, a PMU has been established under the leadership of a Project Director. The PMU shall be responsible for the coordination and implementation of the Project activities, including: (i) procurement; (ii) planning and budgeting; (iii) project design review and physical implementation; (iv) implementation of the environmental and social instruments; (v) financial management and disbursement; (vi) monitoring and evaluation; (vii) reporting; and (viii) communication. The

[6] Of this amount, USD1.6 million will refinance the PPA.

PMU is currently operational, comprising key LWASA personnel[7] dedicated to the Project, as well as professionals recruited from the market. All remaining experts[8] in environmental and social safeguards, procurement, and financial management will be recruited prior to loan effectiveness. The PMU reports directly to LWASA's Managing Director.

(iii) **Project Management Consultant**: The PMC, which has already been mobilized and has completed the preliminary engineering design, cost estimates, and preparation of tender documents for the works contract, will provide specialized contract management and technical support to LWASA during the procurement and execution of all contracts. The PMC will also support the PMU in the implementation of environmental and social safeguard instruments, as well as in monitoring and evaluation, regularly reporting on RMF progress, and documentation. It will coordinate with all stakeholders—including contractors, project beneficiary representatives, and PMU managers—to facilitate timely information sharing and guidance, manage interdependency risks, ensure continuous supervision and monitoring of Project components, and produce monthly progress reports.

(iv) **Procurement arrangements**: Procurement will be conducted in accordance with the provisions of the AIIB Procurement Policy, June 2024, and Directive on Procurement Instructions for Recipients, July 2024. The GPN and the PDS including the PP were prepared by PMU/LWASA and have been cleared by AIIB. Works under Component A shall be procured as an EPC contract using the International Open Competitive Tendering (IOCT) method without prequalification applying a Single-Stage, Two-Envelope bidding procedure. PMC has been recruited under the PPA (for USD4.6 million) and currently is helping the PMU with the project preparation and development.

(v) **Financial Management (FM) arrangements**: Manager Admin & Finance of the PMU will be responsible for the FM and disbursement of the Project. The PMU will maintain project accounting records and prepare financial statements in a format agreed with AIIB, reflecting the overall sources and uses of project funds. These financial statements will be submitted to AIIB within 60 days after the end of each calendar semester. In line with the country system and consistent with the practice followed in other MDB-financed operations in Pakistan, the Auditor General of Pakistan, through the Director General (Works), Punjab, will conduct an annual audit of the Project. The audited Project Financial Statements along with the Management Letter will be submitted to AIIB within six months after the end of each fiscal year.

[7] Project Director, Manager Technical (Civil), Manager (Environment and Social), Engineer and sub-engineer (Procurement), Human Resources and Office Manager, Admin and Finance officer, and support staff (8 No.)

[8] One (1) senior environmental specialist/deputy manager; one (1) senior social development specialist/assistant manager; a manager, administration and finance; a manager, procurement and contracts, an assistant manager, civil; four (4) sub-engineers, as well as financial management specialist, office and human resource manager; assistant manager, legal; and support staff within the PMU.

(vi) **Environmental and Social (E&S) arrangements**: The existing PMU has a dedicated Environmental and Social Manager to oversee the E&S aspects of the Project. The E&S staff will be further strengthened by deputing one deputy manager for environment and social and one assistant manager for social prior to project effectiveness. As part of the project implementation supervision, the PMC will supervise the implementation of E&S safeguard instruments and prepare necessary monitoring reports. A third-party monitoring consultant will be engaged to monitor the implementation of E&S management plans and provide advice to PMU on E&S matters.

(vii) **Project implementation plans and project manual**: The PMU is in the process of developing the Project Operations Manual (POM). In addition to detailing implementation arrangements, the POM will outline procedures for tender evaluation, approvals, contract awards, PMC-contractor interface, and procurement governance; project implementation reviews; monitoring and evaluation; regular reporting; coordination requirements with all stakeholders; and schedule and contents of trainings in FM, Procurement, E&S, technical operations, and cybersecurity. It will also define clear protocols for financial and contract management. The Project Team will support the PMU in the comprehensive preparation of the POM and will ensure that robust E&S arrangements are established in a timely manner. These arrangements will cover the PMU and all responsible entities involved in day-to-day operations, including those managing the associated facilities.

3.5.2 **Implementation period.** The Project will be implemented from January 2026 to December 2030.

3.5.3 **Implementation readiness.** The project implementation readiness is summarized below:

(i) The PMU has already been established and functional. The Project Director and key professional and support staff are on board. The PMU will be expanded before the loan effectiveness in line with the staffing arrangement agreed with the Bank.

(ii) The PPA facilitated the PMU in recruiting the PMC in advance. The PMC has completed the preliminary engineering design, cost estimates, and the preparation of the PC-1 for the Project. In addition, the PMC has also completed the draft tender documents for the Works Contract. It is anticipated that the final tender documents will be issued by September 2025.

(iii) An Environmental and Social Due Diligence (ESDD) has been carried out and an Environmental and Social Impact Assessment (ESIA), including an Environmental and Social Management Plan (ESMP), has been prepared by PMU to identify and plan for the environmental and social risks of the Project. Additionally, a Stakeholder Engagement Plan (SEP), Livelihood

Restoration Plan (LRP) and Gender Action Plan (GAP) are in place to ensure a comprehensive and successful implementation of the Project in accordance with AIIB's Environmental and Social Policy (ESP). These documents have been cleared by AIIB and disclosed by PMU.

3.5.4 **Monitoring and Evaluation.** The RMF will serve as the primary tool for tracking progress toward the Project Objectives. The overall responsibility for monitoring project results will lie with the PMU, with technical support from the PMC.

3.5.5 The PMC is required under its contract to maintain adequate equipment and staff to carry out regular data collection and analysis. Additionally, the PMC will assist the PMU in developing a comprehensive MIS, which will include geo-tagging of all project-created assets. The MIS will feature a robust data management system to process and manage all project-related information, including beneficiary records, disbursements, verification processes, and monitoring data. Field staff from the PMC, as well as project beneficiaries, will have the capability to upload information to the MIS in real-time using smartphones. The PMU will centrally verify and consolidate this information.

3.5.6 Data collection and reporting will be conducted collaboratively by the PMC, PMU managers, and field staff. Based on this data, regular progress reports will be prepared and shared with LWASA. The PMU will produce quarterly progress reports for submission to AIIB, detailing progress against agreed monitoring indicators and targets. For internal purposes, the PMU will also generate concise monthly physical progress reports to monitor the ongoing implementation of project activities and use the reports for monthly review meetings.

3.5.7 For regularly monitoring the physical progress of the Project and troubleshooting all issues, LWASA shall establish the Project Implementation Progress Review Committee (PIPRC)[9] immediately after the works contract is awarded. This Committee will review the implementation progress of all project components (monthly or earlier, when required) resolve the identified issues and highlight matters for LWASA or GoPb attention, if and where applies, and submit the quarterly progress report to GoPb, LWASA and AIIB. LWASA shall ensure the participation of the E&S Teams of the Project and that of the proposed Babu Sabu Wastewater Treatment Plant Project financed by AFD for the coordination regarding the implementation of corrective action plan for the wastewater treatment plant project.

3.5.8 To ensure that the AFD Project is completed prior to the closing date of the Project, GoPb shall establish a high-level Coordination Committee led by the Chairman of GoPb's Planning and Development Board, comprising representatives from Pakistan Economic Affairs Division (EAD), LWASA, AFD, AIIB, the PMUs of both AFD and AIIB projects. The Committee shall meet quarterly or more frequently, as required, for consistent monitoring of the implementation progress of the AFD

[9] Composition of PIPRC is to be described in the Project Operations Manual, which shall be approved by AIIB.

Project. EAD shall provide the GoPb with any support it may require, including among others, expeditious custom clearance of imported equipment.

3.5.9 **AIIB's Implementation Support.** Under normal circumstances AIIB is expected to conduct two field visits per year to monitor the implementation progress. Depending on the Project's progress and the performance of the PMU, PMC, and Contractors, AIIB may conduct additional visits to resolve any critical issues. AIIB Implementation Support Missions will also coordinate with AFD Resident Office in Islamabad to jointly undertake the site visits to the WWTP during its implementation and shall report their findings and recommendations to GoPb to ensure that WWTP is completed prior to the closing date of the Project.

4. Project Assessment

A. Technical

4.1 **Project Design.** Guided by LWASA's updated Master Plan for Lahore District—which addresses water supply, sewerage, stormwater drainage, and wastewater treatment—the Project will support the construction of modern wastewater infrastructure to divert sewage from drainage channels and low-lying areas, as well as to rehabilitate and clean the affected drains.

4.2 LWASA was established in 1976, by Lahore Development Authority Act 1975 under the legislative assembly of GoPb with the mandate of enhancing the water supply, sewerage, and drainage systems in Lahore. LWASA is owned 100 percent by GoPb. Initially, the city's entire sewage was discharged into the River Ravi through six major disposal stations along its banks. However, over time, the absence of a trunk sewer system, coupled with rapid urban expansion, led to the misuse of Lahore's primary drains. Originally designed to carry stormwater, these drains were repurposed as sullage carriers due to the uncontrolled discharge of sewage via intermediate lift stations, which were installed as temporary measures to transport wastewater from contributory sewers.

4.3 To rectify this issue—by segregating sewage from stormwater drains and reducing the exorbitant pumping costs associated with lift stations—a proposal has been developed to construct trunk sewers along the Cantonment drain using micro-tunneling. This trenchless method was chosen specifically to minimize disruptions to daily life and prevent damage to critical infrastructure.

4.4 PMC was engaged to finalize preliminary designs and revise cost estimates. After evaluating multiple technologies—including pipe-jacking, conventional tunneling, and micro-tunneling—the PMC concluded that micro-tunneling was the optimal solution. The selection was driven by the Project's core objective: to implement a cost-effective, expedient trenchless construction method. Unlike conventional tunneling, which is better suited for diameters exceeding 4 meters, micro-tunneling proved both technically and economically viable for the proposed sewer diameters (ranging from 1050-mm to 3500-mm). Additionally, its ability to navigate curved alignments—anticipated along the planned routes—further reinforced its suitability over alternative methods.

4.5 Extensive geotechnical investigations were conducted, including the drilling of 115 boreholes along the proposed trunk sewer alignment to thoroughly evaluate soil stratigraphy. These studies proved instrumental in selecting the optimal cutter head design and micro-tunneling machine type. Furthermore, the geotechnical data enabled the precise design and quantity assessment of jacking and receiving shafts, ensuring efficient micro-tunneling operations. To complement these subsurface investigations, advanced topographic surveys were performed using unmanned aerial vehicles (UAVs) and total stations. This approach not only validated existing benchmarks but also facilitated the development of a high-resolution 3D digital elevation model. Additionally, bathymetric surveys of the drains were carried out to assess flow conditions, providing essential data for their proposed remodeling. Based on Geotechnical investigations, the design was prepared by PMC with planning horizon of Year 2050 on basis of latest published census for its sustainable operation. In addition, other critical

factors which have been employed for making the infrastructure resilient to ensure its longevity include:

- Utilization of High Strength Concrete of compressive strength of 6000 pounds per square inch (PSI) for reinforced cement concrete (RCC) sewers to aid in pipe jacking operation.
- Optimized design of tunnel with dedicated space for ventilation and air cushion to provide ventilation and prevention against foul gases
- Lining of High-Density Polyethylene inside sewer pipes for enhanced resistivity against crown failure.
- Consideration of Mechanical Screens at sewage intake points of main tunnel for recurrent cleansing of screens to avoid ingress of solid waste and trash into main tunnel thus enabling self-cleansing operation system.
- Consideration of Drop Structures, Odor Control System and Ventilation System at intake points of proposed tunnel for energy dissipation and tangential vortex flow at connecting points.

4.6 Technical designs address the interrelated challenges of inadequate transport capacity of bulk wastewater, continuous deterioration of stormwater channels, and recurrent urban flooding. At the same time, the reliance on round-the-clock O&M of multiple pumping stations to dispose the wastewater is a major burden on LWASA's financial resources. The trunk sewers will therefore be installed at such depths to allow the system to operate at gravity without the need for intermediate pumping.

