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Report No: PAD3590

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
AND
INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN
IN THE AMOUNT OF US$ 200 MILLION

AND

PROPOSED CREDIT
IN THE AMOUNT OF SDR 168.9 MILLION
(US$ 242.4 MILLION EQUIVALENT)

TO

THE ISLAMIC REPUBLIC OF PAKISTAN

FOR A

PUNJAB RURAL SUSTAINABLE WATER SUPPLY AND SANITATION PROJECT

May 27, 2021

Water Global Practice
South Asia Region

CURRENCY EQUIVALENTS

Exchange Rate Effective April 30, 2021

Currency Unit =	Pakistani Rupee (PKR)
US$1 =	PKR 155.13
US$1 =	SDR 0.697

FISCAL YEAR
July 1 – June 30

Regional Vice President:	Hartwig Schafer
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ABBREVIATIONS AND ACRONYMS

ABR	Anaerobic Baffled Reactor
APAA	Aab-e-Pak Authority Act
BCC	Behavior Change Communication
BCR	Benefit-cost Ratio
BOD	Biochemical Oxygen Demand
BTF	Bio-trickling Filter
CCO	Community Caretaker and Operator
CDG	Concept Development Group
CH4	Methane
COD	Chemical Oxygen Demand
DA	Designated Account
ESMF	Environmental and Social Management Framework
FM	Financial Management
FMS	Financial Management Specialist
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoP	Government of Pakistan (Federal)
GoPunjab	Government of Punjab (Provincial)
GRS	Grievance Redress Service
HadAM3P	Hadley Centre Atmospheric Model, version 3
HIES	Household Income and Expenditure Survey
IUFR	Interim Unaudited Financial Report
LG&CD	Local Government & Community Development
LHW	Lady Health Worker
MICS	Multiple Indicator Cluster Survey
MIS	Management Information System
NAM	New Accounting Model
NGO	Non-governmental Organization
NNS	National Nutrition Survey
N2O	Nitrous Oxide
P&D	Planning & Development
PDO	Project Development Objective
PHED	Public Health Engineering Department
PICIIP	Punjab Intermediate Cities Improvement Investment Project
PIMU	Project Implementation and Management Unit
PLGA	Punjab Local Government Act
PMDFC	Punjab Municipal Development Fund Company
PMU	Project Management Unit
POM	Project Operational Manual
POU	Point-of-Use
PRMSC	Punjab Rural Municipal Services Company
PRMSC-TO	Punjab Rural Municipal Services Company-Tehsil Office
PRSWSSP	Punjab Rural Sustainable Water Supply and Sanitation Project
PSC	Project Steering Committee
PSLM	Pakistan Social and Living Standards Measurement

PVPNCA	Punjab Village Panchayat and Neighborhood Council Act
PWA	Punjab Water Act
PWSRA	Punjab Water Services Regulatory Authority
SDG	Sustainable Development Goal
SOP	Standard Operating Procedure
STEP	Systematic Tracking of Exchanges in Procurement
SWM	Solid Waste Management
TC	Tehsil Council
TPM	Third-party Monitor
TSS	Total Suspended Solids
UNICEF	United Nations Children's Fund
VC	Village Council
VO	Village Organization
WASH	Water, Sanitation, and Hygiene
WB	World Bank
WHO	World Health Organization
WSS	Water Supply and Sanitation

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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Pakistan	Punjab Rural Sustainable Water Supply and Sanitation Project	
Project ID	**Financing Instrument**	**Environmental Assessment Category**
P169071	Investment Project Financing	B-Partial Assessment

Financing & Implementation Modalities

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

Expected Approval Date	Expected Closing Date
18-Jun-2021	30-Jun-2028

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The project development objective is to provide equitable and sustainable access to safely managed water and sanitation and reduce child stunting.

Components

Component Name	Cost (US$, millions)

Project Management	16.90
Water Supply and Sanitation Infrastructure Development	477.70
Behavior Change and Capacity Development	16.10
Service Delivery Improvement	42.30

Organizations

Borrower:	The Islamic Republic of Pakistan
Implementing Agency:	Local Government Department, Government of Punjab

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	553.00
Total Financing	553.00
of which IBRD/IDA	442.40
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	200.00
International Development Association (IDA)	242.40
IDA Credit	242.40

Non-World Bank Group Financing

Counterpart Funding	110.60
Borrower/Recipient	110.60

IDA Resources (in US$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
Pakistan	242.40	0.00	0.00	242.40

National PBA	242.40	0.00	0.00	242.40
Total	**242.40**	**0.00**	**0.00**	**242.40**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2021	2022	2023	2024	2025	2026	2027	2028
Annual	0.00	10.00	32.00	40.00	50.00	80.00	100.00	130.40
Cumulative	0.00	10.00	42.00	82.00	132.00	212.00	312.00	442.40

INSTITUTIONAL DATA

Practice Area (Lead)

Water

Contributing Practice Areas

Poverty and Equity

Climate Change and Disaster Screening

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

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

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

COMPLIANCE

Policy

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

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04		✓
Forests OP/BP 4.36		✓
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11		✓
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50	✓	
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

The Project Implementing Entity shall establish by 3 months from the effectiveness, and thereafter maintain, throughout the period of implementation of the Project, a Project Steering Committee comprised of officials of various government entities, in adequate numbers and under terms of reference satisfactory to the Association, vested with the responsibility of overseeing the implementation of the Project in their respective agencies.

Sections and Description

The Project Implementing Entity shall adopt by 30 days from the effectiveness, and thereafter maintain, throughout the period of implementation of the Project, the Operational Manual, in form and substance satisfactory to the Association.

Sections and Description
The Project Implementing Entity shall transfer funds to the PRMSC for implementing Sub-Projects in accordance with eligibility criteria and procedures acceptable to the Association.

Sections and Description
The Recipient shall cause the Project Implementing Entity to ensure that the collection, use and processing (including transfers to third parties) of any Personal Data collected under the Project shall be done in accordance with the best international practice, and ensure legitimate, appropriate and proportionate treatment of such data.

Sections and Description
The Project Implementing Entity and the Association shall, from time to time, at the request of either party, exchange views with regard to the Project Implementing Entity's pricing policies and its plans in respect of the overall development of the sector, supported by baseline and local level consultations and tariff assessment study conducted by the Project Implementing Entity, ensuring the financial viability of operation and management expenses of the sector.

Sections and Description
The Project Implementing Entity shall ensure that no infrastructure activities under Part 1 of the Project shall commence, unless and until the management information system under Part 4.1 of the Project has been developed and has become operational.

Sections and Description
The Recipient shall cause the Project Implementing Entity to (a) establish, with functions required for the normal course of business by three (3) months after the Effective Date, and thereafter maintain, throughout the period of implementation of the Project a PRMSC for the purposes of day-to-day implementation and management of Project activities, including the development and maintenance of the management information system under Part 4.1 of the Project and conducting midline and endline surveys as specified in the Operational Manual, with a mandate for provision of service delivery and tariff collection for water, sanitation and solid waste during the implementation of the Project, and (b) establish with functions required for the normal course of business by six (6) months after the Effective Date, and thereafter maintain, throughout the period of implementation of the Project PRMSC-TOs in each Selected Tehsil as a central service provision unit for the villages and field execution and operations unit for the PRMSC, providing timely and uninterrupted operations and maintenance of the water and sanitation facilities in the project villages; all with the composition, resources and terms of reference satisfactory to the Association.

Conditions

I. STRATEGIC CONTEXT

A. Country Context

1. **Pakistan is at a crossroads as it deals with the coronavirus (COVID-19) pandemic**. Over the last two decades, economic growth has averaged 4.4 percent a year, below the South Asian annual average of 6.3 percent. The country was making good progress in stabilizing its economy and implementing much needed structural reforms. However, real gross domestic product (GDP) growth (at factor cost) is estimated to have declined from 1.9 percent in FY19 to -1.5 percent in FY20, reflecting monetary and fiscal tightening prior to the outbreak and the effects of COVID-19 containment measures that followed.

2. **In response to COVID-19, the government announced a fiscal stimulus package of US$7.5 billion**.[1] This aimed to: (i) support the health sector in combatting and mitigating the virus; (ii) implement social assistance measures for those adversely affected; and (iii) provide stimulus to businesses and industries to protect productive assets. The financing comprises approximately US$2.5 billion of additional resources and a re-appropriation from the existing budget. Pakistan has availed of the Debt Service Suspension Initiative and expects US$1.6 billion to US$2.4 billion in temporary fiscal space.

3. **Pakistan is facing severe health and economic consequences from the COVID-19 pandemic**. The crisis is expected to lead to a sizeable increase in poverty, reversing the sustained reduction observed over the past 20 years. Deterioration of health indicators is expected due to demand-side issues induced by the crisis, such as lower utilization of non-COVID-19 healthcare due to fear of contagion and income constraints. The pandemic has also resulted in an increase in the number of out-of-school children.

4. **Pakistan's low human capital accumulation is a fundamental development challenge**. A key contributing factor is the high rates of stunting and malnutrition among Pakistani children. According to the World Bank Human Capital Index, if no improvements in health and education service delivery take place, a Pakistani child born today is expected to be only 40 percent as productive as they could be by age 18. The latest Pakistan Demographic and Health Survey and National Nutrition Survey (NNS) indicate an overall stunting rate of 37 percent and 40 percent respectively for children under five years of age. These high rates are at odds with the country's success in poverty reduction, improvements in dietary diversity, the reduction in open defecation, and the institutional and policy focus on nutrition.[2]

5. **The absence of significant investments in the treatment of drinking water and safe management of fecal waste is an important reason for the persistently high rates of stunting in rural areas**. The lack of attention to quality of sanitation infrastructure and virtually no attention to fecal waste management has resulted in an unprecedented concentration of untreated fecal waste near human settlements and the consequent contamination of water and soil.

6. **This contamination, coupled with poor hygiene practices and the use of inadequately treated water for drinking purposes, has exacerbated the incidence of diarrhea and environmental enteropathy in young children**. The latter causes malabsorption and maldigestion of nutrients, undermining the impact of improved diets and leading to a host of growth and developmental issues that are manifested in child stunting. This challenge is especially acute in rural areas where households abstract groundwater from shallow depths for drinking purposes. In addition to the direct pumping of contaminated groundwater, the poor quality of well construction leads to bacteriological contamination of drinking water even in cases where the underlying groundwater is clean. According to the NNS 2018, 56 percent of the water samples collected from survey households were contaminated with coliforms, with a higher rate in rural areas.

[1] Estimated USD equivalent for PKR 1.2 trillion stimulus package.
[2] Mansuri, Ghazala, Mohammed Farhanullah Sami, Muhammed Ali, Hang Thi Thu Doan, Bilal Javed, and Priyanka Pandey. 2018. "When Water Becomes a Hazard: A Diagnostic Report on the State of Water Supply, Sanitation and Poverty in Pakistan and its Impact on Child Stunting." WASH Poverty Diagnostic Series Report, World Bank Group, Washington, DC.

7. **The World Bank Economics of Sanitation Initiative (2006) estimated the annual economic cost of poor sanitation in Pakistan at PKR 344 billion (approximately US$2.2 billion)—3.9 percent of nominal GDP**. It is likely that the economic cost of poor sanitation is higher today since there has been little expansion of safely managed sanitation services, at least in rural areas, but a substantial increase in population and density of villages.