4.7 The core master planning documents recommend completing the five WWTPs by 2035, aligning with the city's mid-term development needs. Feasibility studies of WWTPs have been completed and GoPb is in the process of internal approvals for the WWTP at Babu Sabu to be financed by AFD, which will treat all the wastewater carried by the Project trunk sewers. Keeping in view the urgent need of a bulk wastewater conveyance system in Lahore and advance preparation of the proposed project design and all internal approvals completed, GoPb decided to construct the trunk sewers in the first phase ahead of the water supply project. In an ongoing parallel phase, the associated WWTP, presently undergoing the required technical assessments, will be constructed and connected to these trunks sewers for the system to operate as integrated wastewater collection and treatment system. In view of the challenging nature of the Project, the technical risk has been rated High. To manage these risks, the construction of trunk sewers will be procured through Design-Build approach, which will significantly shift the risks of design, construction and cost overruns to the construction contractors. International PMC, experienced in providing engineering and project management support in works of similar nature, has been engaged by LWASA to assist in procurement of construction contracts, design reviews and construction supervision. The construction contractor for trunk sewer contract will also be responsible for operating the system for two years after commissioning. This will build LWASA's capacity in safely managing and operating the system. The contractor will develop a Standard Operating Procedure and a Monitoring and Maintenance Plan during the construction and operation phases. This Procedure and Plan will be adopted by LWASA while it takes over the responsibilities of O&M from the contractor.

4.8 The Phase-1 Project primarily focuses on the provision of a trunk sewer system to ensure the safe conveyance of sewage from the densely populated central areas of Lahore, which have long faced serious environmental and related challenges in its absence. In contrast, the Water Supply Project under Phase-2 is aimed at supplementing the city's water supply with surface water sources to help address the ongoing decline in groundwater levels. Therefore, the absence of an integrated approach combining both water and wastewater components in a single project will not result in any adverse impacts, as each project independently addresses distinct and critical issues. Furthermore, there would be no sequential and/or interface issues when the water component would be left as the next phase. Phase 1 would deliver real gains (flood reduction, storm drain rehabilitation, O&M savings) even before Phase 2 is implemented. Phase-2 is planned to be processed separately once its appraisal requirements are substantially complete.

4.9 **Operational Sustainability.** To cover O&M costs of the sewerage system, LWASA has introduced sewerage service charges as a percentage of water bills or a fixed rate. In parallel, it has adopted a combination of institutional and financial reforms which resulted in LWASA fiscal surplus exceeding PKR3.7 billion (USD13.01 million equivalent). The successful introduction of these reforms such as indexed tariff reforms, coupled with digital governance, operational automation, and energy efficiency measures, ensure that LWASA is well-positioned to achieve full financial sustainability and service excellence in the years ahead.

4.10 For operational capacity development of LWASA, staff training by the TBM contractor during the first two years of operation is part of the contract as employer's requirements. PMC has also been mandated to provide staff training to ensure sustainable operations.

4.11 The Project integrates sound environmental and social management into its operations, aiming to avoid, minimize, mitigate, offset, or compensate for environmental and social impacts, as part of the ESMP. It includes provisions for environmental and social screening, categorization, and analysis of potential risks and impacts. Actions are identified to support decision-making, manage operational and reputational risks, and ensure sustainable management measures are integrated into the Project. Additionally, the Project is expected to have high positive impacts on land use, aesthetics, employment, and air quality during the operational phase.

4.12 Operational Monitoring: To better facilitate the management, operation and control of the new facilities i.e. disposal pumping stations and trunk sewerage lines, a state-of-the-art computerized control and monitoring system termed as Supervisory Control and Data Acquisition (SCADA) system will be part of the Project scope.

B. Economic and Financial Analysis

4.13 **Economic Analysis.** *Project costs and benefits***.** A Cost-Benefit Analysis was carried out to assess the economic viability of the Project comparing "with-" and "without-project" scenarios assuming a 25-year project cycle. The costs considered were for capital investments and annual O&M for the trunk sewer infrastructure. The Project benefits considered were grouped into the following categories: (a) health co-benefits, (b) improvement in urban environment and quality of life of residents measured through their willingness-to-pay for sewerage infrastructure and facilities, (c) savings in operations (reduced energy and O&M costs), (d) avoided costs of machinery and fuel consumption, and (e) avoided GHG emissions.

The approach and detailed results are presented in Annex 2: Economic and Financial Analysis.

4.14 **Results and Sensitivity Analysis**. The Economic Internal Rate of Return (EIRR) was estimated at 15 percent and Economic Net Present Value (ENPV) at USD58 million based on a 10 percent social discount rate. The EIRR exceeds the social discount rate demonstrating the economic viability of the Project. A Sensitivity analysis has been carried out with respect to a 10 percent increase in Project costs, a 10 percent decrease in benefits, and a worst-case scenario combining the above scenarios. In another scenario, we reduce the growth rate in sewerage connections by 5 percent from the baseline model. The EIRR remains above the social discount rate of 10 percent for all scenarios.

4.15 **Financial Analysis.** The GoPb will provide the loan proceeds to LWASA for implementing the Project. LWASA, therefore, will not be liable for repayment of the Loan but will be responsible for operating and maintaining the new infrastructure. The financial analysis, therefore, focused on the financial impacts of the Project on the operations of LWASA. Upon completion, the Project will generate additional revenues from customers served and reduce O&M expenditures through reduced electricity consumption, workforce optimization, and digital billing, as projected in Table 2 below.

Table 2: Project Financial Performance (with – without scenario; PKR Million)

Year	2022	2024	2031	2032	2034
Revenues	12,653	27,451	27,002	27,114	27,413
Less: Expenditures	(15,986)	(25,363)	(23,469)	(23,199)	(22,657)
Net Financial Benefits	(3,333)	2,008	3,533	3,915	4,756

4.16 LWASA's financial sustainability was assessed based on past income and expenditure patterns, unaudited financial statements, and cost recovery under the then-prevailing tariff structure. At that time, the analysis identified several challenges, including low tariff rates, deteriorated infrastructure, high non-revenue water, and limited willingness to pay due to service quality concerns. Since then, major reforms have been implemented. Notably, the tariff structure was revised in July 2023, marking a turning point in LWASA's financial performance. Following the revision, LWASA has achieved a significant improvement in cost recovery, reaching 101 percent in FY2023–24 and further improving to 108 percent in FY2024–25. These reforms have placed LWASA on a clear path toward financial sustainability and service delivery improvement.

4.17 **Cost Recovery and Reduced Reliance on Government Subsidies**. The average Operational Cost Coverage Ratio (OCCR), excluding government subsidies, stood at 73 percent over previous years leading up to 2021. LWASA then largely relied on GoPb subsidies, particularly for energy costs. However, following the tariff reforms in 2023 and implementation of enhanced financial discipline, LWASA is no longer primarily dependent on government support. Subsidies are now limited to covering the differential for subsidized tariffs applicable only to low-consumption domestic users. For all other consumer categories, LWASA operates on a self-sustaining basis. This shift demonstrates a significant improvement in institutional financial health and reduced fiscal burden on the government.

4.18 **Indexed Tariff Structure and Improved OCCR**. Between 2004 and 2017, revenue growth lagged behind the rise in operational costs due to stagnant tariffs. Though partial tariff rationalization occurred in 2017, it wasn't until 2023 that a comprehensive tariff revision was implemented, including the introduction of an indexation formula. This formula now allows for biannual adjustments to account for inflationary impacts, particularly due to changes in electricity and petroleum prices. As a result, LWASA's tariff regime is more dynamic and responsive to cost fluctuations. Consequently, the OCCR has significantly improved, reaching to estimated 94 percent in FY2024–25, reflecting full cost recovery and operational viability.

4.19 In line with the Government's recent efforts to reduce subsidies, LWASA has developed a business plan and proposed a tariff roadmap to its governing body, which foresees to increase the water and sewerage tariff to cost recovery levels in a stepwise approach while phasing out subsidies. To strengthen its financial sustainability in short to medium term, the following actions are foreseen: i) a tariff roadmap to adjust the water and sewage tariffs, ii) measures to increase collection efficiency and client base, and iii) introduction of universal meter-based billing. A detailed analysis is presented in Annex 2: Economic and Financial Analysis.

C. Fiduciary and Governance

4.20 **Procurement:** LWASA has a dedicated procurement department responsible for managing the procurement of works, goods, and consultancy services in accordance with provincial procurement rules and regulations. However, its experience in working with international financial institutions (IFIs) is limited.[10] The Project involves a high value contract for which LWASA has a limited track record. Procurement will, therefore, present substantial challenges and the risk has been rated High. A PDS and PP have been prepared with the AIIB Project Team who provided details of the capacity assessments, market analysis, institutional strengths and weaknesses and potential risks and mitigation measures. The procurement risks will be managed by the PMU with the support of the existing experienced qualified PMC responsible for providing specialized services for design reviews, procurement and contract management, and construction supervision. All works will be procured following the International Open Competitive Tendering method without pre-qualification, which will lead to the selection of contractors with a demonstrable track record. Besides staffing the PMU with procurement and contract management experts, LWASA's procurement department will continue to support the PMU in finalizing the tender documents and tendering process. AIIB will provide implementation support by delivering targeted pre-tender procurement training, and reviewing procurement documents, including technical specifications, and monitor the procurement progress against the PP. LWASA and AIIB have agreed that Advance Contracting be applied to the works packages to expedite project start-up and implementation.

4.21 **Financial Management:** For the proposed Project, a finance function will be established within the PMU. A Manager, Finance will be recruited before loan effectiveness and will be responsible for managing the day-to-day operations of the function, reporting directly to the Project Director. PMU's Manager Finance will be assisted by one Accountant. LWASA will depute Deputy Director of Finance to conduct the validation process through LWASA Finance

[10] LWASA was one of the project implementing units of the Punjab Cities Governance Improvement Project financed by the World Bank (2012). Additional experience has been gained through implementation of AIIB's Project Preparation Special Fund Grant.

Directorate. The roles and responsibilities of PMU financial staff, along with coordination with LWASA during validation, will be documented in the POM.

4.22 Based on the FM assessment conducted on LWASA, AIIB concludes that the Project can maintain financial management and disbursement arrangements acceptable to AIIB, subject to the implementation of mitigation measures outlined below and summarized in Table 3.

4.23 Main risks identified: i) PMU has not been established with sufficient financial staff; ii) the financial staff may not be familiar with AIIB's fiduciary requirement and procedures; and iii) the collaboration between PMU and LWASA may not be efficient, which will affect project implementation or expose higher fiduciary risks. Mitigation measures: i) PMU needs to hire a Manager, Administration and Finance before project effectiveness. For this, the Terms of Reference (TOR) should be provided to AIIB for review, and final selection of the candidate should be agreed by AIIB; ii) AIIB will engage experienced FM consultant to provide more hands-on training and guidance to PMU WASA especially in the initial implementation period; and iii) the coordination mechanism and work flow procedures between PMU and WASA finance team will be documented in the POM, which will be reviewed and approved by the Bank before implementation starts.

4.24 **Budget**. GoP will onlend AIIB loan to GoPb, which will provide the loan to LWASA for implementing the Project. All the capital investment for LWASA is provided by GoPb through the Annual Development Program, reflected in the GoPb's budget. The annual budget for the Project will include all the sub-components as well as the incremental operating expenses of PMU on the basis of planned activities identified in the procurement plan. For preparation of the annual budget for the Project and allocation of resources from counterpart funding, Finance function will seek inputs from all relevant departments and Project Director. PMU's Manager Finance will submit the budget to Director, Finance LWASA for review and inclusion into the annual budget of LWASA. According to the financial & physical phasing of schemes, request for release of funds will be forwarded to Finance Department of Punjab for release of funds on a quarterly basis based on the utilization of funds. In case of fast implementation of the Project and early utilization of funds, GoPb will release additional funds in excess of approved budget, after verification.

4.25 **Internal Control**. Organizational structure ensures segregation of duties and roles & responsibilities are well defined. Organization has a well-established Pre-Audit function and all the payments are pre-audited by the pre-audit team deputed by the Finance Department of GoPb, which will also apply to the reviewing and approval process of project expenditures to provide necessary assurance on proper usage of loan proceeds.

4.26 **Accounting & Financial Reporting**. The project accounts will be maintained on cash basis as per LWASA's existing accounting policies and procedures using the existing Chart of Accounts, which are comprehensive. All supporting documents will be maintained by PMU and payment vouchers will be prepared by PMU for each transaction indicating the relevant accounting codes and disbursement categories. Project components will also be mentioned on the payment vouchers.

4.27 For each semester, PMU will prepare an Interim Unaudited Financial Report (IUFR) that will be furnished to AIIB within 60 days of the close of the semester. IUFR will report on funds

receipt and utilization during the semester according to project components and disbursement categories. The format and content of IUFR will be prepared in the format agreed with AIIB. In addition, PMU shall prepare annual project financial statements and submit audited project financial statements within six months of close of financial year. LWASA's entity level financial statements will be audited by auditors acceptable to AIIB, the audit report will be submitted to AIIB within 6 months after the end of financial year.

4.28 **Disbursements**: The proceeds from the Loan will be disbursed in accordance with the arrangements and instructions contained in the Disbursement Letter. Disbursements under the Loan will be made primarily using the Direct Payment in loan currency or PKR and Advance (in loan currency) methods. Under Advance method, a segregated Designated Account (DA) in loan currency will be established at the National Bank of Pakistan and managed by PMU. Initial advance into DA will be provided by AIIB on the basis of projections for the first 6 months. Subsequent advances will be based on forecast for the following semester and the balance available with the PMU as reported in the IUFRs. At the end of the Project, the unspent advance of loan proceeds will be refunded to AIIB.

4.29 Retroactive Financing for Project expenditures incurred and paid up to 12 months prior to the date of loan signing will be reimbursed subject to a maximum of 20 percent of the Loan amount. Expenditures incurred prior to the loan signing may be subject to audit before reimbursement.

4.30 **Financial Crime and Integrity (FCI) and Counterparty Due Diligence/Know Your Counterparty (CDD/KYC):** Screening has been conducted by an external KYC service provider. Overall Risk is rated as High given country risk, with the following findings: i) No current sanctions reported against the Borrower, the PIE, LWASA or their respective authorized signatories; (ii) No adverse media has been reported on the officials connected with the Project (Borrower and PIE). Fiduciary risks have been noted in public procurement and financial management which have been assessed in detail by AIIB in accordance with its applicable policies, and remedial measures described above and below have been designed accordingly.

4.31 **Governance and Anti-corruption:** AIIB is committed to preventing fraud and corruption in the projects that it finances. It places highest priority on ensuring that projects are implemented in strict compliance with the AIIB's Policy on Prohibited Practices. The Policy on Prohibited Practices applies to the Project. AIIB will monitor the work related to tender document preparation and tender/proposal evaluation and award under its financing. AIIB reserves the right to investigate, directly or indirectly through its agents, any alleged Prohibited Practices relating to the Project and to take necessary measures to prevent and redress any issues in a timely manner, as appropriate.

4.32 **Cybersecurity:** The Project involves the development of wastewater and drainage infrastructure, which may qualify as critical infrastructure due to its essential public service function. While the likelihood of this infrastructure being a primary cyber target is currently assessed as low and not material to the core operation of wastewater, its exposure cannot be considered negligible, particularly given its integration of digital control systems. PMU/LWASA confirmed to the Project Team that these systems are localized and may not directly affect the entire wastewater and drainage networks in the event of compromise; their presence

introduces cyber-physical risks that warrant at least a baseline cybersecurity posture. LWASA has assured to take key measures including: (i) network segmentation to isolate SCADA systems from external and enterprise networks; (ii) implementation of Multiprotocol Label Switching (MPLS) for connectivity of remote sites; and (iii) access control mechanisms with multi-factor authentication for remote access. LWASA also commits to implementing appropriate security controls, conducting regular reviews to adapt to evolving threat landscapes, providing staff training on cybersecurity, and developing contingency plans and impact assessments in the event of possible cybersecurity breaches.

D. Environmental and Social

4.33 **Environmental and Social Policy and Categorization:** The Bank's ESP, including the Environmental and Social Standards (ESSs) and the Environmental and Social Exclusion List (ESEL) are applicable for the proposed Project. The ESS1, Environmental and Social Assessment and Management, and ESS2, Land Acquisition and Involuntary Resettlement are triggered for this Project. The Project has been assigned Category A due to the nature of the project activities, the local environmental and social context, and the potential environmental and social impacts.

4.34 **Environmental and Social Instruments:** An Environmental and Social Impact Assessment, including an Environmental and Social Management Plan, has been prepared by LWASA to address the environmental and social risks and impacts of the Project. Additionally, a Stakeholder Engagement Plan, Livelihood Restoration Plan and Gender Action Plan are in place to ensure a comprehensive and successful implementation of the Project in accordance with AIIB's ESP.

4.35 **Environment Aspects:** The Project is expected to bring positive environmental benefits through provision of a modern sewage conveyance system to transport domestic sewage for final disposal. The large investment in wastewater management is expected to significantly improve the urban environment, resulting in health, hygiene and eco-system improvements within and around the Project area.

4.36 The environmental impacts associated with construction phase of the Project include hazardous and solid waste generation, impact on flora and fauna, soil pollution due to spills, temporary blockage of access in and around the construction areas, traffic impacts due to mobilization and working of heavy machinery, management of excavated material and slurry, dust generation, noise, impact of vibration on the old/historical buildings, damage to utilities and occupational health and safety (OHS) impacts. The operational phase impacts include health and safety impacts during the maintenance of underground sewer lines, ground water quality, generation of odor from the disposal station in case of any malfunction, noise and management of waste including hazardous waste and end-of-life batteries and fire hazards. Wastewater from the AIIB-financed project will ultimately be discharged into the River Ravi via an outfall drain. An analysis of water samples collected from the Syphon site about 35 km upstream of the discharge point on the River Ravi indicated that water quality parameters at this location remain within the permissible limits set by Punjab environmental quality standards. As the river progresses down from Syphon site, multiple streams of untreated wastewater capturing the wastewater flow from different areas of Lahore enter river Ravi. However, wastewater samples taken during the ESIA study from a site upstream of the

Project's discharge point, exhibited elevated values, with BOD at 230 mg/l, COD at 325 mg/l and total suspended solids (TSS) 100 mg/l. The wastewater quality results from the Gulshan-e-Ravi disposal stream prior to mixing with river water showed BOD and COD levels of 86 mg/l and 165 mg/l, respectively, which slightly exceed the Punjab environmental quality standards (BOD 80 mg/l and COD 150 mg/l).

4.37 The surface water samples taken during the ESIA study of WWTP from River Ravi downstream of the discharge point indicated the presence of total coliform, fecal coliform and E. coli. Data indicates that pollution already exists in the river water at the outfall location due to upstream discharges. No additional flow will be discharged in the River Ravi except the flow already entering the river from the existing Cantt drain and its tributaries through an open channel. Consequently, the contribution from the disposal station is not expected to further degrade river water quality. The flow in the river at Syphon varies between roughly 1,000 cusecs in November and 25,000 cusecs in August, with a perennial flow of 1,718 cusecs available for dilution of wastewater. The impact of this discharge will be minimal. Sludge management plan will be prepared by the Contractor after review of the current design.

4.38 The ESIA defines the Zone of Influence (ZOI) as 8.4 meters on both sides of the tunnel centerline, based on technical calculations and assumed volume loss (1 percent)**.** The tunnel cover varies from 8.51 meters to 19.37 meters along the alignment. Based on the vibration historical data and the tunnel depth, the anticipated peak particle velocity (PPV) is expected to be less than 1 mm/sec. During the ESIA a few locations were identified where the old buildings are located, and the depth of the tunnel varies from 12.8 meters to 17.46 meters close to these locations. According to PMC's Micro Tunnel Boring Machine (MTBM) expert, buildings located 6–7 meters above the shaft are considered safe from vibration-related damage. The contractor will assess the condition of old buildings by carrying out a survey before the construction activity and will prepare a detailed list of critical structures. LWASA will provide a detailed list of critical structures after completion of the building assessment. Additional measures, as required, will be deployed to manage the vibration impact during the tunneling work and emergency response measures will be included in the site-specific management plans prepared by the contractor. Mitigation measures are proposed in the ESIA to manage impacts of construction and operational phases. Chance find procedures are prepared to deal with discovery of any physical cultural resources during the excavation work. A traffic management plan has been prepared to manage the traffic during the construction phase. The site specific ESMPs will be prepared by contractors and will be implemented at sites. Relevant procedures to manage health and safety issues, emergency situations and incidents/accidents will be part of the site-specific management plans.

4.39 LWASA will construct a WWTP at Babu Sabu with funding from the AFD. LWASA and GoPb have committed during appraisal of the Project to complete the WWTP prior to closing date of the Project for achieving the desired development impacts. WWTP is an associated facility to the current Project. Preliminary sedimentation and medium load conventional activated sludge process will be used to treat the wastewater in the WWTP. It is mandatory for industrial units to meet the PEQS before discharging wastewater and Punjab environmental protection and climate change department is responsible to ensure compliance with PEQS. The WWTP is designed to treat wastewater to comply with PEQS 2016 and World Health Organization (WHO) Class V standards. When the treated water is discharged into the river, it will improve the condition of the river in the downstream areas. Conclusion of the

LWASA consultants' assessment indicates that the BOD and COD of the River Ravi after the addition of treated wastewater from AFD project will become 78.7 mg/L and 93.9 mg/L respectively. Different options regarding disposal of sludge were reviewed and consultants after discussion with LWASA concluded that the sludge should be sent to landfill site as a short to medium term solution. All the requirements for the landfill site will be fulfilled. Environmental and social due diligence has been carried out, and LWASA consultants visited the proposed WWTP project site and reviewed the ESIA. The ESDD concluded that the ESIA of WWTP is generally in compliance with the AIIB ESP, and a few corrective actions are suggested to bridge the gaps identified during the review of documents. LWASA will establish a coordination mechanism between the PMUs of two projects for smooth implementation of E&S corrective actions.

4.40 **Social Aspects:** Most of the proposed alignment of trunk sewer is along the main roads which is the property of GoPb. The land for the disposal station is owned by Lahore Development Authority (LDA) and is legally in the possession of LWASA. LWASA is the subsidiary of LDA, a wing that is responsible for water supply, sewerage system, and sanitation. Additionally, the drainage channels are in the right of way of LWASA. Hence, no land acquisition is involved in the construction of trunk sewers, disposal station and drainage channels. However, there will be livelihood impacts on trunk sewer lines and drainage channels. To mitigate impacts due to temporary disruption of businesses, a detailed LRP has been prepared in accordance with AIIB's ESP. LRP will be updated in line with any changes to the construction design by the EPC contractor.

4.41 Laying sewers underground through tunnels is proposed in the design to avoid or minimize resettlement impacts. A MTBM is proposed for drilling an underground tunnel for sewer laying. For the launch and exit of MTBM, jacking and recipient stations have been designed. In total, 165 such stations are proposed for alignments A, B and C of the sewerage system as per design. The commercial entities located on the points of pits will be affected. Accordingly, an LRP is prepared to mitigate the impacts on business, access to business & income loss and to provide compensation for affected persons' losses. The PMC conducted an Impact Assessment Survey (IAS), public consultations, information dissemination, and stakeholder engagement activities during the preparation of LRP. Additionally, there will be some impacts at the disposal station, which will be addressed in the ESMP. The identified impacts include the physical displacement and relocation of Government institutions, including the Metropolitan Corporation Lahore field office and Union Council No. 77, as well as Patwar Circles namely Nonarian, Sanda Khurd, Babu Sabu, and Saggiyan Kalanwar. 93 fruit and non-fruit-bearing trees; public utilities, such as an electricity pole and transmission lines, will also be relocated. Currently, these Departments are housed in different small buildings which would be replaced by a multi-story complex. LWASA plans to build the multi-story complex prior to the commencement of construction of the new disposal station.

4.42 **Occupational Health and Safety, Labor and Employment Conditions:** OHS risks associated with the Project include working in deep trenches, handling of excavated material and heavy machinery, and management of hazardous materials. All OHS risks and impacts were assessed as part of the ESIA, and mitigation measures are included in the ESMP. An Emergency Preparedness and Response Plan (EPRP) has been developed as part of the ESMP to manage emergency situations during implementation phase. Regular exercises and drills shall be performed to ensure adequate emergency response capabilities are in place.

The contractors will be required to prepare and implement an Occupational Health and Safety Management Plan (OHSMP). The plan will include identification of potential hazards, provisions and enforcement of preventive and protective measures, training workers and maintenance of training records, and documentation and reporting of accidents and incidents.