8. **The province of Punjab is home to over half of Pakistan's population and characterized by stark socioeconomic divides between north and south and rural and urban areas**. While 30 percent of rural households are poor, only 16 percent of urban households are poor. There is a related geographic divide: most districts[3] in the north and the center have poverty rates of less than 20 percent, while the average district in the south has a poverty rate closer to 36 percent, reaching up to 48 percent in some districts. Similarly, child health outcomes are worse in south Punjab, with an average stunting rate of 42 percent compared to 25 percent in the north and 33 percent in the center. The disparity in health outcomes is mirrored in differences in the quality of water and sanitation services as discussed below.[4]

9. **Climate change and disaster-related vulnerabilities are exacerbating poverty in Pakistan, particularly in Punjab**. These risks relate mainly to increasing frequency of extreme weather events, water supply variability, and higher water demand due to rising temperatures.[5] ThinkHazard classifies extreme heat hazard as high across Pakistan and the long-term Climate Risk Index for 2021 ranks Pakistan eighth among countries most affected by climate-related events such as storms, floods, and heatwaves. Between 2010–14, five major floods resulted in losses of over US$18 billion with over 38 million people affected, 3.45 million houses damaged, and 10.63 million acres of crops destroyed. Of the 10 districts of Pakistan projected to become climate hotpots by 2050, six are in Punjab. The projected temperature increase over the twenty-first century in central and southern Punjab is about 5.4 °C.[6] Punjab is expected to face an average reduction in living standards of 2.6 percent due to climate change.[7] The modeled increase in temperature and more variable precipitation are alarming as Punjab is Pakistan's breadbasket and home to about 110 million people.

B. Sectoral and Institutional Context

10. **Almost 98 percent of rural households in Punjab have access to an improved water source but continuous and treated piped water supply is rare and most households rely on groundwater pumping that is vulnerable to contamination**.[8] In 2018, only 13 percent of rural households had access to piped water, as compared to 29 percent of urban households. Even where piped water was available, less than 4 percent was piped into dwellings as opposed to a yard or public space. Private motorized and hand-pumps account for 76 percent of households with access to water. The remainder depended on protected wells and springs, water delivered through tankers, or bottled water.

11. **Most rural households in Punjab thus rely on groundwater as their main source of water, either through public supply or private investment**. Leakages from the irrigation canal network and seepage from irrigation application account for about two-thirds of groundwater recharge, making surface-groundwater linkages—including contamination from sewage—a critical aspect of sustainable drinking water access in Punjab. Despite the high rate of precipitation in parts of Punjab, harvesting rainwater is not common and no households use harvested rainwater as a main source. Similarly, rural Punjab is broadly unfamiliar with professional water service delivery by the public sector.

[3] Districts are the first administrative tier within a province. Punjab has 36 districts.
[4] Small area estimates using the Pakistan Social and Living Standards Measurement (PSLM) 2015–16 and the Household Income and Expenditure Survey (HIES) 2014. Stunting estimates from Punjab Multiple Indicator Cluster Survey (MICS) 2017–18. Diarrhea prevalence measured over two weeks. http://Data4Pakistan.com.
[5] Young, William J., Arif Anwar, Tousif Bhatti, Edoardo Borgomeo, Stephen Davies, William R. Garthwaite III, Michael E. Gilmont, Christina Leb, Lucy Lytton, Ian Makin, and Basharat Saeed. 2019. "Pakistan: Getting More from Water." World Bank, Washington, DC; Eckstein, David, Marie-Lena Hutfils, and Maik Winges. 2019. "Global Climate Risk Index." Germanwatch Briefing Paper.
[6] The Hadley Centre Atmospheric Model, version 3 (HadAM3P) at N96 resolution.
[7] Mani, Muthukamar, Sushenjit Bandyopadhyay, Shun Chonabayashi, Anil Markandya, and Thomas Mosier. 2018. *South Asia's Hotspots: Impacts of Temperature and Precipitation Changes on Living Standards*. Washington, DC: World Bank.
[8] Punjab MICS 2017–18.

12. **Access to improved sanitation is still low across rural Punjab and fecal waste is generally not safely disposed**. Overall, 73 percent of rural households in Punjab have access to improved sanitation.[9] However, only 4.9 percent have access to flush/pour-flush latrines connected to a sewer system, and another 50 percent have access to flush/pour-flush latrines connected to septic tanks with any overflow leading to a communal drain. Such tanks can be relatively safe if properly engineered and the sludge properly disposed of. However, the World Bank Pakistan WASH-Poverty Diagnostic (2018) found that due to the absence of regulatory oversight and the absence of any enforcement of design standards, septic tank toilets in rural Punjab are typically poorly designed and manually emptied. Fecal waste contaminates the ground through cracks in the tanks, or directly in the case of tankless pit latrines, or is disposed into nearby water bodies or open spaces. Of those without access to improved sanitation, 7 percent use unimproved facilities and close to 20 percent practice open defecation.[10]

13. **There is almost no public investment in the treatment of fecal waste**. Typically, wastewater from poorly engineered septic tanks flows through village lanes in open drains and empties into a pond, canal, or stream where no further treatment occurs. Most of these ponds have become stagnant pools filled with fecal sludge and solid waste. The rapid expansion of poor-quality toilets over the past two decades is a major source of the endemic bacterial contamination of surface and groundwater, which contributes to widespread diarrhea and other water-borne diseases and to child stunting. This is despite a significant reduction in open defecation, which fell nationally from 29 percent in 2004–05 to 13 percent by 2014–15.[11] Across Pakistan, Punjab has the highest rate of open defecation, almost all of which is in rural areas, with variation across districts within the province. Across rural Punjab there is virtually no managed and regulated treatment of fecal sludge or wastewater. Moreover, according to the NNS 2018, 59 percent of households in Punjab do not safely dispose of child feces. A common practice is to dispose of child feces with other solid waste in open piles around the village. This becomes yet another route for fecal–oral contamination and reflects low awareness of the safe handling of waste.

14. **Lack of access to treated water and unsafe disposal of fecal waste contribute to about one-third of all drinking water sources in Punjab being contaminated with E. coli**. This increases to 60 percent at point-of-use (POU). This difference is explained by environmental contamination combined with household health behaviors, hygiene practices, water storage norms, water handling practices, and poor human, solid, and animal waste management. For example, the presence of human feces on the premises is associated with an 8 percent increase in contamination between source and POU. Overall, less than half of rural households across Punjab have access to safely managed water. Among water sources, piped water is about as contaminated as unimproved water and more so than groundwater. Income and education influence the difference in quality at POU versus source, pointing to the key role of information and behavior in safe water management.[12]

15. **The relatively shallow nature of the groundwater and the permeability of the soil mean that pollutants from the land surface move directly to the water table without much dilution**. In addition to unmanaged human, solid, and animal waste, agricultural effluent and randomly discarded solid waste are known contributors to drinking water quality problems. In addition to these anthropogenic sources of contamination, groundwater (and therefore drinking water) in parts of Punjab contains geogenic contamination in the form of arsenic and fluoride. A further common problem is the

[9] "Improved sanitation" is defined by the United Nations Children's Fund (UNICEF)/World Health Organization (WHO) as facilities that "hygienically separate excreta from human contact." Data from MICS Punjab (2017–18).
[10] Only 36 percent of households with septic tanks reported emptying it once; 95 percent of those that had emptied septic tanks did so manually without protection. Mansuri, Ghazala, Mohammed Farhoah Sami, Muhammed Ali, Hang Thi Thu Doan, Bilal Javed, and Priyanka Pandey. 2018. "When Water Becomes a Hazard: A Diagnostic Report on the State of Water Supply, Sanitation and Poverty in Pakistan and its Impact on Child Stunting." WASH Poverty Diagnostic Series Report, World Bank Group, Washington, DC.
[11] PSLM 2004–05 and 2014–15.
[12] Pakistan Council of Research in Water Resources (2011). Safely managed water is "an improved drinking water source located on premises, free of E. coli and available when needed" (UNICEF/WHO).

natural salinity present in groundwater, which can be exacerbated by inappropriately designed infrastructure.

16. **A common situation in rural Punjab in areas where the groundwater is naturally saline is that community drinking water schemes are supplied by groundwater from a thin freshwater layer on top of the saline groundwater which is replenished by seepage from the canal network.** While in its undisturbed state there is generally little mixing of the freshwater layer with the deeper saline groundwater, the lateral extent and depth of these freshwater layers varies as a function of canal characteristics (size and construction) and the hydraulic properties of the groundwater aquifer. Inappropriate pumping from these thin freshwater layers (e.g. excessive pumping or pumping from a well that is installed at too deep a level) causes the deeper saline water to be drawn up into the freshwater layer, compromising the whole freshwater zone within the effective area of that pump. Specialized structures (skimming wells) for using these thin freshwater layers without compromising them are common, although their design is site-specific.[13]

17. **The poor state of rural water supply and sanitation (WSS) services reflects the lack of sustainability of past public investments coupled with their poor targeting**.

(a) **There is a high rate of dysfunctionality among existing water supply schemes**. One-third are completely dysfunctional and, from the remaining, a large number perform below design parameters, providing unsafe and intermittent supply.[14] This is compounded by poor operations and maintenance (O&M), resulting from the common practice of transferring responsibility for the schemes to communities without first investing in community mobilization and capacity building.

(b) **The near absence of tariff collection is a major driver of poor financial sustainability of public rural water and sanitation services**. The usual practice in operational schemes is to charge a flat rate tariff, which has created perverse incentives against the conservation of water. Water provided in this way has been observed as being used for irrigation and for animals, with taps in some cases being left on indefinitely, which is especially concerning in heat- and drought-prone areas. These tariffs are not designed to cover major repairs, treatment, or upgradations/extensions, resulting in eroding infrastructure over time. This sets in motion a vicious cycle in which the deteriorating quality of water services negatively impacts the willingness of households to pay for water. In practice, with largely self-provided water, rural households still pay for water in three ways: (i) the cost of electricity for pumping water and the cost of the pump; (ii) payments for health care needs associated with water-borne diseases; and (iii) lost days of work and low productivity due to related morbidities.

(c) **There has been virtually no public investment in the safe disposal of fecal waste and wastewater treatment in rural Punjab**. Though sanitation is a part of WASH allocations in provincial development budgets, less than 10 percent is allocated to this crucial subsector. Moreover, sanitation expenditures also include village civil works (e.g. construction of soling/pavement) that are, at best, tangentially related to sanitation and hygiene.

(d) **Public spending on WSS in Punjab has historically suffered from a lack of targeting**. WASH budget allocations to districts do not reflect needs as measured by indicators of access to and quality of water and sanitation. Poorer districts tend to receive smaller per capita allocations than richer ones. This inversion of needs-based investment has meant that those districts that require the most investment have received the least, causing them to become chronically underserved. Allocations largely follow legacy, but it is also likely that the constituents of wealthier districts demand better quality services, inducing more public investment. Environmental contamination arising from the lack of fecal, solid, and animal waste management systems cannot be dealt with at the household level. The World Bank Pakistan WASH Poverty Diagnostic found that even the richest households living in poor regions

[13] The canal irrigation network of Punjab serves roughly 8.8 million hectares of land, and seepage from canals and irrigation account for roughly two-thirds of all groundwater recharge in the province. Overall, some 60 percent of the 22,000 or so villages in Punjab are within easy reach of a perennial canal source.
[14] According to the Government of Punjab, as of August 2019, 1,784 out of 5,137 publicly funded rural water supply schemes (35 percent) were dysfunctional.

show high diarrhea rates and are therefore not protected against the regional or local impacts of environmental contamination and oral transmission. This underscores the importance of public investments to reduce the health hazards of poor water and sanitation management.