4.43 Labor and Working Conditions. The ESMP used for the Project includes requirements to identify and mitigate potential health, safety, social and environmental hazards in all Project activities that pose a risk to employees and may also have the potential for disruption of site works. In addition, all suppliers and contractors will be advised of the importance of implementing appropriate management measures to identify and address issues related to the environmental and social provisions of the ESMP, including labor and working conditions and health and safety matters. Compliance with the ESMP is an essential part of the contract document with suppliers and contractors. This compliance as well as representations and warranties to be provided to the Client by suppliers and contractors will be reflected in relevant agreements and contracts.

4.44 Pakistan has comprehensive labor laws, covering the terms and conditions of employment, termination of contracts, working time and rest time (working hours, paid leave, maternity leave and maternity protection, other leave entitlements), appropriate labor and working conditions, minimum age, and protection of young workers, equality, pay issues, workers' representation in the enterprise, trade union and employers' association regulation and other aspects. In addition, Pakistan has also ratified several International Labor Organization (ILO) labor conventions. The contractor will prepare a labor management plan as part of ESMP to manage labor issues at the construction sites. Compliance with the ESMP will be reflected in all relevant agreements and contract documents with the contractors.

4.45 **Stakeholder Engagement, Consultation and Information Disclosure:** The Project's SEP outlines a structured, phased approach to involve stakeholders throughout the project lifecycle to address environmental and social risks effectively and enhance project design and implementation. During the planning phase, stakeholders such as affected persons, Government agencies, and civil bodies participate in consultations, data collection, and feedback to refine project design and identify mitigation measures. The second phase ensures transparency through public disclosure of key documents like ESIA/ESMP, LRP, GAP, and SEP via websites and awareness-raising sessions. In the implementation and operational phases, the Project emphasizes sustained engagement to maintain transparency, manage grievances, and ensure stakeholder cooperation. Prior to undertaking any civil works, community awareness programs will be scheduled jointly by the PMU and the Contractor to inform the scope of the project, procedure of construction activities, possible disturbances to utilities, anticipated impacts and mitigation measures. Furthermore, printed materials such as posters, leaflets containing the project details, its anticipated impacts, implementation procedures and time frames and grievance redress procedures, etc. will be distributed among all parties who would be potentially affected by the project. Such information will also be posted on public places. The PMU and PMC are also tasked with monitoring, record-keeping, and maintaining a database of engagement activities and grievances. SEP implementation will involve creating information materials, building stakeholder capacity, and monitoring progress against key indicators such as grievance resolution rates.

4.46 The draft E&S documents, including the ESIA/ESMP, LRP, GAP and SEP have been disclosed on the websites of LWASA[11] and AIIB[12]. The executive summaries of these documents in English and local language (Urdu) are also disclosed, and the hard copies will be made available in Project areas. The final E&S documents will be disclosed by LWASA and AIIB prior to approval of the Project.

4.47 **Project Grievance Redress Mechanism (GRM):** A three-tier GRM will be made available to provide a time-bound, transparent, and fair resolution for Project-affected people and other stakeholder grievances. As a first step, PMC and contractors will devise awareness-raising to provide information on the GRM to Project-affected people and other stakeholders. A Grievance Redressal Cell will be established as the first tier of GRM at site. The second tier of the GRM will be at PMU level and LWASA Management will form the third tier. A commensurate mechanism will be made available at the contractor level for worker's grievances.

4.48 **Bank's Project-Affected People's Mechanism:** AIIB's Policy on the Project-affected People's Mechanism (PPM) applies to this Project. The PPM has been established by the Bank to provide an opportunity for the independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by the Bank's failure to implement its ESP in situations when their concerns cannot be addressed satisfactorily through the Project-level GRM or the processes of AIIB's Management. Information on AIIB's PPM is available at: https://www.aiib.org/en/about-aiib/who-we-are/project-affected-peoples-mechanism/how-we-assist-you/index.html.

4.49 **Monitoring and Supervision Arrangements:** LWASA has established a PMU to implement the Project which is headed by a Project Director, and environmental and social manager is part of the PMU. The E&S staff will be further strengthened by deputing one deputy manager for environment and social and one assistant manager for social. A PMC already engaged by the PMU will supervise the project implementation, implementation of environmental and social safeguard instruments and prepare necessary monitoring reports. A third-party monitoring consultant will be engaged to monitor the implementation of ESMPs and provide advice to PMU on E&S matters. During project implementation, the PMU will prepare quarterly environmental and social monitoring reports for AIIB to review and disclose on the Project website. This will include information on OHS issues as well as implementation phase consultations. The PMC will assist the PMU in carrying out E&S monitoring during project implementation. The Bank Team will carry out supervision missions during the project implementation.

E. Climate Change

4.50 **Climate Change:** Pakistan as a whole, and Lahore in particular, faces increasing risks from climate change impacts, including rising temperatures, heavier monsoon rainfall, and increased urban flooding. The intensification of extreme weather events has placed increasing pressure on the city's aging wastewater infrastructure, which struggles to manage combined sewage and stormwater flows. The Project introduces a set of energy-efficient infrastructure upgrades that support climate change mitigation. Key interventions include the construction of

[11] https://wasa.punjab.gov.pk/node/55
[12] https://www.aiib.org/en/projects/details/2025/approved/Pakistan-Lahore-Water-and-Wastewater-Management-Project.html

gravity-based trunk sewers to eliminate energy-intensive intermediate pumping, as well as the installation of solar-powered systems to reduce reliance on grid electricity. Additionally, the new centralized pumping station will be designed for optimal energy performance. From an adaptation perspective, the Project plays a crucial role in reducing vulnerability to monsoon-related urban flooding by separating sewage from stormwater, rehabilitating critical drainage infrastructure, and increasing the capacity of surface drains. These measures help safeguard urban infrastructure and public health, particularly for communities at risk of inundation, waterborne disease outbreaks, and service disruptions caused by climate-related hazards.

F. Gender Aspects

4.51 **Gender Aspects**: The GAP for the Project emphasizes the importance of integrating gender issues into all project components, enhancing women's participation, raising awareness about health and sanitation, and addressing gender-based violence. Key objectives include conducting gender sensitivity training, fostering community engagement, and ensuring that women and marginalized groups are included in designing, implementation, monitoring and evaluation activities.

4.52 The GAP outlines targeted measures to ensure women's meaningful participation through consultations and stakeholder engagement on gender development. Activities include consultations with women, gender-sensitive livelihood restoration, WASH awareness, public health trainings, skill development trainings, road safety and health awareness campaigns, and gender-responsive grievance mechanisms. The GAP enhances women's access to information, economic opportunities, and decision-making, thereby maximizing the project's positive gender impact.

4.53 To implement the GAP, the Project will focus on various initiatives such as awareness training on sewerage management and hygiene, capacity building for women, and economic opportunities. Activities include educating participants on safe waste disposal and the economic impacts of inadequate sewerage systems while providing training to enhance skills in sanitation management. Additionally, measures will be taken to ensure appropriate labor and working conditions and to address gender-based violence through awareness campaigns and the establishment of support structures. The Project aims for improved health outcomes for women and girls, increased gender equality in accessing resources, and enhanced safety and security during the Project's execution. The PMC will provide technical expertise and oversee compliance with the GAP, while the contractor will engage with local communities to understand their needs, incorporate gender considerations into project design, and actively promote equal opportunities for women in project activities.

G. Operational Policy on International Relations (OPIR)

4.54 The Project aims to construct wastewater infrastructure along three corridors in central Lahore to ensure the safe conveyance of sewage. Under the Project, two main trunk sewers will merge downstream into a single major trunk sewer, discharging near Babu Sabu. A WWTP, financed by AFD at Babu Sabu, and considered an associated facility of the Project, will treat the collected project wastewater in compliance with applicable PEQS and safely discharge it into the River Ravi. The WWTP is scheduled to be completed prior to the AIIB-funded Project. The River Ravi is considered an international waterway under the OPIR. After entering in Pakistan, the River Ravi remains within the country.

4.55 An analysis of the wastewater samples taken during the ESIA study from a site just upstream of the project's discharge point showed the BOD at 230 mg/l, COD at 325 mg/l and TSS 100 mg/l. The WWTP is designed to treat wastewater to comply with PEQS 2016 and WHO Class V standards. When the treated water is discharged into the river, it will improve the condition of the river in the downstream areas. Conclusion of the LWASA consultants' assessment indicates that the BOD and COD of the River Ravi after the addition of treated wastewater from AFD project will become 78.7 mg/L and 93.9 mg/L respectively.

4.56 The Project's discharge point is located 39 km downstream of the Indian border and no flow returns to India after it enters Pakistan. Based on the current design and location, the Project neither involves any construction activities on River Ravi, nor will it adversely affect water use or water quality in any other riparian country as all project-related impacts, which are minimal, will be confined within Pakistan's territory. The OPIR will trigger for this Project but the exception to notification under Section 3.3(c)(i) applies as the Bank is satisfied the Project will have no material adverse effect on other riparians for the purposes of the OPIR.

H. Risks and Mitigants

4.57 The overall Project risk has been rated as High due to high risks in individual categories of Technical, Procurement, and Environmental. Other risks including Financial, Implementation Capacity, Social, and Stakeholders have been assessed as Medium and Low. Key risks and proposed mitigation measures are summarized below:

Table 3: Summary of Risks and Mitigating Measures

Risk Description	Assessment (H/M/L)	Mitigation Measures
Project Preparation Risks		
Technical designs		
▪ The first ever use of micro-tunneling technology for construction of trunk sewers in Lahore, for which there is a limited in-country experience poses significant risks.	H	▪ International PMC having the required experience in design, tendering and construction supervision in similar operations to help LWASA during all phases of implementation-Design-Build contract will be procured for construction of works which will shift the design and construction risks to experienced international contractors.
▪ New technology with specialized operations and imported spare parts will be used which can result in financial and operational implications / difficulties ranging from personnel and equipment.	M	▪ EPC contractors have provision for arranging spares and have experience of similar projects to tackle this specialized operation during construction. ▪ Post construction experience of O&M of the Disposal Station will be done by WASA trained staff.

Risk Description	Assessment (H/M/L)	Mitigation Measures
		▪ Post construction of O&M of newly laid sewer lines have been discussed in the design report in which various methodologies have been elaborated. Relevant training can also be provided to avoid any risks. ▪ One year O&M cost of the Project has been made part of the Project to ensure sustainability.
Program/Project Implementation Risks		
Implementation delays		
▪ Lack of contractors' interest to work in Pakistan and/or high bid cost.	M	▪ Road shows (raising awareness of the project site and working conditions, providing clarity on project scope and procurement processes, showcasing the commitment government and AIIB commitment, highlighting risk mitigation measures, demonstrating the project readiness, responding to all their queries and recommendations, and building confidence for the potential contractors to participate in the bidding), and wide publicity and LWASA's assurance to potential contractors of providing exceptional facilitation particularly security, mobilizing local resources, PMC's full-time support, and prompt custom clearances of equipment will attract bidders to participate. ▪ PSC to play a vital role in facilitating contractors for prompt utilities relocation.
Land acquisition and resettlement		
▪ There will be no land acquisition and resettlement under the Project as all the jacking and recipient stations are located on the roads owned by GoPb.	L	▪ To ensure that the Project remains free from land acquisition and resettlement impacts, continuous coordination will be maintained with relevant government departments to confirm land

Risk Description	Assessment (H/M/L)	Mitigation Measures
		ownership and usage rights throughout the project lifecycle. Detailed site verification and documentation will be conducted prior to construction to reaffirm that all project activities are confined to government-owned roadways.
Financial management		
▪ Limited LWASA personnel knowledge on financial management could lead to fiduciary risks of transparency and reliability to the entire fiscal policy lifecycle.	M	▪ LWASA will undertake steps to eliminate fiduciary risk through measures of financial management that comprised funds flow arrangements, governance, staffing, budgeting, accounting and financial reporting systems, internal control procedures, financial information systems, and internal and external auditing arrangements as well as related financial management risk. ▪ The financial management team of the PMU will be strengthened from Market-based financial experts and supported by well-experienced staff from LWASA.
Procurement of large and complex packages		
▪ Procurement processes and managing high value contracts through non-conventional (design-build and design-build-operate) methods could present challenges.	H	▪ The preliminary tender documents have been furnished through international PMC expert. Scope of PMC work includes performing comprehensive review of these documents, and assisting LWASA in tendering, evaluations, clarifications, and contact management. ▪ The Procurement management team of the PMU will be strengthened from Market-based procurement and supported by well-experienced staff from LWASA.
Time and cost overrun		
▪ Inaccurate initial cost estimation during the planning	M	▪ The Cost estimates have been revised based on current market

Risk Description	Assessment (H/M/L)	Mitigation Measures
phase and therefore delay in project processing.		rates and some provisions for contingencies have also been taken into account. ▪ Moreover, the provision for Escalation has also accounted for.
▪ Unforeseen Risks: Unexpected events that impact the Project's progress.	H	▪ Develop and maintain a comprehensive contingency plan that outlines response protocols for various types of unexpected events, including natural disasters, supply chain disruptions, and regulatory changes.
▪ Market Conditions: Changes in prices or availability of resources.	M	▪ Allocate contingency resources (time, budget, and personnel) to address unforeseen technical problems without compromising overall project timeliness or quality.
E&S risks and impacts during construction and operation		
▪ Management of environmental and social impacts as the micro tunnel boring machine will be used for the first time. ▪ Limited capacity of LWASA in managing complex E&S issues.	H	▪ E&S instruments including ESIA, LRP, GAP, and SEP have been prepared to manage E&S impacts. The contractors will also be required to prepare a site specific ESMP and an OHSMP. ▪ The current E&S team of PMU will be strengthened by recruiting two deputy managers, one each for environment and social. ▪ PMC with experience in implementing E&S instruments will assist PMU in mitigating these risks.

Annex 1: Results Monitoring Framework

Project Objective (PO):	To improve wastewater and drainage management services in Lahore, thereby enhancing the urban environment and reducing urban flooding.									
Indicator Name	**Unit of measure**	**Baseline Data 2025**	**Cumulative Target Values**				**End Target 2030**	**Frequency**	**Data source / Methodology**	**Responsibility**
			2026	**2027**	**2028**	**2029**				
Project Objective Indicators: *(Outcome indicators measure each aspect of the PO statement and are to track progress toward the achievement of the PO)*										
1. Direct project beneficiaries benefitting from averted urban flooding/improved drainage (disaggregated by female beneficiaries)	Number (million)	0	-	-	-	0.217 (0.102)	2.35 (1.104)	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
2. Wastewater safely collected and transported in the Project area	Percentage	0	-	-	-	15	100	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
3. Reduced wastewater discharges in stormwater drains	Percentage	0	-	-	-	10	100	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
4. Flood-prone locations resolved in target area	Number	0	-	-	-	-	07	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
Intermediate Results Indicators: *(To measure key intermediate results under each component that are necessary for showing progress toward achieving PO. They can capture outputs or short-term outcomes.)*										
1. Component A: Trunk sewers constructed	Kilometers	0	-	5	15	25	32.37	Annually	PEDR/PC-I	PMU/ EPC Contractor
2. Component A: Old pumping stations eliminated	Number	0	-	-	-	3	22	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
3. Component A: Operating cost of the disposal pumps reduced	PKR million	0	-	-	-	680	700	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
4. Component A: A new disposal station constructed and operational	Yes/No	No	-	-	-	Yes	Yes	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
5. Component A: Stormwater drains rehabilitated	Kilometers	0	-	-	3.5	7	7	Annually	PEDR/PC-I	PMU/ EPC Contractor

Project Objective (PO):	To improve wastewater and drainage management services in Lahore, thereby enhancing the urban environment and reducing urban flooding.									
Indicator Name	**Unit of measure**	**Baseline Data 2025**	**Cumulative Target Values**				**End Target 2030**	**Frequency**	**Data source / Methodology**	**Responsibility**
			2026	**2027**	**2028**	**2029**				
6. Component A: 450 kW solar energy installation at the Gulshan-e-Ravi Disposal Station completed	Yes/No	No	-	-	-	Yes	Yes	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
7. Component A: Change in commercial property values in upgraded areas	PKR/sqft	310,000	-	-	-	350,000	400,000	End-of-Project	Online Website	-
8. Component A: Change in residential property values in upgraded areas	PKR/sqft	20,000	-	-	-	22,000	25,000	End-of-Project	Online Website	-
9. Component A: Resident satisfaction on urban services through annual survey of a representative sample of households focused on perception of improved drainage and flood reduction	Percentage	0	-	-	-	10	100	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
10. Component A: BOD/COD levels in main drainage canals within PEQS limits	Yes/No	No	-	-	-	Yes	Yes	End-of-Project	PEDR/PC-I	PMU/ EPC Contractor
11. Component A: Grievances redressed within stipulated time	Yes/No	No	Yes	Yes	Yes	Yes	Yes	Semi-annually	PEDR/PC-I	PMU/ EPC Contractor
12. Component A: WASH and Gender-Sensitive Training Sessions held for females residing in the Project area	Number	0	0	15	30	45	60	Semi-annually	PEDR/PC-I	PMU
13. Component B: PMU/LWASA staff trained on O&M	Number	0	-	-	10	20	20	Semi-annually	PEDR/PC-I	PMU/ EPC Contractor

Project Objective (PO):	To improve wastewater and drainage management services in Lahore, thereby enhancing the urban environment and reducing urban flooding.									
Indicator Name	**Unit of measure**	**Baseline Data 2025**	**Cumulative Target Values**				**End Target 2030**	**Frequency**	**Data source / Methodology**	**Responsibility**
			2026	**2027**	**2028**	**2029**				
14. Component B: Semi-annual progress reports submitted on time	Yes/No	No	Yes	Yes	Yes	Yes	Yes	Semi-annually	PEDR/PC-I	PMU/ EPC Contractor

Annex 2: Economic and Financial Analysis

1. The Economic and Financial Analysis (EFA) have been carried out from Project perspective which will finance construction of trunk sewers to safely transport wastewater from the dense urban neighborhood for final disposal, improve urban environment, prevent urban flooding, reduce incidence of waterborne diseases, and avoid GHG emissions. It is worth-noting that the stream of benefits is contingent upon successful completion and enhancement of waste-water treatment plant (Babu Sabu Wastewater Treatment Plant).

A. Economic Analysis

2. **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 EIRR and ENPV of the Project was estimated based on a discounted cashflow analysis considering costs and benefits. Sensitivity Analysis was performed taking into consideration (i) increased costs, (ii) decreased benefits, and (iii) a worst-case scenario, which combines an increase in costs as well as a decrease in benefits.

3. **Key Assumptions**. The following key assumptions are used to calculate key benefits of the project.

a. The Willingness-to-Pay for Urban Amenities: The number of connections in 2025 are 309,494, based on LWASA data. These connections are expected to grow at 7.5 percent, as assumed in the feasibility study conducted by LWASA.

b. Health Benefits: Served population 1.2 million based on 6th Population and Housing Survey 2017, and data provided by LWASA. Disability-Adjusted Life Years (DALY) rate of 0.0131 caused by poor sanitation based on data from International Health Metrics and Evaluation. Relative risk reduction in waterborne disease is based on the literature.[13]

c. O&M Savings, Repairs, and Maintenance: Calculations for O&M savings along with savings related to fuel consumption and repairs are based on the feasibility study conducted by LWASA.

4. **Data.** Primary and secondary information was used, including on project cost, expenditures on sewerage services and coping cost related to inadequate sewerage infrastructure assessed by the project engineering consultants of the Project, and existing tariffs. Data sources included the Technical Feasibility Study, Economic Survey of Pakistan 2017-18, Household Integrated Economic Survey 2015-16, 6th Population and Housing Survey 2017, and data provided by LWASA. This data was complemented with demographic information, public health data and technical assumptions. A data verification process was jointly conducted by the Bank Team and the Client.

5. **Project Costs**. All capital costs, project management costs, and recurring O&M costs have been considered for the economic analysis. Total project costs (excluding financial costs) have been estimated at USD177 million. The capital investment costs, estimated at USD155.7

[13] The DALY rate for poor sanitation is based on data from Institute for Health Metrics and Evaluation: VizHub - GBD Compare. The reduction in waterborne disease due to better sewerage is based on Norman et al. (2010): Norman, G., Pedley, S., & Takkouche, B. (2010). Effects of sewerage on diarrhea and enteric infections: a systematic review and meta-analysis. *The Lancet infectious diseases*, *10*(8), 536-544.

million, have been broken down over the construction period of 5-years based on the consultation with LWASA. A salvage value of 20 percent is assumed at the end of the project.

6. **Project benefits.** The considered project benefits can be grouped into the following categories (a) improved urban environment, reduced urban flooding and quality of life of residents, (b) health benefits, (c) reduced energy and O&M costs, (d) reduced repair and maintenance costs, and (e) reduced emissions. These benefits are summarized below.

7. **Willingness to Pay for Urban Environment.** The current release of sewerage water into urban locations is a major problem in the city causing pollution and disease. Construction of trunk sewers will significantly reduce these negative impacts on urban environment and groundwater pollution. Furthermore, these investments will significantly reduce urban flooding which increases repair costs for urban properties. However, these benefits are difficult to quantify and therefore a willingness-to-pay approach is used to quantify these benefits based on the average residential tariffs paid annually for sewerage services in Lahore (about USD28 annually), based on LWASA data.[14] The average yearly tariff is further reduced by about 30 percent in our calculation to ensure benefits are not double counted. This annual willingness-to-pay of USD20 is then multiplied by the number of connections (309,494 in Year 2025), which are assumed to growth at 7.5 percent based on the feasibility study conducted by LWASA. These benefits account for about 50 percent of the total benefits of the Project.

8. **Health Benefits.** Health benefits are calculated by multiplying the beneficiary population, the DALY rate caused by poor sanitation (0.0131), the reduced risk of waterborne disease due to infrastructure investment (about 30 percent reduction in waterborne disease), and the value of avoided loss in DALY. Health benefits account for about 30 percent of the total economic project benefits.

9. **O&M Savings (including energy, machinery, and labor savings).** About 11.5 percent of the benefits accrue from savings related to O&M savings related to reduced energy use, reduced machinery use, and the labor and maintenance costs avoided due to truck sewer infrastructure. These estimates are based on the feasibility study conducted by LWASA.

10. **Reduced Repair and Maintenance (R&M) of Sewers, Drains, and Roads.** The avoided costs in terms of reduced need to repair and maintain sewers, drains, and roads account for 5.6 percent of the benefits. These benefits are based on the estimates provided in the feasibility study conducted by LWASA.

11. **Reduced Carbon Emissions.** Because of reduced use of electricity and fuel for machinery and other processes such as desilting, the Project will also have a negative impact on GHG emissions, thus contributing positively to the economic viability of the Project. The reduction in GHGs accounts for 1.5 percent of the project benefits.

Table 2-1 Breakdown of Project Benefits

Project Benefits	Share of Total Benefits (%)
Willingness-to-Pay for Urban Amenities	52.2

[14] Hussain and Hayat (2018) estimate a similar willingness-to-pay for sanitation services in Lahore, Pakistan. https://environmentaljournals.org/article/assessing-household-willingness-to-pay-for-quality-sanitation-services-in-urban-areas-of-pakistan

Health Benefits	29.2
O&M Savings (including energy, machinery, and labor)	11.5
R&M of Sewers, Drains and Roads	5.6
Carbon Emissions	1.5

12. **Results and Sensitivity Analysis.** The EIRR was estimated at 15 percent and ENPV at USD58 million based on a 10-percent discount rate. The EIRR of 15 percent suggests strong economic viability, as the Project's benefits—such as improved public health, reduced flood damage, and energy savings—clearly outweigh the associated costs. It also reflects efficient resource allocation, demonstrating that the Project is a sound investment of public funds and contributes meaningfully to overall economic growth. A positive ENPV of USD 58 million indicates substantial long-term gains, as the Project is expected to deliver significant net benefits to society over its lifecycle. It also reflects a robust economic impact, demonstrating that even under conservative assumptions, the Project remains economically sound and beneficial. The yearly costs and benefits are illustrated in Table 2-2. The EIRR exceeds the social discount rate demonstrating the economic viability of the Project. Sensitivity analysis has been carried out with respect to a 10 percent increase in Project cost, a 10 percent decrease in benefits, and a worst-case scenario combining the two shocks together i.e. 10 percent cost increase and 10 percent decline in benefits (Table 2-3). We also reduce the growth rate in number of connections to 2.5 percent instead of 7.5 percent in the model (Case 4, Table 2-3). The EIRR remains above the social discount rate of 10 percent for all scenarios.