18. **The effective implementation of WSS services in rural Punjab has also suffered from institutional fragmentation, low technical capacity, and ineffective intergovernmental transfers to lower administrative tiers**. Responsibility for the provision of WSS is unclear as both the Local Government and Community Development Department and the Public Health Engineering Department oversee implementation of schemes, with little coordination and, at times, a duplication of effort. Both departments suffer from low capacity to deliver WSS services in a professional manner. This sectoral and institutional context has contributed to the dysfunctional public WSS services described above.

19. **In 2019, the province of Punjab adopted four key pieces of legislation that underlie governance in the WSS sector**. These are the Punjab Water Act (PWA) 2019, the Punjab Local Government Act (PLGA) 2019, the Punjab Village Panchayat and Neighborhood Council Act (PVPNCA) 2019,[15] and the Aab-e-Pak Authority Act (APAA) 2019. Critical aspects of these laws relevant to the delivery of WSS services include:

(a) The PLGA empowers Tehsil Councils[16] (TCs) to perform and be accountable for functions including preventive health and hygiene, solid waste collection and disposal, sewerage collection and disposal including water management and treatment, drinking water supply, and environmental health and awareness services. The amended act (Punjab Local Government Amendment Ordinance 2021) empowers Village Councils (VCs) to perform and be accountable for functions related to drinking water and public sanitation, including the construction, maintenance, and repair of infrastructure.

(b) The PWA established the Punjab Water Resources Commission and the Punjab Water Services Regulatory Authority.[17] The Commission has the power to appoint service providers, which the Act refers to as "undertakers," for water and sewerage services. These undertakers may be companies, local governments, or statutory bodies that shall be regulated by the Authority with regard to fair pricing, adequate coverage of service delivery, adequate quality of service, non-discrimination in service provision, and protection of interests of vulnerable groups. The PWA also established a licensing system to regulate abstraction of water and disposal of sewage.

(c) The APAA establishes the Aab-e-Pak Authority with the objectives of providing efficient and affordable clean drinking water by undertaking or supervising construction of water supply schemes and water filtration plants, setting up of bottling plants and testing laboratories, and engaging and educating communities to improve water quality. Related functions include research and publication, development of digital database and integration of "disruptive technology" to increase transparency, coordination with other institutions engaged in drinking water provision, and execution of Government of Punjab (GoPunjab) drinking water projects.

20. **These reform-oriented legislative acts together hold the promise of a significant shift towards a more sustainable management of water resources and higher quality WSS services**. Existing plans and strategies of the GoPunjab provide direction for the implementation and rollout of these acts. The Punjab WASH Sector Development Plan (2014–24) commits the government to investment in sewerage and drainage with the objective of promoting safe sanitation in high open defecation zones. The Punjab Growth Strategy 2023 has a dedicated focus on Water, Sanitation, and Hygiene where it lays out six principles for water and sanitation services: recognizing water and sanitation as a

[15] The PVPNCA 2019 was repealed in 2021 and at the same time the Punjab Local Government (Amendment) Act 2021 established a new tier of local government called Village Councils, incorporating the main water, sanitation, and waste management functions of the panchayats prescribed in the PVPNCA 2019.
[16] The PLGA divides all of Punjab into Urban and Rural local areas, with the exception of areas that are notified as cantonments or are under active possession and direct control of the Armed Forces of Pakistan. All areas in a tehsil that are rural, i.e. not cantonments or notified as Urban local areas, are the responsibility of the TC.
[17] The Commission includes Ministers and Secretaries of all relevant departments—Local Government & Community Development (LG&CD), Housing Urban Development & Public Health Engineering, Irrigation Department, etc.—as members, while the Authority includes Secretaries of all relevant departments. Both bodies include experts in public health and water quality.

fundamental right, inclusiveness, appropriate resource allocation, multi-sectoral approach, engagement of women and other vulnerable community groups, and, finally, underpinning the Sustainable Development Goals (SDGs). However, more work is needed to clarify the division of responsibilities between these newly created institutions, and between them and existing government departments.

C. Relevance to Higher Level Objectives

21. **The proposed Punjab Rural Sustainable Water Supply and Sanitation Project (PRSWSSP) (the Project) is fully aligned with the Pakistan Country Partnership Strategy (CPS) for FY2015–FY2021.**[18] It most directly supports Results Area 4: Service Delivery. Specifically, it contributes directly to Outcome 4.2: Improved access to maternal and child health services and Outcome 4.4: Adoption of performance and transparency mechanisms in selected institutions. The World Bank program in Pakistan has been adjusted to respond to the pandemic (refer to Annex 1).

22. **The Project is also aligned with the higher-level objectives of the Federal Government and the GoPunjab**. Specifically: The Project will contribute significantly to Punjab's progress on SDG 6, "to ensure access to water and sanitation for all," specifically on targets 6.1.1, "proportion of population using safely managed drinking water services;" 6.2.1, "proportion of population using safely managed sanitation services;" 6.3.1, "proportion of wastewater safely treated;" and 6.b.1, "proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management." The Project will contribute to SDG 2 "to end hunger achieve food security and improved nutrition and promote sustainable agriculture," specifically on target 6.2.1, "prevalence of stunting among children under 5 years of age." The Project will address two of the high-level objectives of the National Climate Change Policy, namely, to ensure water security in the face of climate change and to promote conservation of natural resources and long-term sustainability. The Project objective is also aligned with Pakistan's Nationally Determined Contribution under the Paris Agreement as it promotes water conservation and optimization of water resource use.

II. PROJECT DESCRIPTION

A. Project Development Objective

23. **The project development objective (PDO) is *to provide equitable and sustainable access to safely managed water and sanitation and reduce child stunting***.

24. **PDO Level Indicators include**: (i) Number of beneficiaries provided safe drinking water in areas with high exposure to heat stress and water scarcity (6 million); (ii) Number of villages provided with wastewater treatment facilities that mitigate risk of fecal contamination of water resources in heat stressed and water-scarce areas by generating safe effluent (2000 villages); (iii) Percentage of households that have WHO quality drinking water at point-of-use (75 percent); (iv) Percentage of O&M costs covered through tariff collection (75 percent); (v) Reduction in the incidence of stunting among children aged 0–3 (40 percent).

[18] World Bank Group. 2014. *Islamic Republic of Pakistan: Country Partnership Strategy, 2015–2020*. (Report No. 84645-PK), discussed by the Executive Directors on May 1, 2014, and extended by the Performance and Learning Review (Report No. 113574), distributed to the Executive Directors on an absence-of-objection basis with a closing date of June 15, 2017. The bulk of project implementation will take place under the upcoming cobFY22–26, which is at an advanced stage of development. One of the CPF FY22–26 focus areas will be building Pakistan's human capital base, including a target of reducing stunting in children under five years of age through a multiphasic and multi-sectoral program that includes improvements in water and sanitation services. PRSWSSP is aligned with this area and contributes directly to the target.

B. Project Components

25. **The Project will combine infrastructure investments with a comprehensive behavior change communication (BCC) campaign and improved service delivery** to: (i) provide potable water through cost-effective and sustainable investments; (ii) provide safely managed sanitation facilities to reduce the total fecal burden in the village environment; and (iii) raise awareness and promote behavior change for better hygiene practices at the household and community level to promote health and ensure the sustainability and quality of the water source.

26. **The key implementation principles of this Project are**: (i) a needs-based approach towards resource allocation and geographic targeting; (ii) protecting groundwater from over-abstraction and contamination to conserve it as a sustainable resource in the face of population growth and climate change; (iii) professional service delivery to underpin infrastructure investments, sustained primarily by cost-recovery from beneficiaries and backed by provincial budget allocations as needed; (iv) robust community participation in all aspects of project implementation with a strong focus on women; and (v) better outcome tracking and greater transparency through a Management Information System (MIS) and a robust impact evaluation.

Component 1: Water Supply and Sanitation Infrastructure Development (US$477.7 million)

27. **Component 1 will finance infrastructure to help address the lack of WSS systems in rural Punjab that underlies the low access to safely managed water and sanitation and poses threats to public health and the environment**. Specifically, it will: (i) increase reliable access to treated piped water supply inside dwellings, with 100 percent metering to ensure sustainability; and (ii) increase access to safely managed sanitation, primarily by connecting household latrines to a network of covered sewers and by ensuring safe disposal of treated wastewater. During implementation, a customized approach will be developed for each village by an engineering design consultant based on the technical investment options study that considered variations in topography, demography, groundwater quality, and distance to freshwater sources, among others.

Subcomponent 1.1: Sanitation Infrastructure Development (US$298.7 million)

28. **Activities under this subcomponent will include upgrading existing sanitation systems through sub-projects with a focus on improving fecal waste collection, treatment, and disposal.** As described in Section I.B, the current sanitation systems in rural Punjab are largely inadequate and play a key role in the contamination of drinking water and the wider environment, contributing to fecal-oral transmission of harmful bacteria and the high incidence of childhood stunting. The proposed investments will mitigate these public health risks and also support climate change adaptation, notably by making wastewater systems more resistant to floods, thus reducing clogging and the spread of contaminants by floodwater. Based on an investment options study the following technical solutions will be preferred in most project villages, but the project will remain open to alternative technology options that are more feasible and suitable for specific locations:[19]

(a) **Fecal waste collection**. The Project will upgrade the sewage conveyance system through sub-surface closed conduits. Where an upgrade or installation of household toilets is required, beneficiary households are expected to undertake the investment themselves or through community support. For extremely poor households—those in the bottom decile—the Project will subsidize part of the expense. Existing open drains will be cleaned to remove waste and maintained for storm and flood water drainage only. This will have several climate resilience and public health benefits—the improved drainage capacity will reduce retention of flood water, while the separation of

[19] A typical Revenue village in Punjab consists of a main settlement (or sometimes two) and a smattering of smaller settlements. All main settlements in the project villages will benefit from Component 1. As many small settlements as possible will be included but most likely with a modified technical design to account for the remote locations and small populations. It is estimated that up to 8,000 small settlements will benefit from the project.

sewerage and open surface drains will prevent mixing of flood water with fecal waste.

(b) **Wastewater treatment**. For most project villages (about 90 percent), anaerobic baffled reactors (ABRs) will be suitable due to low construction and O&M costs, no daily operational requirements, low land requirements, and reliably consistent quality of effluent commensurate with provincial and national standards. Given the increasing threat of climate-change-induced flooding, the flood-resilient nature of this sealed concrete structure, which would safeguard community health by preventing the mixing of sewage and flood water, was a major consideration. For the remaining 10 percent of villages, other treatment options will be considered, with a strong preference for bio-trickling filters (BTFs). For settlements that are too small and/or too remote to be connected to a centralized treatment unit, a three-chamber septic tank was recommended by the investment options study. Oxidation ponds will be considered for villages where land availability and soil texture are favorable.

(c) **Sludge management**. Where ABRs are used, sludge drying beds will be attached to dry sludge and make it inert, safe for handling, and suitable for use as fertilizer. For villages where ABRs are not used, household or multi-household septic tanks will be provided for pre-treatment sludge settlement and separation. Standard operating procedures (SOPs) will be developed for the safe removal of fecal sludge and septic tank cleaning.

(d) **Final disposal or reuse**. Treated wastewater will be discharged to the same waterbodies that untreated wastewater is currently discharged to. In cases where untreated wastewater is currently being applied to agricultural fields—directly or via irrigation channels—it will be replaced by treated wastewater.

29. **While there will be some variation across project locations, all interventions in this subcomponent will conform to the following principles and objectives**: (i) the effluent does not exceed threshold limits defined by National Environmental Quality Standards; (ii) where treated wastewater is reused for irrigation, threshold limits defined by the Food and Agriculture Organization or an accredited body will be applied in the absence of any national laws; (iii) maintenance, monitoring, and management requirements are planned through professional service delivery units. The monitoring role of the community will be enabled through a behavior change and capacity building component.; (iv) existing informal systems, whereby wastewater and fecal waste are discharged to open drains and ponds, are upgraded to sewerage systems that collect, treat, and safely dispose fecal waste.