Table 2-2: Project Costs and Benefits in USD Millions

YEARS	Year of Construction	Year after Construction	CAPEX	OPEX	Project Economic Benefits	Net Benefits
2025						
2026	1		31.14			(31.14)
2027	2		31.14			(31.14)
2028	3		31.14			(31.14)
2029	4		31.14			(31.14)
2030	5		31.14			(31.14)
2031		1		1.75	26.30	24.55
2032		2		1.75	27.33	25.58
2033		3		1.75	28.43	26.67
2034		4		1.75	29.59	27.84
2035		5		1.75	30.82	29.07
2036		6		1.75	32.13	30.37
2037		7		1.75	33.51	31.76
2038		8		1.75	34.99	33.24
2039		9		1.75	36.55	34.80
2040		10		1.75	38.22	36.47
2041		11		1.75	39.99	38.24
2042		12		1.75	41.88	40.12

YEARS	Year of Construction	Year after Construction	CAPEX	OPEX	Project Economic Benefits	Net Benefits
2043		13		1.75	43.88	42.13
2044		14		1.75	46.02	44.27
2045		15		1.75	48.30	46.55
2046		16		1.75	50.72	48.97
2047		17		1.75	53.31	51.56
2048		18		1.75	56.07	54.32
2049		19		1.75	59.01	57.26
2050		20		1.75	93.28	91.53
Total			**155**	**35**	**850**	**815**

Table 2-3: Results of Cost Benefit Analysis

Results of Evaluation	Change	ENPV (USD Million) @ 10%	EIRR
Base Case	**-**	**58**	**15%**
Sensitivity Scenarios			
Case 1 - Increase in Capital and O&M Costs	10%	50	14%
Case 2 - Decrease in Overall Benefit	-10%	38	13%
Case 3- Combination of Case 1 and 2	as above	37	13%
Case 4 – Different growth assumption for number of connections	-5%	33	13%

B. Financial Analysis

13. **Objectives**. The GoPb will provide the loan proceeds to LWASA for implementing the Project. LWASA, therefore, will not be liable for repayment of Loan but will be responsible for operating and maintaining the new infrastructure. Therefore, a conventional financial analysis (based on calculating Financial Internal Rate of Return and Financial Net Present Value of the capital investments) has not been carried out. Instead, the analysis focuses on the financial impacts of the Project on the operations of LWASA. Upon completion, the Project will generate additional revenues from customers served and reduce operational expenditures. A cost-benefit model was developed to calculate net incremental revenues based on the existing tariff regime, population and water demand projections in the selected localities; and reduction in the operating expenditures driven by reduced electricity consumption and other O&M expenditures. LWASA's sustainability was assessed by reviewing its past income and expenditure patterns, financial (unaudited) statements, and operating cost recovery based on the prevalent tariff structure.

Project Financial Performance

14. **Methodology and Assumptions.** The analysis has been done by estimating operating costs and benefits at market prices, in the same way LWASA will be paying or receiving from each input, with an objective to assess the financial impact of the Project on LWASA's capacity for adequate O&M of the water and wastewater systems. The analysis examined the financial benefits of the Project over ten years period based on the existing tariff structure of LWASA.

Additional technical assumptions:

- Average water tariff has been assumed as PKR21 (per thousand gallon) and PKR93 (per thousand gallon) respectively for domestic and commercial connections. In the Project localities, all the retail customers are billed on flat tariffs (assumed average PKR223 per month).
- Collection efficiency is 80 percent.

Without-Project scenario

- No increase has been assumed for water tariffs. Domestic customers billing will continue to be based on flat tariffs.
- Collection efficiency remains unchanged.

With-Project scenario

- Tariffs remain unchanged. However, with installation of meters, consumption-based billing will be introduced.
- Services would be improved significantly in terms of quality and quantity. The collection rates will increase gradually to 85 percent with the introduction of metered connections as they will be linked to LWASA billing system.

Table 2-4: Key Parameters

Item	2022	2024	2026 (est.)	2028 (est.)	2030 (est.)
Population in Project localities	1,193,650	1,239,926	1,287,996	1,337,930	1,389,800
Ave. Water tariff retail (metered), (PKR per thousand gallons)	20.86	20.86	20.86	20.86	20.86
Ave. Water tariff retail (unmetered), (PKR per connection)	220.72	220.72	220.72	220.72	220.72
Ave. Water tariff bulk, (PKR per thousand gallons)	92.82	92.82	92.82	92.82	92.82
Without Project					
No. of domestic customers	119,954	124,604	129,435	134,453	139,666
No. of commercial customers	4,060	4,101	4,142	4,184	4,226
Collection rate	80%	80%	80%	80%	80%
Water Produced (million gallon/year)	17,184	17,529	17,882	18,241	18,608

Item	2022	2024	2026 (est.)	2028 (est.)	2030 (est.)
Water Consumed-billed (million gallon/year)	9,451	9,641	9,835	10,033	10,234
No. of domestic accounts (trunk sewer) areas	258,070	258,070	258,070	258,070	258,070
With Project					
No. of domestic customers	119,954	124,604	129,435	134,453	139,666
No. of commercial customers	4,060	4,101	4,142	4,184	4,226
Collection rate	80%	82%	84%	85%	85%
Water Produced (million gallon/year)	17,184	17,529	18,805	19,534	20,291
Water Consumed-billed (million gallon/year)	9,451	9,641	13,163	13,674	14,204
No. of domestic accounts (trunk sewer) areas	282,000	299,174	308,149	308,149	308,149
Increments due to Project					
Water Produced (million gallon/year)	-	-	923	1,293	1,683
Water Consumed-billed (million gallon/year)	-	-	3,328	3,641	3,970
No. of domestic accounts (trunk sewer) areas	23,930	41,104	50,079	50,079	50,079

15. Referring to the analysis of Net Financial Benefits table below, the Project has significant net incremental financial benefits with an estimated PKR3,533 million (eq. USD12.39 million), in the first years of operations (2031) and increasing to PKR4,756 (eq. USD16.68 million) by Year 2034. Drivers of the financial benefits include:

- increased water revenues, which are derived from replacement of fixed-tariff-based billing to consumption-based billing and additional water sales.
- increased revenues from wastewater services as a result of increased domestic accounts that will be connected to sewer network in the area served by trunk sewers,
- additional tax collection i.e. Urban Immovable Property (UIP) Tax[15], and leasing of land and facilities (for telecom towers and solar panels).
- major financial benefits accrue as a result of savings in operating costs, electricity consumption and other O&M costs.

Table 2-5: Net Financial Benefits (PKR millions)

Year	2022	2024	2031	2032	2034
Revenues	12,653	27,451	27,002	27,114	27,413
Less: Expenditures	(15,986)	(25,363)	(23,469)	(23,199)	(22,657)
Net Financial Benefits	(3,333)	2,008	3,533	3,915	4,756

[15] A share of the collected UIP tax is allocated to local bodies, which may include municipal corporations, town committees, and other local authorities. This share is intended to support local infrastructure and services, including drainage systems, sanitation, and other urban public utilities

C. LWASA Financial Analysis

16. **Past Performance.** LWASA has historically faced significant financial sustainability challenges, operating under a persistent working capital deficit and maintaining a long-standing reliance on fiscal support from the GoPb. Between 2004 and 2017, while LWASA's revenues grew by an impressive 327 percent, this growth was far outpaced by a 575 percent surge in operational expenditures. This imbalance was primarily driven by the expansion of infrastructure, substantial increases in electricity tariffs, and a 58 percent rise in workforce-related costs. The widening fiscal gap reflected structural inefficiencies and an outdated revenue model that struggled to adapt to the growing demands of an urbanizing population.

17. Several key financial constraints compounded these issues in earlier years. The agency consistently reported operating losses and negative cash flows, undermining its capacity to invest in maintenance and service improvements. Energy and electricity costs alone accounted for 40 to 45 percent of total operating expenses, leaving limited room for cost flexibility. Compounding the issue, the tariff structure—particularly for domestic consumers—remained stagnant for over a decade, eroding LWASA's ability to keep pace with inflation and service delivery costs. Additionally, revenue recovery ratios hovered between just 67 percent and 73 percent, pointing to inefficiencies in billing, collections, and enforcement mechanisms.

18. Although a tariff revision for commercial users was implemented in 2017 and 2023, it provided only temporary relief. The cost-recovery gap continued to stabilize in subsequent years but with rising energy costs, network expansion, and inflationary pressures, it had become evident that deeper structural reforms—including more dynamic tariff adjustment mechanisms, improved metering, and operational efficiency were necessary to place LWASA on a more sustainable financial path.

19. *Income-Expenditure Statement.* A summary of the income-expenditure statement is shown in the Table below.

Table 2-6: Income Expenditure Statement of LWASA (PKR Million)

DESCRIPTION	2018-19	2019-20	2020-21	2021–22	2022–23	2023–24	2024–25
INCOME							
Internal (Own Source)							
Water Supply	3,002	3,420	3,860	3,963	5,650	8,775	11,596
Sewerage Charges	2,084	2,102	2,442	2,794	3,476	5,739	8,153
Miscellaneous	227	756	493	423	638	1,153	1020
Sub-Total	**5,314**	**6,278**	**6,794**	**7,180**	**9,764**	**15,667**	**20,769**
External Source							
UIP Tax Share in lieu of drainage	1,681	1,718	1,967	2,535	2,463	2,989	2,868
For Monsoon Preparation	426	426	426	426	426	426	426
PCGIP	220	-	-	-	-	-	-
For LESCO Liability						3,825	2,588
For Charrar Drains							800

DESCRIPTION	2018-19	2019-20	2020-21	2021–22	2022–23	2023–24	2024–25
Sub-Total	**2,327**	**2,144**	**2,392**	**2,960**	**2,889**	**7,240**	**6,682**
Total Operating Revenues	**7,641**	**8,422**	**9,187**	**10,141**	**12,653**	**22,907**	**27,451**
OPERATING EXPENDITURE:							
Electricity and Power	3,721	4,395	5,439	5,489	6,215	10,926	11,917
Salaries and Benefits	4,200	4,376	4,878	5,435	6,219	7,196	7,909
Repair and Maintenance	1,503	1,308	1,634	2,130	2,824	3,524	4,542
Other Expenses	416	586	677	634	728	939	995
Total Operating Expenditures	**9,840**	**10,665**	**12,629**	**13,688**	**15,986**	**22,585**	**25,363**
Operating Profit/Loss	**(2,199)**	**(2,243)**	**(3,442)**	**(3,547)**	**(3,333)**	**322**	**2,088**
Subsidies by Govt.	2,193	2,200	2,164	2,644	3,347	1,840	1,845
Net Income	**(6)**	**(43)**	**(1,278)**	**(903)**	**14**	**2,162**	**3,933**

Key: UIP = Urban Immoveable Property; PCGIP = Punjab Cities Govt. Improvement Project; LESCO = Lahore Electricity Service Company

20. According to the income-expenditure statements summarized above, LWASA is receiving subsidies from the government on a regular basis. The subsidy is utilized mainly for the payment of electricity bills. Analysis of the data in the above table reveals that the power and energy charges have generally been 40-45 percent of the total operating expenditures. There has been a sharp increase in the power and energy expenditures in 2022-23 due to upward revision of electricity charges, which has consequently affected LWASA's operating ratio for the financial year.

21. *Expenditures Recovery Ratio.* The expense recovery ratio for FY2023-24 (excluding Government subsidies) comes to 84 percent, an increase from 73 percent in FY2020-21. The income-expenditure statement shows that the subsidies have decreased from PKR2,193 million in 2018-19 to PKR2,164 million in 2020-21, and decreased over the years to PKR1,840 million in 2023-24. Over the same period, tariff revenues have increased by about 295 percent (from PKR5,314 million to PKR15,667 million), whereas the total operating revenue has increased by about 250 percent (from PKR7,641 million to PKR22,907 million).

Tariff and Cost of Services

22. *Existing Water Tariff and Cost of Water Supply.* The water tariff for domestic users is in place since 2004 and has not been increased thereafter. However, the definitions of tariff slabs were revised and water consumption per households were rationalized in 2017. Domestic consumers are presently charged PKR12.88 to PKR27.30 per thousand gallons and commercial consumers are charged PKR51.55 to PKR134.27 per thousand gallons depending on their water consumption slabs. Un-metered industrial and commercial users are assigned fixed consumptions depending upon type of facility and charged on the noted rates. For commercial, industrial, non-residential & bulk water users, the last tariff adjustment was also made in 2017. Moreover, an aquifer charge was also introduced for domestic, industrial, commercial and corporate bodies. These measures substantially improved the tariff revenues

between 2017-18 (tariff revenues = PKR3,736 million) and 2020-21 (tariff revenues = PKR6,794 million). The shortfall in costs as compared to tariff revenue was met by the GoPb.