Subcomponent 1.2: Water Supply Infrastructure Development (US$179 million)

30. **Activities under this subcomponent will include upgrading the water supply conveyance systems through sub-projects by increasing household access to piped and metered supply of treated water and improving quality of public service delivery**. The objective is to upgrade rural drinking water sources which are vulnerable to a plethora of issues that undermine public health, environmental sustainability, and climate resilience, as described in Section I.B.

31. **All main settlements will be equipped with a water supply system comprising of underground supply mains/rising mains, overhead storage tanks, water treatment and water quality monitoring, a piped distribution network, and universal metering.** While some variation is expected, all water supply networks will conform to the following principles and objectives: (i) Water supply systems will ensure protected source points with filtration and disinfection arrangements to ensure WHO[20] recommended quality of drinking water with regular water quality monitoring; (ii) Rising mains in existing piped schemes may be rehabilitated and augmented to serve more people if the Project's service standards for reliability and quality can be met feasibly; (iii) Treatment will typically be restricted to filtration and chlorination, except for locations where water quality tests reveal unacceptable concentrations of contaminants that require more sophisticated treatment; and (iv) Estimates of safe groundwater yield coupled with the spatial spread of human settlements will determine how many users can be provided water from one abstraction point. The aim is to transition rural areas from existing scattered, unstandardized abstraction points with limited water

[20] National and provincial policies of Pakistan endorse WHO standards for drinking water.

treatment to consolidated, regulated sources that provide treated water. Though drawing from the same local aquifers, replacing unmonitored private pumps with communal schemes is expected not to require additional groundwater withdrawals on balance.

32. **The abstraction points for most village water supply systems will be set up on or close to the banks of irrigation canals, as the seepage from canals provides a reliable source of recharge for shallow groundwater**. The investment options study recommended that most schemes use skimming wells adjacent to irrigation canals. It is estimated that the drinking water needs of up to 25,000 existing users in the vicinity of such canals can be met from a single abstraction location, thus eliminating the need for private pumping by individual households and communities. Where this is not possible due to geographical or topographical factors, the Project will use other options. In selected locations, rainwater harvesting for groundwater recharge will be supported to ensure resource sustainability. For remote and small settlements piped networks may not be feasible, thus the Project will provide communal water collection points that adhere to the water quality and source sustainability objectives of the Project. Behavior change activities (Component 2) will play a key role in ensuring safe water and storage practices in these settlements.

33. **Financial sustainability will be ensured through a tariff structure that is based on the principle of balancing full cost recovery for O&M with social inclusion and water as a fundamental right**.[21] On average, a tariff of PKR 450 per household is estimated to be sufficient to finance operations and maintenance of water supply, sanitation, and waste management services, cover overheads of the service delivery units,[22] and contribute to its reserve fund. The high likelihood of households willing and able to pay this tariff is deduced from estimates of their current spending on a lower standard of water supply with no sanitation and waste management service, and indirectly through household health costs and lost income on account of morbidity linked to poor water and sanitation quality.

Component 2: Behavior Change and Capacity Development (US$16.1 million)

34. **This component will finance activities that facilitate and induce health protective behavior change and build community capacity to support WSS service delivery**. The behavior change communication (BCC) campaign will stress the importance of safely managed water and waste for health and economic wellbeing and the costs of inaction. It will focus on household and community actions for the prevention of infectious diseases, such as COVID-19, as well as bacterial infections caused by the poor management of water and waste. It will also promote the safe handling of water at the POU, animal and solid waste and wastewater management practices, water conservation, and community actions to enhance the sustainability and safety of source water. These are all expected to contribute to the reduction of disproportionate burden of care work provided by women. It will also convey and reinforce the importance of conserving and protecting water in the natural environment, especially groundwater, as a strategy for increasing resilience to periods of drought, which are projected to increase due to climate change, and adapting to gradually increasing water demand due to population and demographic changes and exacerbated by climate warming.

Subcomponent 2.1. Awareness Raising and Behavior Change Related to COVID-19 and Safe WASH Practices (US$8.6 million)

35. **Activities under this subcomponent will include:** (a) Supporting COVID-19 mitigation measures in rural Punjab including information on household and community actions to ensure physical distancing and basic hygiene; small-scale infrastructure to directly promote good hygiene practices; and jobs for unskilled and semi-skilled labor; and (b) designing and implementing water sanitation and hygiene information campaigns to increase community knowledge of and ability to sustain safely managed water and sanitation.

[21] The Punjab Growth Strategy recognizes water and sanitation services as a fundamental right "implicit under Article 9 of the Constitution of Pakistan."

[22] Please see III.A. Institutional and Implementation Arrangements.

36. **The COVID-19 mitigation activities include communication campaigns on hygiene practices** that reduce spread of infectious diseases; handwashing stations in public areas; widespread adoption of POU treatment of water to eliminate pathogens, including COVID-19; and monetization of tasks linked to water, sanitation, and waste management.

37. **WASH campaigns will be designed to increase communities' knowledge of and ability to sustain safely managed water and sanitation to prevent fecal–oral transmission through the five pathways: field, flies, fingers, fluid, food**. The key messages of the campaigns will focus on the environmental and health impacts of existing WASH practices and how specific behavioral changes can improve village hygiene, maximize individual health outcomes, and build community resilience to drivers of stress, including climate change. Messages from existing/past BCC campaigns on handwashing and defecation practices will be reinforced, and new content on maternal and child health and infant care and feeding practices, animal and solid waste management, and use of treated wastewater will be delivered. Information on cellphone-based participation in data generation and grievance registration will also be included.

38. **The Project MIS will be used to track progress of the campaigns and will include participant/household information to facilitate follow-up communication and feedback (See subcomponent 4.1 for details on MIS)**. This will support the move away from one-off behavior change events and towards sustained messaging.

Subcomponent 2.2: Training and Capacity Building of Village-level Institutions (US$7.5 million)

39. **Activities under this subcomponent will include providing training to targeted village-level institutions that have a defined role in water and sanitation service provision and in household and community behavior change**. These will be complemented by household behavior change but are distinct, in that they will build the capacity of informal village organizations (VOs)[23] to perform tasks that both complement and supplement the O&M responsibilities of the service delivery units established by the Project. Areas for capacity building will include solid and animal waste (see subcomponent 3.2 for details); observation-based monitoring of water, sanitation and wastewater infrastructure for signs of leakage, malfunction, contamination, etc.; coordination and communication with the Tehsil Office of the Punjab Rural Municipal Services Company (see subcomponent 3.1); community outreach; and data entry into MIS (see subcomponent 4.1). The Project's approach to village-level institutions is informed by past provincial experience.

Component 3: Service Delivery Improvement (US$42.3 million)

Subcomponent 3.1: Establishing Institutions and Building Capacity for Service Delivery (US$2.5 million)

40. **Activities under this subcomponent will include supporting the establishing and training of the WSS service delivery and project implementation arrangements, consisting of Punjab Rural Municipal Services Company Head Office (PRMSC)—serving also as the Project implementation and management unit[24]—PRMSC Tehsil Offices (PRMSC-TO), and community caretakers and operators (CCOs).** The details of these arrangements are provided in Section III.A.

Subcomponent 3.2: Solid Waste and Animal Waste Management (US$36.9 million)

41. **Activities under this subcomponent will include supporting waste management improvement through**: (i) promotion of separation followed by reuse, recycle, and disposal of residual solid waste; and (ii) reduced environmental contamination from animal fecal waste.

42. **Solid waste is a major source of fecal–oral contamination in rural Punjab and promoting safe solid waste management (SWM) is thus an integral aspect of the project design**. Poor SWM also contributes to contamination of

[23] Formal Village Councils are foreseen under the Punjab Local Government (Amendment) Ordinance 2021 but these have not yet been constituted. The project team will assess the status of Village Councils during the project mid-term review. If functional, capacity building will support them to execute their role in water supply, sanitation, and wastewater and solid waste management.

[24] PRMSC will be established by the Government of Punjab as a public company to provide rural water and sanitation services. "PRMSC" refers to the company in both its capacities, i.e. as the Project Implementation and Management Unit and as the provincial Head Office for rural WSS service provision. The accompanying text throughout the PAD clarifies which function of PRMSC is being referred to.

water resources, clogging up of flood water drains, and methane (CH4) and nitrous oxide (N2O) emissions. Without addressing SWM issues, the health and hygiene outcomes of the Project will likely be undermined as: (i) there is no waste separation at the household or village level; (ii) households dispose infant fecal waste into solid waste; (iii) there is no regular waste collection, which leads to accumulation of waste in settlements or water bodies; and (iv) even though solid waste collection and disposal is a local government responsibility, there are no mechanisms currently in place for its execution as a regular public service.

43. **The Project will support activities to improve SWM with the following objectives**: (i) Promote separation and safe disposal of solid waste. Key activities include minor infrastructure provision backed by robust behavior change to: separate organic, recyclable, and residual waste at household level; collect and compost organic waste using village sanitation workers; collect and transport residual waste to a secure village collection site; transport accumulated residual waste from village sites to a tehsil disposal site through PRMSC-TO trucks; and training of village organizations to promote and monitor SWM practices by households. (ii) Facilitate recycling of waste. It is common practice in rural Punjab for hawkers to periodically collect (or purchase) metals, paper, plastic, and glass from households to sell them in bulk to small production units and factories. Where this informal arrangement does not exist, the VO will promote it to collect recyclables. (iii) Prevent disposing of waste in water bodies. The Project will ensure that the village collection site for residual waste is not near surface water bodies or storm-water drains, in a shallow groundwater region, or in places prone to flooding during heavy rain spells. The composite impact of improved SWM will be a substantial reduction in solid waste inside settlements and water bodies and drains, which will decrease impact of flooding by reducing retention of flood water.

44. **Poorly managed animal fecal waste is also a major source of bacterial contamination of the environment**. In rural Punjab, it is common for households to own and/or keep ruminants and poultry inside or adjacent to dwellings, which leads to a concentration of animal waste very close to humans and fecal—oral transmission of pathogens. This can potentially jeopardize the health and hygiene outcomes of the Project.

45. **The Project will support behavior change with minor goods/equipment to improve animal waste management at the household level**. Given the widespread use of animal waste for fuel and manure, safe handling at the household level will likely be the option preferred by most owners of livestock. However, subject to community willingness, the Project will pilot communal management of animal waste to produce manure for agricultural use. Many of the fecal–oral routes can be disrupted by robust and recurring behavior change complemented by trainings for village-level institutions. Working in cooperation with non-governmental organizations (NGOs) already active in the field, these will include: (i) separation of areas where animals are kept from areas where infants crawl/play; (ii) protocols for handwashing after handling animals as well as the cleaning of shoes and the protection of clothes; (iii) equipping households with scoopers for waste removal; (iv) tarp sheets to cover animal waste stored outside for drying.

Subcomponent 3.3: Water Quality Monitoring (US$3 million)

46. **Activities under this subcomponent will include supporting a program for regular and frequent water quality monitoring in project areas for both drinking water supply and wastewater**. The current practice consists of infrequent water quality studies at the provincial or district level. Under the Project a program for regular water quality testing will be supported in every project tehsil. The program will be routed through the PRMSC and TOs but will engage a reputed institute with adequate capacity for sample collection and testing against agreed water quality parameters. For drinking water these will typically include pH, E. coli, total dissolved solids, and turbidity, and for wastewater these will typically include pH, biochemical oxygen demand (BOD), total suspended solids (TSS), and chemical oxygen demand (COD). Other parameters such as heavy metals, pesticide residue, and nitrates will be added for specific locations based on results of baseline tests. In addition, a third-party water quality audit will be performed at frequent intervals. For E. coli, BOD, TSS, and COD testing will be required every quarter, but for others, like arsenic, annual testing will likely suffice. The results

of all testing will also be reflected in the online public inter-face of the MIS system for community review and monitoring.

Component 4: Project Management and Monitoring (US$16.9 million)

Subcomponent 4.1: Project Monitoring through a Customized Management Information System (US$3.7 million)

47. **Activities under this subcomponent will include developing a comprehensive IT-based MIS to track project implementation progress, water supply and sanitation service delivery performance, the flow of public and donor funds earmarked for water, sanitation and hygiene and related financial management (FM) information, and outcome indicators**. A key feature of the MIS will be a focus on the role of the community in the monitoring on all project-related activities. Robust community engagement has been shown to build capacity for oversight and monitoring of service providers, improve service quality and ensure transparency in the use of budgets at the local level.[25] The interface of the MIS will be web-based and user-friendly and allow for real-time monitoring by government and the public of key outcomes including WSS service delivery, water quality tests, financial flows, and project implementation progress. In addition to project and service monitoring, the MIS will contribute to a robust impact evaluation of the Project (see Section III.B).

48. **MIS and impact evaluation will collect personal data and personally identifiable information**. To prevent abuse of data, data privacy issues will be handled in line with international best practices as well as Pakistan's constitution, which recognizes the right to privacy under Article 14 (1). A proposed Personal Data Protection Bill is expected to create a legal framework for data protection in Pakistan. In the meantime, a framework for data protection will be a key part of the project operational manual (POM), specifying data protection principles including limiting data collection to required information, seeking consent and informing data subjects of the intended use, providing an opportunity to correct information, restricting access to data and ensuring its safe storage, data anonymization prior to analysis, and so on.

49. **A grievance redress mechanism will be established at all levels according to the guidelines specified in the Environmental and Social Management Framework (ESMF)**. It will be a multitiered system that includes village, tehsil, and provincial grievance level implementation mechanisms. The system will receive complaints by phone, email, WhatsApp, and SMS. The grievance redress system will be fully integrated into the MIS, with a built-in escalation feature for complaints that remain unresolved at the PRMSC-TO level. The PRMSC will use the MIS to monitor complaints and complaint redressal patterns to ensure that there is no preferential treatment of certain villages or households over others driven by non-technical factors. This will ensure equity and reduce elite capture of services. The World Bank (WB) also offers a Grievance Redress Service (GRS) as described in Section IV.C.

Subcomponent 4.2: Strengthening of the PRMSC (US$ 13.2 million)

50. **Activities under this subcomponent will include providing training and consulting services to support strengthening of the PRMSC to execute Project implementation and management functions, with a focus on financial management, contract management, procurement, monitoring and evaluation (M&E), safeguards monitoring and compliance, and sector-specific technical capacities**. The PIMU will be led by a full-time Project Director. This subcomponent will focus on strengthening PRMSC for project management, while capacity building for its functions as a service delivery unit will be supported by subcomponent 3.1.

C. Project Beneficiaries

51. **The Project will target districts in Punjab that are the poorest and have the worst outcomes on child stunting, access to and quality of sanitation infrastructure, and bacterial contamination of drinking water**. These indicators are

[25] Mansuri, Ghazala, and Vijayendra Rao. 2013. "Localizing Development: Does Participation Work?" Policy Research Report, World Bank.

represented in an index of need developed by the WB and the GoPunjab's Concept Development Group (CDG) notified for the Project. The index ranked all districts in south, central, and north Punjab. Within each region the districts with the worst outcomes were selected, with 50 percent of the districts drawn from south Punjab and 25 percent each from central and north Punjab. Within each district, the most disadvantaged tehsil was chosen, and all its villages included in the Project.[26] Table 1 provides the list of selected districts and tehsils, with some characteristics.

Region	District	Tehsil	District rank within region	Tehsil rank within district	Population (2017)	Rural population (2017)	Proportion of population that is rural (2017)	No. of rural villages (2017)	Rural HH's (2017)
North	KHUSHAB	NOORPUR THAL	1	1	243,295	223,452	92%	87	37,922
North	MIANWALI	ISA KHEL	2	1	375,026	290,316	77%	64	41,828
North	SARGODHA	KOT MOMAN	3	1	453,562	387,860	86%	117	59,990
North	CHAKWAL	KALLAR KAHAR	4	1	169,660	125,857	74%	60	23,469
Centre	BHAKKAR	DARYA KHAN	1	1	360,807	280,441	78%	94	46,838
Centre	PAKPATTAN	PAKPATTAN	2	1	969,225	792,532	82%	317	130,240
Centre	CHINIOT	BHOWANA	3	1	374,270	340,193	91%	105	53,858
Centre	JHANG	AHMAD PUR SIAL	4	1	433,517	365,892	84%	99	54,206
South	RAJANPUR	ROJHAN	1	1	405,774	391,280	96%	88	54,958
South	RAHIM YAR KHAN	LIAQATPUR	2	1	1,035,509	983,520	95%	572	140,445
South	D.G.KHAN	TAUNSA	3	1	675,756	578,656	86%	196	79,054
South	LODHRAN	KAROR PACCA	4	1	500,939	394,655	79%	102	62,463
South	BAHAWALPUR	KHAIRPUR TAMEWALI	5	1	262,628	221,208	84%	107	35,616
South	MUZAFFARGARH	ALIPUR	6	1	639,748	595,299	93%	124	86,290
South	BAHAWALNAGAR	BAHAWALNAGAR	7	1	815,143	621,101	76%	238	101,148
South	MULTAN	SHUJA ABAD	8	1	609,631	529,596	87%	83	82,311
		TOTAL:			**8,324,490**	**7,121,858**	**85%**	**2,453**	**1,090,636**
		TOTAL with Pakpattan & Liaqatpur at 50%:			**7,322,123**	**6,233,832**	**85%**	**2,009**	**955,294**

Table 1 Number of villages, households, and total population in selected project tehsils

52. **Overall, the Project is expected to cover approximately 2,000 Revenue Villages and serve a population of 6.65 million of the most deprived citizens of Punjab**. In addition to fully covering the most disadvantaged tehsil in each project district, between 10–20 villages that are close to the project tehsil area, but administratively outside it, may also be covered, subject to the availability of funds and approval from the Project Steering Committee (PSC) (see Chapter III: Implementation Arrangements). The Project will support this expansion of coverage in the three worst performing districts as per the index. In DG Khan district, the recently approved tehsil Koh-e-Suleiman will also be included since it was created partly from Taunsa tehsil.[27] However, the overall project limit of 2,000 villages will continue to apply, requiring a potential adjustment of village coverage in both Taunsa and Koh-e-Suleiman.

53. **A typical Revenue Village comprises one or more large settlements and some scattered, small, and remote habitations**. Often only the large/main settlements benefit from public WASH investments, even in programs that claim "blanket" coverage of villages. PRSWSSP will provide customized infrastructure and services to both large and small settlements to ensure that the poorest and remotely located residents are not left behind. It is estimated that the 2,000 villages will include a little over 2,000 main settlements and 8,000 small settlements.

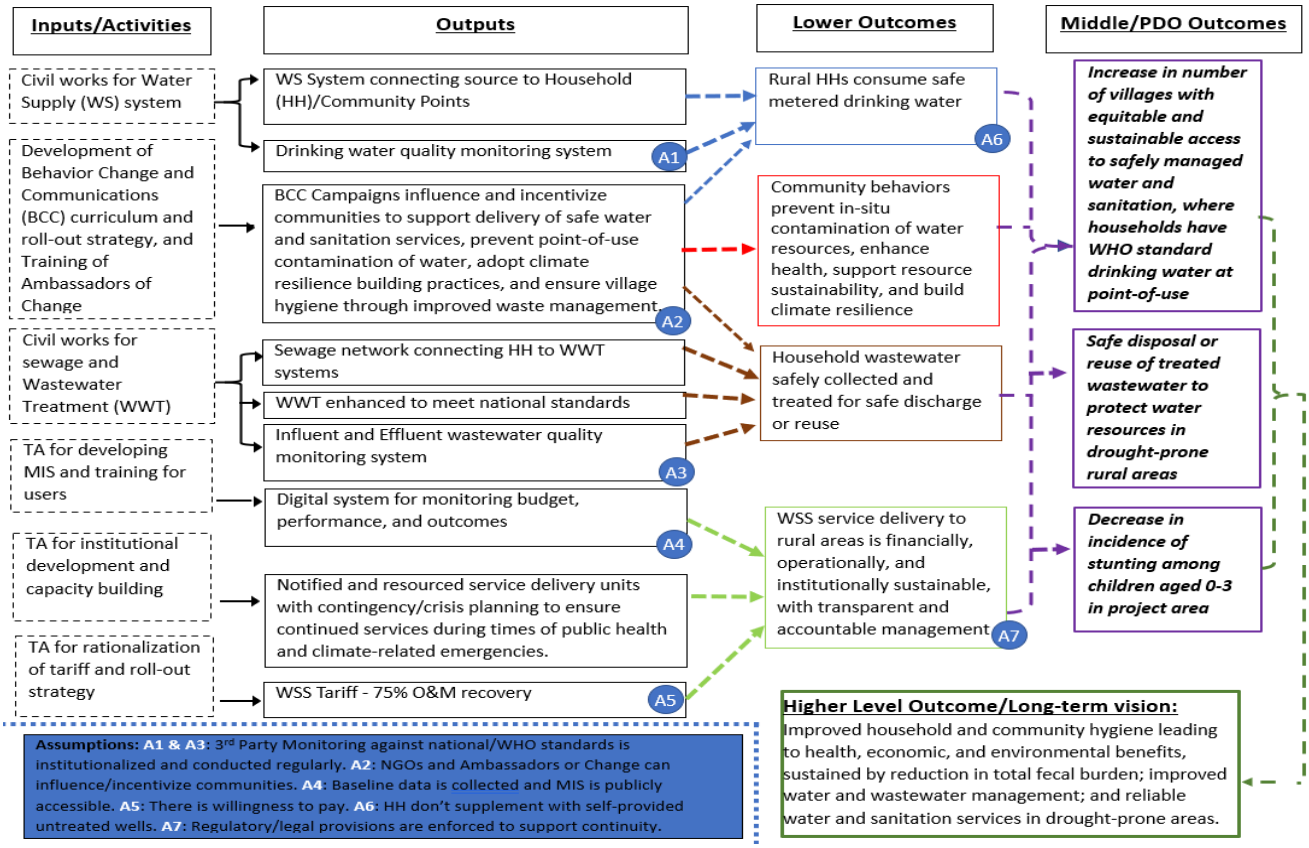
54. **Direct project beneficiaries are expected to realize significant reductions in the cost of health care and in lost productivity and income due to illness and childhood stunting**. The treatment of fecal waste and the resulting removal of bacterial pathogens from water bodies and the environment will also have downstream health and environmental

[26] Two tehsils—Pakpattan and Liaqatpur—will be partially covered (about 50 percent) due to the uncharacteristically large number of villages in each of them.