23. The sewer fee is collected on the water bill as 80 percent of the water rate. Collection efficiency for sewerage charges is estimated at 70 percent based on the last three years billing which is lower than the collection efficiency of 80 percent for water charges. Revenue from bulk sewer charge amounts to PKR50,000 per month for one cubic foot per second flow. Drainage charges for industrial, commercial, non-residential government and semi-government organizations, corporate bodies, private housing scheme not directly connected with WASA but disposing through LWASA drainage system are charged PKR8,400 per hectare per annum.

Tariff Reforms and Biannual Indexation (Effective July 2023)

24. In July 2023, LWASA implemented a landmark tariff reform that introduced a biannual indexation mechanism for both domestic and commercial consumers. While the first two domestic slabs—typically covering households up to 5 Marla (126 square meters) remain subsidized by the GoPb, the broader adjustment marks a shift toward a more dynamic and cost-reflective pricing structure. The new indexation formula enables automatic revisions of tariff slabs based on fluctuations in electricity tariffs and prices of petroleum, oil and lubricants. This reform has brought several strategic benefits: tariffs are now more closely aligned with actual service delivery costs, internal revenue generation capacity has improved, and the agency's financial planning has become more predictable. Moreover, by linking tariff adjustments to core input costs, LWASA has enhanced its resilience to external price shocks while gradually phasing out reliance on operating subsidies through a transparent compensation mechanism supported by the provincial government. This reform marks a significant step toward greater fiscal autonomy and long-term financial sustainability.

Development of Business Plan for the Future

25. In line with Government efforts to make the utilities financially viable organizations, LWASA has developed a Business Plan which analyses its financial position and reveals following major operating issues that limit its ability to achieve sustainable cost recovery:

- *Low Tariffs.* The financial analysis underscores the need for major reforms in the existing tariff structure. Tariffs are not only unrealistically low, but their collections are also based on arbitrary assumptions about property-area based water use. Improvement in operating cost recovery will require major tariff reforms and, at least over the short term, major tariffs revisions. Tariff reforms is the major focus of LWASA's Business Plan.

- *Unaccounted-for Water.* Current levels of unaccounted-for water are unsustainable. While controlling technical losses (real losses) through fixing leakages require sustained effort and significant resources over a long horizon, a major component of Non-Revenue Water (NRW) – relating to unmetered-consumption – can be successfully controlled through bulk and retail metering to replace the current flat tariffs-based billing. The Project will establish universal metering in the selected Project localities, but LWASA will be required to build on the Project and expand the metering to rest of the customers in its other service areas.

- *Operational inefficiencies,* especially the high electricity costs associated with aged and inefficiently designed infrastructure, are a major drain on LWASA revenues. Strategic capital investments to rehabilitate, replace and modernize the existing energy-inefficient infrastructure can significantly reduce LWASA's O&M burden. Promoting the conjunctive use of ground water and surface water not only ensures the sustainability of the water supplies but as demonstrated in the Project Financial Analysis, major savings can also be achieved in the operating costs through a system designed with optimum hydraulic efficiency.

26. The Business Plan analyses LWASA's historical finances and forecasts its future financial position to propose measures to meet its operating expenses from operating revenues and eventually to generate a surplus. This is because of substantial increases foreseen in electricity expenditures (as a result of proposed revision of electricity tariffs by electricity provider[16]), non-electric O&M expenditures (due to taking over of additional assets[17]) and salaries and benefits (due to revision in Human Resource benefits[18]). The below table shows projected revenues and expenditures of the Business Plan; however, it shall be noted that the projections are indicative and generally frontloads the energy and other expenditures in the initial years which may not be the actual scenario. This will require further discussions among LWASA, Lahore Electricity Supply Corporation and GoPb so that the impact of the additional expenditures is reduced or gradually imposed on LWASA and some form of O&M assistance is also made available with the transfer of new assets to LWASA for their upkeep.

Table 2-7: Indicative Expenditure Projection (PKR Million)

DESCRIPTION	2021-22	2022-23	2023-24	2024-25	2025-26 (est.)	2026-27 (est.)	2027-28 (est.)
Operating expenditure forecast:							
Electricity and Power	5,489	6,215	10,926	11,917	11,488	11,059	10,630
Salaries and Benefits	5,435	6,219	7,196	7,909	7,933	7,957	7,981
Repair and Maintenance	2,130	2,824	3,524	4,542	4,726	4,910	5,093
Other Expenses	634	728	939	995	946	897	848
Total	**13,688**	**15,986**	**22,585**	**25,363**	**25,092**	**24,822**	**24,551**

27. The table above shows that total operating expenses have increased from PKR13,688 million in FY2020-21, and it is forecast to reach PKR24,551 (est.) in FY2027-28. Due to tariff revisions in 2023, improvements were achieved in revenues over the same period benefiting the expense recovery. For phasing out the subsidies over this period, the Business Plan

[16] Presently Lahore Electricity Supply Company (LESCO) is providing electricity to all LWASA tube-wells under D (Agriculture Tube Wells) category, which are subsidized tariffs. However, LESCO is gradually converting the tariff rate to A3-(General Services), which is almost 25-30 percent expensive than D-tariffs.

[17] GoPb has more than 400 filtration plants running in province which were built under various development schemes. After operating the plants for initial 2-3 years, GoPb is transferring these plants to various municipalities and service providers. The plants in Lahore are planned to be transferred to LWASA, which, after taking their ownership, will be responsible for O&M costs of filtration plans. This will add to the overall O&M burden of LWASA.

[18] LDA's employee are drawing some special benefits and allowances which were so far not allowed to LWASA. However, LDA, the governing body of LWASA, has recently approved the uniform application of these salaries and benefits to LWASA's employees also.

presents alternative proposals on a tariff roadmap, proposing stepwise adjustment to meet cost recovery levels and, depending on the selected proposal, phase out subsidies over a period that can be as short as 2 years or a prolonged timeframe of 5 years. The alternatives range from a one-time steep revision, followed by gradual annual revisions in tariffs to a more spread-out and uniform incremental revisions over several years. The proposed stepwise tariff adjustment would improve LWASA's financial position to better finance O&M of its water supply and sanitation infrastructure with gradual reduction of government subsidies in the short to medium term.

28. The completion of the construction under the proposed Project in 2031 will contribute to a strengthening of LWASA's financial position through reduced O&M costs and technical losses. By this time, LWASA would also be implementing the institutional and operational reforms of its Business Plan, including rolling out of performance management systems for its assets and operations; installation of consumer meters for all its consumers; improving collection rates and implementing a modern Management Information System. These measures will ensure that LWASA is transformed into a progressive, accountable and financially viable institution.

29. Financial sustainability is a process where both the revenues and costs must be managed with a long-term vision. Continued capacity building of staff, and coordination with the GoPb for subsidies, if required, will be the key elements to achieve the goal of financial sustainability. The Financial Analysis reveals a serious need for GoPb to review policy and regulatory constraints that impede LWASA's ability to charge more rational tariffs rates. But, at the same time, LWASA needs to be cognizant of the affordability of the tariffs by different client groups – so that the customers with higher willing to pay are charged higher tariffs, whereas the poor and the marginalized communities are selectively assisted.

Government of Punjab Debt Servicing Plan

30. As of the end of June 2024, the GoPb total outstanding debt stands at PKR1,685 billion[19] (approximately USD6.0 billion). Of this amount, PKR1,683 billion is sourced from external lenders, while only PKR1.7 billion originates from domestic sources. Collectively, this debt represents 2.9 percent of Punjab's Gross State Domestic Product (GSDP). The outstanding debt is denominated in multiple currencies. As of the close of the fiscal year, approximately 70 percent of the external debt is denominated in US Dollars, followed by 22 percent in Special Drawing Rights (SDRs), 4 percent in Japanese Yen, and the remaining 4 percent in other currencies. The debt servicing and redemption profile is well-structured and spread over a 33-year period, ensuring manageable repayment obligations. For FY2024–25, the ratio of debt servicing expenses to the average revenue of the past three years is projected at 6.2 percent, with a downward trend anticipated through 2034. This indicates the Government's strong capacity to meet its debt obligations without financial distress. Furthermore, the Public Financial Management (PFM) Act, 2022, has established clear limits on public debt and guarantees to ensure fiscal discipline. All key risk indicators and PFM thresholds related to Punjab's public debt portfolio remain within prescribed limits, providing adequate fiscal space for the GoPb to pursue additional economically beneficial borrowing through the Government of Pakistan, if needed.

[19] GoPb – Finance Department - Budget for Fiscal Year 2024- 2025

Annex 3: Paris Agreement Alignment and Climate Finance

1. **The Project is aligned with both the mitigation (BB1) and adaptation (BB2) goals of the Paris Climate Agreement.** The Project addresses climate mitigation by focusing on reducing GHG emissions and enhancing resource efficiency. The Project's activities fall under the universally aligned list for BB1 (mitigation). Additionally, the Project supports climate adaptation by addressing the vulnerabilities of Lahore's urban infrastructure, natural environment, and public health to monsoon flooding and climate-induced stresses. In particular, the anticipated increase in water supply demand, driven by population growth and climatic variability, is expected to result in a corresponding rise in sewage generation. To manage this, the Project invests in climate-resilient wastewater management systems and stormwater drainage rehabilitation. Therefore, the Project is considered to be aligned for BB2.

A. Alignment with mitigation goals of the Paris Agreement (BB1)

2. The Project involves financing for the following components:

- **Component A: Investment in Wastewater and Drainage Management**, including:
  - *Sub-component A.1: Construction of Trunk Sewers*
  - *Sub-component A.2: Construction of Disposal Pumping Station*
  - *Sub-component A.3: Rehabilitation of Stormwater Drains*
  - *Sub-component A.4: Clean Energy Support for Wastewater Disposal Pumps*

- **Component B: Project Management**

3. All activities fall under the universally aligned activities for mitigation in the "Water supply and wastewater" sector, in accordance with the eligible operation types outlined in the joint MDB Alignment Approach and the Methodological Principles for Assessment of Paris Agreement Alignment. Specifically, the Project supports activities related to wastewater collection, drainage rehabilitation, and clean energy integration in wastewater operations.

4. The Project supports construction of gravity-based trunk sewers, eliminating the need for 22 energy-intensive intermediate pumping stations and thereby significantly reducing electricity consumption and associated GHG emissions. It includes the construction of a modern pumping station and the installation of a 450 kW solar power system, further enhancing energy efficiency and reducing operational emissions. The rehabilitation of stormwater drains, previously contaminated with sewage, prevents methane emissions from anaerobic decomposition in open drains, improves water quality, and reduces flood-induced disruptions that contribute to transport-related emissions. Together, these interventions enhance resource efficiency, expand sewer coverage, reduce untreated wastewater discharge, and promote the use of clean energy.

GHG Emissions Impact

5. Over the 25-year project period, the proposed improvements to Lahore's sewerage system are expected to significantly reduce energy consumption and GHG emissions. Power consumption will decrease by approximately 97,293 Megawatt-hour (MWh), representing a 23 percent reduction compared to the existing system. Fuel consumption from diesel generators will be eliminated, resulting in a 100 percent reduction in associated emissions.

6. As a result, total CO_2 emissions will decline by approximately 69,277 tonnes (35 percent), from 196,452 tonnes under the current system to 127,175 tonnes with the proposed system. Furthermore, the integration of clean energy solutions, such as solar-powered pumps, will generate around 15,520 MWh of electricity, leading to an additional 7,993 tonnes of CO_2 savings.

7. **The total emissions reduction is estimated at approximately -77,270 tonnes of CO_2.**

8. **Conclusion**: the Project is considered aligned with the mitigation goals of the Paris Agreement (BB1).

B. Alignment with adaptation goals of the Paris Agreement (BB2)

Step 1: Climate risk and vulnerability assessment

9. Lahore faces increasing climate-related challenges due to its geographic location and urban conditions. Intensifying monsoon variability, increased frequency of urban flooding, and rising temperatures are among the primary risks. These climate stressors threaten the city's water, wastewater, and stormwater infrastructure, particularly in low-lying and densely populated neighborhoods.