[27] The Baluch Area of DG Khan was declared an Excluded Area, in the Ministry of States and Frontier Regions Notification No. D-2162-F/50, dated 17 April 1950. Due to its recent change in status to a Tehsil of district D.G. Khan, it was not featured in previous MICS and PSLM surveys and therefore, could not be included in the project's index of need due to unavailability of data on relevant metrics. It is included in the project as an exception due to its composition, which includes villages that were formerly a part of tehsil Taunsa, which was already ranked as the most deprived tehsil of D.G. Khan by the index.

benefits. Typically, in Punjab, untreated wastewater is drained into freshwater bodies—rivers, ponds, lakes, aquifer, etc.—which are a water source for downstream communities. The Project will therefore also create positive externalities for those who use canal water downstream from project tehsils.

D. Results Chain



E. Rationale for Bank Involvement and Role of Partners

55. **The WB is working closely with the Federal and provincial governments to support their development vision**. Human capital accumulation is particularly important to sustained growth and protection from future risks. The WB report *Pakistan@100: Shaping the Future* recommends investment in early childhood development for long-term outcomes such as improved educational attainment, increased labor productivity, and sustained growth. As mentioned in the Section I.B, poor WASH services in rural Punjab drive high stunting rates among children under five with life-long impacts in the form of lower educational attainment and labor productivity. Moreover, WASH-linked health issues lead to increased household expenditures on care as well as lost work and education days. The outcomes of the Project are thus a critical step towards higher human capital accumulation and more sustainable development in Pakistan.

56. **The proposed Project will work closely with partners who have been working in the province of Punjab**. These include international organizations such as UNICEF and Water Aid; civil society organizations and NGOs, and umbrella organizations such as the National Rural Support Program and the Pakistan Poverty Alleviation Fund, both of which work closely with many government programs. The Project will also work with renowned government bodies such as the Pakistan Council of Research in Water Resources, National Agriculture Research Centre, and National Institute of

Health. The team will also coordinate with the Punjab Human Capital Investment Project (P164785), which is supporting improvements in maternal and child nutrition and health services, educational facilities, and economic inclusion in 11 districts of Punjab, all of which are part of PRSWSSP.[28]

F. Lessons Learned and Reflected in the Project Design

57. **The intellectual impetus for the Project was provided by the World Bank Pakistan WASH Poverty Diagnostic Report**.[29] In the report, Pakistan's lack of progress on child stunting, despite a decade and half of steadily declining poverty, an increase in dietary diversity and a halving of the open defecation rate, were linked to the chronic underinvestment in rural sanitation and wastewater treatment. A recent consensus paper echoes these findings with "a call for transformative WASH [that is] a comprehensive package of WASH interventions […] that is tailored to address the local exposure landscape and enteric disease burden."[30] The project design and objectives were also informed by other studies and reports. Most significantly: *Pakistan: Getting More from Water*; *Groundwater in Pakistan's Indus Basin: Present and Future Prospects*; and *Localizing Development: Does Participation Work?*[31]

58. **The Project has also incorporated lessons regarding the benefits of women's participation in decision making**. The design of behavior change and capacity building under Component 2 and the emphasis on participation of women is informed by the experience from rural Pakistan that social mobilization efforts empowering women can have important knock-on effects on the performance of public health service providers, WASH related behavior change, and the allocation of public budgets.[32]

59. **The Project's approach to structuring tariff and flow of tariff money is based on lessons learnt from Public Health Engineering Department (PHED) executed schemes in the 1990s and Tehsil Municipal Administration service delivery post-2001 devolution**. An Asian Development Bank (ADB) evaluation report[33] showed that efforts to improve tariff collection by the PHED showed encouraging results initially but eventually stumbled as the revenue went to the provincial (and after 2001, to district) exchequer. The PHED remained dependent on provincial transfers that do not reflect cost recovery efforts or O&M requirement. The institutional arrangements of PRSWSSP ensure that the tariff collected stays within the PRMSC, with close to 95 percent of the revenue remaining within the PRMSC-TOs account to fund O&M and emergency repair work. Studies have also shown that community infrastructure built with support from NGOs[34] have a higher survival rate because of upfront O&M planning backed by in-house engineering staff.

60. **As part of project preparation, the project team and the GoPunjab's Concept Development Group undertook an exposure visit to the Zhejiang Rural Water Supply and Sanitation Project in China**. The PRSWSSP design, specifically

[28] Specifically, PHCIP task team will finalize their selection of Union Councils within districts to maximize overlap with PRSWSSP locations; both projects will coordinate the content of their respective behavior change campaigns to ensure the messages on WASH, nutrition, and public health are reinforced; and PRSWSSP will provide water and sanitation infrastructure only to schools and Basic Health Units that are not covered by PHCIP.
[29] Mansuri, Ghazala, Mohammed Farhoah Sami, Muhammed Ali, Hang Thi Thu Doan, Bilal Javed, and Priyanka Pandey. 2018. "When Water Becomes a Hazard: A Diagnostic Report on the State of Water Supply, Sanitation and Poverty in Pakistan and its Impact on Child Stunting." WASH Poverty Diagnostic Series Report, World Bank Group, Washington, DC.
[30] Cumming, Oliver et al. 2019. "The Implications of Three Major New Trials for the Effect of Water, Sanitation and Hygiene on Childhood Diarrhea and Stunting: A Consensus Statement." *BMC Medicine* 17 (173). https://doi.org/10.1186/s12916-019-1410-x.
[31] Young, William J., Arif Anwar, Tousif Bhatti, Edoardo Borgomeo, Stephen Davies, William R. Garthwaite III, Michael E. Gilmont, Christina Leb, Lucy Lytton, Ian Makin, and Basharat Saeed. 2019. "Pakistan: Getting More from Water." World Bank, Washington, DC; Lytton, Lucy, Akthar Ali, Bill Garthwaite, Jehangir F. Punthakey, and Basharat Saeed. 2021. "Groundwater in Pakistan's Indus Basin: Present and Future Prospects." World Bank, Washington, DC; Mansuri, Ghazala, and Vijayendra Rao. 2013. "Localizing Development: Does Participation Work?" Policy Research Report, World Bank.
[32] Please refer to Impact Evaluation of "Mobilization for Empowerment (MORE)" project, which was implemented by the Pakistan Poverty Alleviation Fund, with its partner NGO, the National Rural Support Program, as a randomized field experiment in 150 villages. In one half of treated villages, an inclusion mandate required that at least 40 percent of the membership of all community and village level decision making bodies was female.
[33] Asian Development Bank. 2009. *Impact of Rural Water Supply and Sanitation in Punjab, Pakistan*. Reference Number: IES: PAK 2009-26.
[34] For example, the Agha Khan Rural Support Program and the National Rural Support Program.

the technical design of sanitation systems and the institutional design of the PRMSC, incorporates a number of lessons learned from this visit that the CDG agreed are replicable in Punjab.

61. **As part of project preparation, a technical investment options study was commissioned to compare different technology options for water and sanitation investments given village characteristics**. The study used a representative sample of 30 villages from across the project areas and mapped the learnings to the 2,000 villages included in the Project with indicative cost estimates. This study has informed the design of Component 1.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

62. **The Project will be steered by a Project Steering Committee (PSC) headed by the Chairman, Planning & Development (P&D) Board, GoPunjab**. The PSC will be the provincial coordination platform for the Project on behalf of the GoPunjab. The committee will consist of Secretaries of LG&CD, PHED, Irrigation, Environmental Protection, and Health departments, the Head of the Nutrition and Stunting Cell, and selected high-level representatives from academic and civil society organizations with a track record of working in the WSS sector in Punjab. The PSC will meet once every six months to be briefed by the PRMSC on the state of project implementation. Any higher-level compliance issues with the legal and financing agreements with the WB will also be discussed in this forum. PSC will also approve the inclusion of additional villages, subject to the Project's principles for selection, agreed between the Bank and the GoPunjab.

63. **To ensure continued oversight after project closure, the PSC is expected to approve a District or Divisional Steering Committee**.[35] This committee will be briefed on locally specific aspects of service delivery by the TCs with support from the PRMSC. The DSC will meet every six months to ensure that there are no significant disparities in service delivery across all tehsils in the region, facilitate cross-learning between PRMSC-TOs from different tehsils, review successes and bottlenecks in the delivery of services in the project tehsil(s), and develop plans for the next tehsil in the division or district where the Project's service delivery model should be scaled.

64. **The Punjab Water Resources Commission and the Punjab Water Services Regulatory Authority (PWSRA) were created by the Punjab Water Act 2019**. However, neither is currently fully operational. The GoPunjab and WB have agreed that once in place, the service delivery structure of the Project will align itself with the provisions of PWA and the PRMSC will receive a license to become an "undertaker" for water and sanitation services in project tehsils. This will provide additional oversight, with a focus on service quality, resource sustainability, fair pricing, and equity.

65. **At the implementation level, the service delivery model of the Project consists of three tiers**: (i) the provincial Head Office of the PRMSC, which will be set up as a self-sustaining public company for rural WSS service delivery; (ii) PRMSC-TOs that will on the frontlines of service delivery; and (iii) CCOs that may be part of VCs, VOs, or just village residents (Figure 1).

66. **The PRMSC will also serve as the PIMU during the life of the Project**. The setting up of this company will be an important institutional milestone for rural WSS service delivery and its timely establishment will ensure that the institutional strengthening and capacity building can begin before any other component/subcomponent commences. During the Project it will perform typical project management functions including fiduciary, safeguards, contract management, M&E, and coordination function, and simultaneously build capacity to serve as a WSS service provider for rural Punjab. Its service delivery functions will continue after the Project closes.

[35] In the administrative setup of Punjab, a Division typically consists of 3–5 Districts and is governed by a Commissioner. Each District in a Division is governed by a Deputy Commissioner. There are currently 9 Divisions in Punjab. The Government of Punjab has not yet decided which tier it wants to engage for this long-term oversight role.

67. **The PRMSC-TOs will be responsible for operating and maintaining the WSS assets built under the Project, coupled with ensuring that reliable WSS services are delivered to consumers and their complaints promptly addressed**. They will be sustained through tariff collection, with initial financial support from the Project. The Project will continue to provide technical assistance and capacity building till project closure with a focus on making the PRMSC-TOs professional, consumer-centric, and transparent. The Project will also support development of SOPs for both regular operations and emergencies, such as climate-induced disasters and pandemic or security related lockdowns. The PRMSC-TOs will be housed at the TC offices[36] and will have 6–12 permanent staff (depending on the size of the tehsil) that undertake routine monitoring visits to villages and are first responders to complaints and equipment malfunction/breakdown. For tasks that require specialized equipment and expertise, the PRMSC-TO will outsource to private providers (individuals or small firms). The PRMSC-TO staff is expected to have the capacity to resolve routine technological problems but tasks that require specialized equipment and expertise will be outsourced to private providers (individuals or small firms) in the tehsil.

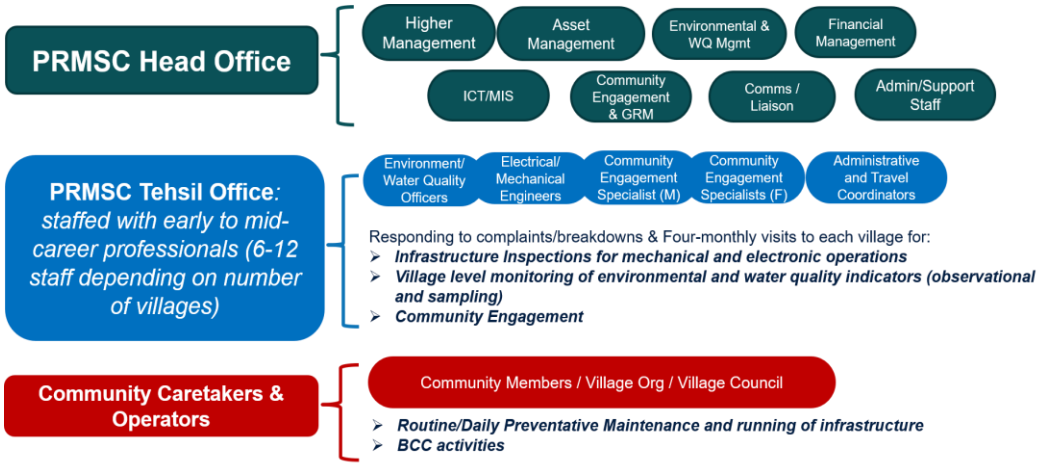


Figure 1 Service delivery model under PRSWSSP

68. **CCOs will be village residents that perform day-to-day tasks that do not require technical knowledge or skills**. This will include activities such as switching pumps on/off at agreed times, opening ABR valves at agreed times, ensuring that infrastructure is not tampered with. The CCOs will be the PRMSC-TO's liaison with each village to ensure infrastructure is functional, consumers are satisfied, and tariff is being collected. They will provide observation-based monitoring to support the O&M of village schemes by looking out for unusual sounds and smells coming from infrastructures, visible signs of physical damage, signs of leaking pipes and overheating pumps, and so on.

69. **The role of VCs—once they are operationalized through elections as per the Punjab Local Government Amendment Ordinance 2021—has also been elaborated**. Informal VOs will perform these support functions until formal VCs are in place. In addition to support to O&M of infrastructure, these VOs will also support the Project by: (i) collecting in-person community feedback periodically; (ii) ensuring the functionality of household toilets and presence and evidence of use of soap for handwashing by conducting monitoring visits on a random basis to check the status; (iii) maintaining a hygienic environment within the village through activities focused on solid and animal waste; (iv) ensuring 100 percent tariff collection through persuasion and follow-up to prevent the involvement of PRMSC-TO and TC, which would lead to a penalty or disconnection; (v) monitoring the grievance redress system in the MIS related to the operations and maintenance of water and sanitation infrastructure, including whether it is used by consumers (or if not, why not); (vi) facilitating social mobilization, especially for reinforcing messages from the behavior change campaign.

[36] The Tehsil Administration from every project tehsil has given written consent to house the PRMSC-TO and cooperate with them for service delivery and tariff collection.

70. **The Project supports the recent devolution and encourages Public Private Partnerships and Private Sector Participation**. In Component 1 a private engineering firm will be hired to prepare customized designs for each project village as per the options study and social and technical field surveys. In addition, an innovation and business design (IBD) firm will be hired to participate in the initial infrastructure roll out to assess the performance of the technologies used and propose appropriate innovations and improvements to increase the efficiency of future systems. This is particularly important for the sanitation subcomponent, given the technology-lite nature of existing wastewater treatment in rural Punjab. For Component 2, local NGOs will be involved to act as social mobilization delivery vehicles for the Project and LG&CD. Component 2 will also support the outsourcing of services related to capacity development such as social mobilization techniques, development of information, education, and communication materials, and carrying out training needs assessments. Component 3 of the Project requires PRMSC-TOs to engage and work with private contractors for O&M, including repair, regular maintenance, and water quality testing.

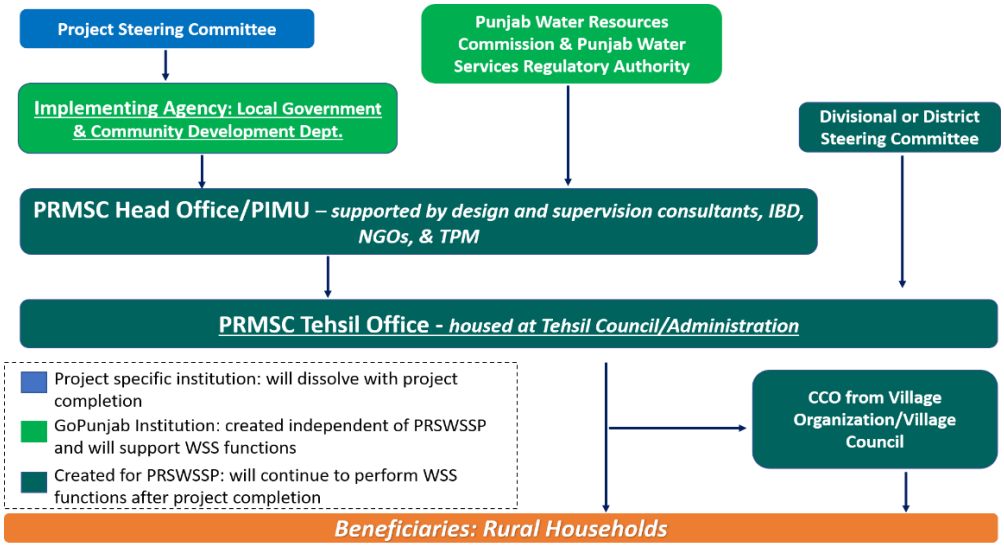


Figure 2 Institutional and implementation arrangements and transition to post-project service delivery

71. **A Third-Party Monitor (TPM) will be engaged to ensure financial accountability and compliance with technical standards by contractors that undertake infrastructure construction**. This will involve random verification of a sub-sample of submitted financial claims along with a verification of the specifications and quality of materials, equipment, and other inputs. This function may be supported by the District Steering Committee as well.

72. **Implementation Schedule**. Development of the MIS (subcomponent 4.1) and the strengthening and capacity building of the PRMSC (subcomponent 3.1) will commence upon project effectiveness to ensure that institutional arrangements are in place prior to commencement of village-level operations. In terms of village-level activities, the Project will employ a phased rollout, thus not all project villages will receive investment at once. The phased approach offers many benefits with regard to procurement, M&E, and contract supervision. Within each phase, villages will be randomly selected under the robust evaluation design of the Project, with cognizance of the fact that in some cases clusters of villages would need to be selected instead of individual villages for technical reasons Within each selected village, behavior change and awareness raising (Component 2) and solid and animal waste management (subcomponent 3.2) activities will precede infrastructure investments (Component 1). This sequencing will ensure village readiness in terms of sustainable hygiene practices, capacity to undertake community monitoring, and willingness to pay tariff, before infrastructure upgrades are done.

B. Results Monitoring and Evaluation Arrangements

73. **The M&E arrangements are designed to credibly demonstrate the impact of project investments and serve as a model for good evaluation and monitoring**. The MIS outlined in Section II.B will collect a range of health statistics that are trackable within villages. Data will be collected by trained female village residents. The Punjab Human Capital Investment Project (P164785) is building the capacity of lady health workers (LHWs) in 11 districts of PRSWSSP and it is expected that in those locations data collection by LHWs will be robust enough to support M&E for PRSWSSP with project-trained women in support roles. The MIS will also track indicators related to water quality monitoring for both drinking water and post-treatment effluent from the waste-water treatment plant. The MIS will thus be the backbone of the results monitoring framework. It will provide large-scale, real-time data that will be used to ensure the Project is progressing as designed, problems are resolved, and necessary course corrections are undertaken in a timely way. The capacity building component will ensure that the capacity to input data and use the MIS is systematically built at all levels.

74. **Underlying this core monitoring system is a randomized impact evaluation design**. The design uses two features of the project rollout: (i) all villages in a selected tehsil will participate in the Project over its lifetime. By randomizing village rollout across years the villages that rollout last can serve as controls for the villages that rollout first; (ii) villages in the second highest ranking tehsil in each selected district can also serve as controls for a regression discontinuity design evaluation, which would mimic a randomized design since we know the odds of selection precisely.

75. **A baseline survey will be conducted in all project tehsils**. This survey will have three components:

(a) A listing survey which will collect core geo-coded data on all households in project tehsils, including cell phone numbers. This data will also be used to populate the household level interface in the MIS.

(b) A village level survey that will provide information on WSS, hygiene, animal and solid waste management practices etc. in the village at baseline. All existing village infrastructure will be mapped, and a photo record of village conditions will be taken. Surface, ground, and sewage water quality and crops will also be tested.

(c) A detailed multi-purpose household survey. This will be undertaken in a subset of villages in each tehsil. In each selected village, a subset of households will be interviewed. The data collected will include information on: (i) household demographics; (ii) income, employment, assets, and poverty; (iii) WSS infrastructure in the household, payment for WSS, attitudes towards payment for WSS services, level of satisfaction with existing services, testing of source and POU water, and testing of soil etc.; (iv) existing health conditions, costs of health care, knowledge about the health costs of unsafe water and sanitation, knowledge of COVID-19 mitigation measures, impact of COVID-19 on household health; (v) adult anthropometrics; (vi) child module—child's birth weight, anthropometrics, vaccinations, supplementation, care practices, diarrhea prevalence; (vii) maternal birth histories, ante- and post-natal care received, knowledge of child-care and feeding practices; (viii) women's role in household and village decision making, participation in income earning activities and other metrics of empowerment; (ix) household practices around solid and animal waste; (x) dietary diversity and quality.

76. **The baseline survey will be followed by two midline panel surveys, which will follow up with the same households 2.5 and 5 years into project implementation and an endline survey, which will take place in the last year of project implementation**. These will track outcomes for the same villages and households. The midline and endline surveys will also include detailed modules on satisfaction with the WSS services provided by the Project and tariffs. The underlying randomization will allow not just the surveys but also the MIS, and all other administrative data to contribute directly to the impact assessment, in addition to its use for the day-to-day management of the Project.

C. Sustainability

77. **The Project will achieve sustainability by establishing a professional service provider (PRMSC), emphasizing cost-recovery, achieving community ownership, as well as a durable, locally appropriate infrastructure design**.

78. **The first layer of sustainability is linked to the establishment of PRMSC-TOs for O&M**. Key O&M responsibilities include infrastructure maintenance, timely repair and replacement of hardware, effective response to consumer complaints, billing and collection, and monitoring of water quality and service parameters. These functions of the PRMSC-TOs will replace the traditional model in Punjab of "handing over" schemes to communities for O&M.

79. **The second layer of sustainability is linked to making the PRMSC-TOs sustainable entities**. This includes a capacity building trainings to boost competence and professional performance, and a strategy for tariff setting and collection that ensures financial sustainability of PRMSC-TOs. The MIS will enable the monitoring of the PRMSC-TOs' performance and accountability. To facilitate the legal mandate for monitoring of WSS services, the MIS in its entirety will be accessible to the LG&CD Department and the PWSRA. For public accountability and to build trust between beneficiaries and the PRMSC, the MIS will have a public interface with key performance and outcome indicators.

80. **The third layer of sustainability is linked to community ownership**. Participation of community members and assignment of roles to village level institutions will supplement professional services provided by the PRMSC-TO, to ensure accountability, and to follow routine practices that achieve the long-term health, economic, and environmental objectives of WSS service provision. This will include village level oversight to identify and address service shortfalls. The Project will support village-level trainings to facilitate these community and village-level institutional functions.