10. The Climate Risk and Management Assessment indicates that historical data indicate frequent inundation during peak monsoon months, with sewerage systems often overwhelmed due to insufficient separation between stormwater and wastewater flows. Rising urban temperatures, combined with poor drainage and water stagnation, significantly increase the risks of disease outbreaks and public health emergencies, particularly in underserved communities.

11. Climate projections for the region indicate a continued rise in both maximum and minimum temperatures, especially during summer months. Studies suggest that water consumption increases by 1 percent to 7 percent for every 1°C rise in temperature. However, considering Lahore's higher baseline temperatures, frequent power shortages (load-shedding), and local water use behaviors, an 8 percent increase per 1°C has been conservatively adopted in the design parameters.

12. Based on projected temperature increases through 2050, water demand is estimated to rise 13.5 percent, leading to a corresponding increase in sewage generation.

13. The broader context of climate vulnerability includes projections of more erratic rainfall, leading to waterlogging and damage to urban infrastructure, reduced system performance during floods, and greater wear on aging drainage assets. To accommodate this, the Project has incorporated climate-adaptive design measures.

Step 2: Climate adaptation and resilient measures

14. The Project integrates multiple adaptation measures in response to the identified risks:

Table 3-1: Adaptation Measures by Component

Project Component	Adaptation Measures
Sub-component A.1: Construction of Trunk Sewers	- **Separation of stormwater and sewage flows**: Trunk sewers constructed alongside existing drains allow separation of flows, reducing flood risk and restoring the ecological function of storm drains. - **Capacity design for climate-induced sewage flow increases**: Sewers are sized to manage increased sewage volumes due to rising temperatures and projected 13.5 percent rise in water demand. - **Gravity-based system**: Designed to function without intermediate pumping, increasing reliability during power outages common during extreme weather. - **Use of resilient materials**: 6000 PSI RCC pipes and HDPE lining protect against structural failure due to gas corrosion and soil pressure. - **Ventilation and odor control systems**: Improve long-term functionality and reduce climate-exacerbated health risks from gas buildup.
Sub-component A.2: Construction of Disposal Pumping Station	- **Stormwater runoff management**: Inclusion of 50 percent peak flow stormwater allowance in design to accommodate monsoon variability. - **Restoration of original drainage function**: Central and Cantonment Drains, once overwhelmed by sewage, will be restored for exclusive stormwater use. - **High-capacity and standby pumping**: The Gulshan-e-Ravi pumping station (688–848 cusecs + 140 cusec standby) provides a buffer for stormwater surges. - **Backup use of decommissioned pumping structures**: Retained as contingency during high-rainfall events to ensure flood resilience.
Sub-component A.3: Rehabilitation of Stormwater Drains	- **Stormwater capacity enhancement**: Rehabilitation of 7 km of surface drains improves drainage capacity in flood-prone areas, reducing exposure to seasonal waterlogging and waterborne diseases.
Component B: Project Management	Supporting climate-resilient design review, construction quality, institutional capacity, and digital tools for adaptive management, ensuring that the project's physical adaptation investments are effective, sustainable, and responsive to future climate risks.

Step 3: Consistency with the country's climate commitments

15. The Project aligns with Pakistan's national climate resilience strategies, including the National Climate Change Policy (2021) and the National Adaptation Plan (2022), by addressing urban infrastructure vulnerabilities and strengthening service delivery in flood-prone zones.

16. It supports priority objectives under Pakistan's adaptation goals, including:

- Reducing exposure to urban flood risks,
- Enhancing resilience of critical wastewater and drainage infrastructure,
- Strengthening institutional capacity to manage climate-impacted service disruptions.

17. At the local level, the Project is also consistent with Lahore's urban development and environmental protection priorities, contributing to enhanced adaptive capacity through integrated, climate-smart wastewater and drainage solutions.

18. **Conclusion**: The Project incorporates measures that tackle the climate risks that might materially affect it, and it is not incompatible with the country's climate commitments, thus it is considered aligned with the adaptation goals of the Paris Alignment (BB2).

Climate Finance

19. In line with the Joint MDB Methodologies for Tracking Climate Change Mitigation and Adaptation Finance, the Project has been assessed to determine the eligible components contributing to climate objectives. The allocation is based on a proportional approach, reflecting the estimated share of activities within each component that deliver mitigation and/or adaptation benefits. For mitigation, eligibility is supported by the transition to gravity-based sewerage systems, the reduction of energy-intensive pumping stations, and the integration of solar energy solutions. For adaptation, the Project responds to climate vulnerability in urban Lahore by enhancing flood resilience through stormwater drain rehabilitation and improving public health systems during monsoon seasons.

Component A: Investment in Wastewater and Drainage Management

- **Sub-component A.1: Construction of Trunk Sewers**

  The gravity-based sewer design eliminates 2 intermediate pumping stations, significantly reducing electricity demand (mitigation), while also relieving chronic flood-prone areas and reducing public health risks during monsoon events (adaptation).
- **Sub-component A.2: Construction of Disposal Pumping Station**
  Construction of a centralized, energy-efficient sewage pumping station enhances operational reliability during extreme weather events (adaptation) and reduces electricity consumption compared to decentralized pumping systems (mitigation).
- **Sub-component A.3: Rehabilitation of Stormwater Drains**
  Rehabilitation of 7 km of surface drains improves flow and capacity during extreme rainfalls (adaptation).
- **Sub-component A.4: Clean Energy Support for Wastewater Disposal Pumps**

Solar-based systems (e.g., 450 kW for sewage pumps) directly reduce grid-based emissions (mitigation).

Component B: Project Management

Strengthening institutional capacity, monitoring, and system-level integration supports better long-term management of climate risks and energy use (both adaptation and mitigation outcomes).

20. Based on this assessment, approximately USD136.57 million (85 percent) of AIIB's financing qualifies as climate finance, with breakdowns for mitigation, adaptation, and dual-benefit activities as summarized in the table below.

Table 3-2: Climate Finance Estimations

Components / Sub-components	AIIB Financing (USD million)	Climate mitigation (USD million)	Climate adaptation (USD million)	Dual benefits (USD million)
Component A: Investment in Wastewater and Drainage Management	**155.40**			
Sub-component A.1: Construction of Trunk Sewers	116.66	46.66	58.33	104.99
Sub-component A.2: Construction of Disposal Pumping Station	33.52	5.00	16.76	21.76
Sub-component A.3: Rehabilitation of Stormwater Drains	4.91		4.91	
Sub-component A.4: Clean Energy Support for Wastewater Disposal Pumps	0.31	0.31		
Component B: Project Management	**4.60**	2.3	2.3	4.6
Sub-Total	**160.00**	**54.27**	**82.30**	**131.35**
Total climate finance (USD million)		**136.57**		

Annex 4: Country Credit Fact Sheet

1. **Background**: Pakistan is a lower-middle-income country with a GDP per capita of approximately USD1,600 (or USD7,000 in purchasing power parity) and a population of around 240 million. Pakistan's economic prospects have been constrained by longstanding structural challenges. Economic growth and living standards have trailed regional peers, reflecting policy missteps, underinvestment in human and physical capital, distortions from an outsized state presence in the economy, and persistent fiscal weaknesses. Pakistan's economy grew at an average annual rate of 3.5 percent over the last decade. Since mid-2021, macroeconomic instability has intensified due to a combination of domestic and external shocks. Political volatility, especially in 2022, further undermined confidence and raised doubts about the Government's ability to stabilize the economy. Delays in the IMF program and concerns about debt sustainability triggered market anxiety, curtailed external financing, and led to a downgrade of Pakistan's sovereign credit rating to the 'CCC' range, pushing yields sharply higher. As a result, growth came to a standstill in FY23, the rupee depreciated by 50 percent, and foreign exchange (FX) reserves fell by 75 percent between mid-2021 and mid-2023.

2. Since mid-2023, Pakistan has resumed engagement with the IMF. The initial 9-month program has provided a policy anchor and restored confidence. New official financing, including support from Gulf Cooperation Council (GCC) bilateral partners, signaled sustained international backing. The program has been implemented effectively and contributed to macroeconomic stabilization. The subsequent 37-month, USD7 billion EFF program, since September 2024, focuses on macroeconomic stability—through fiscal consolidation, tax reform, tight monetary policies, and higher FX reserves—strengthening competitiveness, reforming State-owned Enterprises (SOEs) and improving the energy sector. The economy started to recover in FY24 with higher growth and lower inflation.

Selected Economic Indicators	FY23*	FY24*	FY25*	FY26*	FY27*	FY28	FY29
Real GDP growth (% change)	-0.2	2.5	2.6	3.6	4.1	4.5	4.5
Inflation (end-of-period, % change)	29.4	12.6	6.5	6.6	6.5	6.5	6.5
Fiscal balance 1/	-7.7	-6.8	-5.6	-5.1	-3.9	-3.4	-3.2
Public debt 1/	78.2	70.1	73.6	71.9	70.0	67.0	63.9
Current account balance	-1.0	-0.5	-0.1	-0.4	-0.5	-0.8	-0.9
External debt	34.8	33.7	33.9	33.1	31.9	35.1	32.2
Gross external financing need	7.1	5.7	4.0	4.7	4.5	6.7	4.6
FX reserves (USD billion) 2/	4.4	9.4	11.4	..	..	..	..
Exchange rate (PKR/USD) 2/	287.6	278.3	282.2	..	..	..	,,

Source: IMF Country Report No. 25/109; in percent of GDP, unless otherwise indicated; * denotes projections; fiscal year runs July-June. Notes: 1/ General government, including IMF obligations; 2/ Data from central bank, end-of-period, for FY25: as of May 29, 2025

3. **Recent developments.** The IMF has recently completed the first review of Pakistan's program, with overall performance assessed as strong. Pakistan met key program targets, particularly in reserve accumulation and fiscal performance. The budget is on track to meet the full-year target of 2.1 percent primary surplus. Provincial governments implemented

increases in agricultural income tax, fulfilling a major reform milestone. The parties also agreed to a new USD1.3 billion Resilience and Sustainability Facility (RSF) program, aimed at strengthening Pakistan's climate resilience.

4. Inflation fell to a historic low of 0.3 percent in April, although core inflation remains at around nine percent. Strong disinflation has enabled the central bank to cut the policy rate from a peak of 22 percent in FY24 to 11, as of May 2025. Meanwhile, foreign exchange reserves surpassed targets, rising from USD9.4 billion in August 2024 to USD11.4 billion, as of May 2025, while public debt fell from 78 to 70 percent of GDP.

5. **Outlook and Risks.** Growth in FY25 is projected at 2.6 percent. Forecasts for inflation and the current account deficit have been revised downward to 6.5 percent and -0.1 percent, respectively. The narrower current account deficit reflects strong export performance and recovering remittances, supported by improved macroeconomic and exchange rate stability. Over the medium term, it is expected to widen to around one percent of GDP as imports rebound. Reserves are set to further strengthen, aided by multilateral and bilateral financing. For example, the World Bank has recently committed USD20 billion over the next 10 years under its Country Partnership Framework for Pakistan.

6. The main risks to the outlook include potential slippages in the IMF program, political volatility, and social unrest that could derail reforms efforts. The main external risks include higher commodity prices, geopolitical tensions, and elevated global economic policy uncertainty, which could further tighten already constrained global financial conditions. Additionally, Pakistan remains highly vulnerable to climate related risks.

7. According to the IMF, public debt continues to be sustainable. However, this critically hinges on a decisive implementation of the IMF-supported economic reforms, the gradual resumption of growth and the continued financial support from partners. Under such a scenario, public debt remains contained at around 70 percent of GDP by 2027 and falls afterwards. However, 70 percent of GDP remains high compared with peers. Risks to debt sustainability are high, key of them related to liquidity, namely high external financing needs and low FX reserves (less than half of what the IMF deems adequate), while interest payments are absorbing more than half of government revenue. Debt sustainability could also come under further pressure in case of policy slippages, higher interest rates, lower growth, and exchange rate volatility.

8. On account of recent macroeconomic improvements, Pakistan's sovereign credit ratings have been upgraded, and international borrowing spreads have narrowed, reflecting stronger investor confidence. In 2025, all three major rating agencies revised Pakistan's ratings upward – Fitch and Standard and Poor's (S&P) to B- (positive outlook), and Moody's to Caa1 (stable).