81. **Finally, the institutional and behavioral aspects of sustainability will be reinforced by a resilient and sustainable infrastructure design**. Project financed systems will aim to protect water resources and ensure environmental sustainability with regard to wastewater disposal, which are critical in a region marked by chronic water stress. The water source for the infrastructure in project villages is groundwater abstracted from sites adjacent to the banks of unlined perennial irrigation canals. Seepage from these canals contributes the majority of recharge to groundwater, a situation that is not likely to change while the use and management of the canal network remains unchanged. Recent tests conducted on existing irrigation wells confirm that the water table drops less than three feet after 10 hours of pumping. Further, the engineering design parameters, including diameter of borewells, power of motorized pumps, number of pumps for a scheme, and distance between pumps, will be based on estimates of sustainable groundwater yield determined during the detailed design stage of each scheme. For wastewater treatment, the infrastructure and its operating procedures will be designed to meet effluent quality targets that comply with National and Provincial Environmental Quality Standards. This will ensure that wastewater disposal does not cause environmental harm to receiving waterbodies or soil. These five layers of sustainability will ensure that project outputs and outcomes are institutionally and environmentally sustainable, and responsive to identified climate change risks.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic, and Financial Analysis

82. **The Project draws on a wealth of evidence that demonstrates that fecal contamination of the environment is a primary reason behind child stunting**. E. coli contaminated water, soil, household surfaces, solid and animal waste, and shared public spaces make fecal–oral transmission of pathogens highly likely, creating the perfect circumstances for environmental enteropathy.[37] Avoiding ingestion of enteric pathogens by infants and young children, including those from animal waste, can prevent most of the environmental enteropathy burden.[38] The World Bank WASH Poverty Diagnostic for Pakistan demonstrated that in rural Pakistan the lack of wastewater treatment, negligible investment in safe sanitation, and poor drinking water quality indicate a high level of exposure to enteric pathogens. This has hindered progress on child stunting despite a large decline in extreme poverty, a reduction in open defecation, and significant

[37] Environmental enteropathy is a chronic subclinical intestinal disease that causes malabsorption and maldigestion of nutrients.
[38] Mbuya, Mduduzi, and Jean H. Humphrey. 2016. "Preventing Environmental Enteric Dysfunction Through Improved Water, Sanitation and Hygiene: An Opportunity for Stunting reduction in Developing Countries." *Maternal and Child Nutrition* 12 (1): 106–20.

improvements in nutritional diversity and curative health services. The Project is designed to reduce fecal contamination caused by infrastructure gaps and unhygienic behavior, so that the burden of environmental enteropathy on rural communities in Punjab can be reduced. There is also broad consensus, which is echoed by WHO, that the provision of safe water, sanitation, and hygienic conditions is essential to protecting human health during all infectious disease outbreaks, including COVID-19.[39]

83. **The Project components are designed to deliver integrated water and sanitation services in a sustainable manner in order to prevent contamination of the environment and thereby mitigate common channels for fecal–-oral transmission**. The activities proposed under Component 1 will ensure that adequate infrastructure is in place to prevent human fecal waste from contaminating village water resources and public spaces, and that drinking water is safe for human consumption. The infrastructure will be made sustainable through professional tariff-based WSS service delivery to households, provided by tehsil field-level offices of the PRMSC strengthened by the implementation of Component 3. The suite of services will also include solid waste collection and disposal. Component 2 will ensure that household and community behaviors do not undermine sustainable public provision of safely managed water and sanitation services, that other sources of contamination such as solid and animal waste are managed safely, and that there is sufficient capacity to sustain and monitor hygienic behaviors. Component 4 on project management and monitoring is integral to monitor the performance of key institutions, ensure transparency and accountability, and measure outcomes over the life of the Project and beyond. The successful integration of all four components is critical to sustain a closed hygiene loop. Past rural WASH investments have largely been stand-alone water supply schemes that suffered from a high rate of dysfunctionality (in rural Punjab, about one-third are completely dysfunctional) and have made no significant contribution to improving health and environmental outcomes.

84. **The Project's technical design is based on best available technologies and lessons learned from sustainable design innovations, which have been further customized to the physical, cultural, and environmental context of Punjab**. First, sources of water are designed to be dependent on seepage from local irrigation canals that provide a continual source of supply of predictable quality. Service delivery upgrades through multi-village connectivity will reduce costs due to economies of scale. Second, cost-effective technologies are proposed that will comply with national environmental quality standards. These include ABRs for the vast majority of villages, and BTFs for some. These technologies are easy to operate, require negligible O&M, and can be operated day to day in a low-capacity context. Third, the service delivery model to be implemented under the Project is transformative: the PRMSC will be a publicly owned company governed by an independent Board, with a mandate to collect tariffs to ensure professional and financially sustainable service delivery. The financial sustainability and autonomy of the PRMSC will ensure that it continues providing services, including both O&M and necessary upgrades and systems repairs, in perpetuity. At the same time, the tariff structure has been designed to ensure that poor households are able to pay the bill with ease. Fourth, an end-to-end SWM plan is coupled with income generation from recyclables and conversion of food and green waste into compost for agricultural use. Residual waste will be disposed of at government specified sites.

85. **The Project design also increases climate resilience and contributes to greenhouse gas (GHG) emission reductions in project locations**. All project districts are classified as high exposure for extreme heat and water scarcity on ThinkHazard in line with model projections on the WB's Climate Knowledge Portal. The project design ensures that there is reliable access to treated drinking water that is abstracted sustainably in these water-scarce and drought-prone areas. Further, the Project protects localized groundwater resources, which serve as a buffer during droughts, from fecal contamination through its infrastructure and behavior change investments in safe sanitation and waste management. The cleaning up of surface drains and separation of sewage and solid waste systems also improves flood drainage and will reduce the retention of flood water in habitations and thus increases flood resilience. It will also prevent mixing of

[39] Cooper, Rachel. 2020. "Water Security Beyond Covid-19." K4D Helpdesk Report 803. Brighton, UK: Institute of Development Studies.

sewage and solid waste with flood water. The treatment of sewage and management of solid waste will also reduce CH4 and N2O emissions. Finally, the service delivery model enables a more flexible response to extreme weather events.

86. **The complex and integrated nature of investments will deliver water security, public health, and environmental outcomes, which will be evaluated against a combination of higher-level outcome indicators and intermediate outcome or output indicators**. The higher-level outcomes will be evaluated by tracking the number of beneficiaries that receive reliable access to safe drinking water; the number of villages that enjoy reduced environmental contamination due to wastewater treatment and fecal sludge management; water quality improvement at point-of-use through treatment and better household practices around water handling, sanitation, and hygiene; a financially sustainable service delivery mechanism will be assessed by how much of its operational expenses are covered by tariff recovery; and a reduction in the incidence of stunting among children aged 0–3 will be measured through the impact evaluation as well as the continuous child growth monitoring implemented by the female ambassadors of change in collaboration with LHWs. The Project will track outcomes, service delivery satisfaction and quality, and intermediate outcomes through the MIS. The grievance redress system in the MIS will also monitor PRMSC's customer service performance, the engagement of village level personnel for SWM, and the number of households that have received metered water connections.

87. **Benefit-cost analysis.** The economic returns from the Project have been assessed using available data on the aggregate impact of poor quality water and sanitation on adult and child health, infant mortality, health care costs and the economic costs of lost productivity, measured in terms of Disability Adjusted Life years (DALYs) and benefits from overall reduction in Greenhouse Gas Emissions. This is complemented by the direct costs paid by households in terms of electricity bills for water abstracted from household tube wells and pumps, payment for health care and income lost due to illness days. The analysis indicates the average benefit-cost ratio (BCR) of the Project is 7.6[40] with a minimum BCR of 6.9 and a maximum of 7.9. On average, the project cost is about US$443 per household and the average benefit per household is US$3,369. The detailed analysis is provided in Annex 4.

88. **Implementation Capacity Assessment.** While the new local government legislation is a landmark achievement that clarified the assignment of functions for the lower tiers of governance, it has also created an implementation gap. In Punjab, administrative tiers of district and tehsil government are functional but the transition to elected well-performing local bodies under the new Local Government Act will take time. Moreover, although the LG&CD department possesses prior experience of working with multilateral agencies, it has skill inadequacies in several areas and unoccupied staff positions. Many of these constraints can be addressed by adding some staff from GoPunjab's Public Health Engineering Department, which has staff with some key needed skills in the design and construction of infrastructure. Although a significant proportion of WSS infrastructure became dysfunctional, this was less related to capacity gaps than a lack of transparent procurement, lack of a robust O&M mechanism, and, in certain cases, lack of adequate capital allocation to ensure infrastructure quality. The prior experience of the local government department of managing a public-owned company—the Punjab Municipal Development Fund Company (PMDFC), created with the support of a WB-funded project—will also be utilized to fast-track the similar institutional arrangement under this Project.

89. **The Project is addressing the above concerns by creating a strong PIMU at the provincial level with 16 tehsil-level field offices to provide services to rural households**. The PRMSC is being registered as a public company with the Securities and Exchange Commission of Pakistan to execute this role.[41] The LG&CD department has already benefitted from interactions with the PMDFC and is preparing to duplicate its successful experience in the rural water and sanitation domain. This institutional setup is expected to be sustainable by project closure due to continuous capacity building during the Project's lifetime, combined with the collection of a tariff that ensures financial viability. PRMSC and TOs will

[40] Discount rate of 7% is assumed. Using discount rate of 7.5%, the average BC ratio is 7.1.

[41] All project implementation, service delivery, and capacity building aspects of this project linked to PIMU will be executed by the PRMSC.

have experienced staff coming from the PHED/LG&CD department or the market on a competitive basis. PRMSC will procure most staff through project procurement guidelines in the first 6–9 months of implementation. Issues related to procurement principles, O&M, and lack of resource allocation have also been addressed through the Project design. LG&CD has already assigned a Project Director committed to complying with Bank procurement guidelines. O&M will be financed through the tariff-model embedded in the institutional arrangement. It has been agreed with GoPunjab that tariff adjustment will be periodically considered, in accordance with published inflation rates in order to cover future O&M requirements. Adequate resources have been allocated based on the investment options study and the Bank team will ensure satisfactory designs and construction quality during implementation. A well-designed capacity development program has also been embedded to train a range of stakeholders under the Project. To address remaining implementation challenges, the Project will draw on the expertise of experienced NGOs, consultants, and contractors for specialized tasks or complex infrastructure development.

B. Fiduciary

90. **Financial Management**. The PRMSC will be responsible for managing and overseeing the FM arrangements of the Project. Tehsil Offices established at TCs in all targeted tehsils have minimal basic FM functions. The FM arrangements are satisfactory for meeting the requirements of Bank Policy for Investment Project Financing (IPF) effective October 1, 2018 (see Annex 3). An assessment of PRMSC's FM arrangements concluded that PRMSC will maintain FM arrangements that will be acceptable to the Bank, and that as part of the overall arrangements in place for implementing the Project, provide reasonable assurance that proceeds of the credit will be used for the purposes for which they are provided. The respective government department will manage the Project until the newly established PRMSC is fully functional as a public sector company. The Project will be a part of the GoPunjab's annual development budget. The New Accounting Model (NAM), which includes the Chart of Accounts prescribed by the Auditor General of Pakistan, will be used for the Project. External audit for the Project will be conducted by the acceptable auditors and the audit report and Management Letter will be submitted to the Bank within six months of the close of financial year (by December 31).Disbursements will be based on a bi-annual cash forecast provided in the bi-annual interim unaudited financial reports (IUFRs) prepared and submitted by PRMSC within 45 days of the end of six months. The Project will open and maintain two Designated Accounts (DA) – one for IBRD and the other for IDA funds. All payments of the Project shall be centralized at the PRMSC.

91. **Procurement for investment project financing will be carried out in accordance with the WB's Procurement Regulations** for Borrowers for Goods, Works, Non-Consulting and Consulting Services dated July 1, 2016, and revised November 2017, August 2018 and November 2020 (Procurement Regulations). The Bank's rules apply to the entire budget line, not merely that part financed by the Bank. The Project will be subject to the WB's Anticorruption Guidelines, dated October 15, 2006, and revised in January 2011 and July 2016. The Borrower is currently implementing the Punjab Cities Program (PCP; P156972) funded by the WB and Punjab Intermediate Cities Improvement Investment Project (PICIIP), funded by the Asian Development Bank (ADB), both of which have established Project Management Units (PMUs) that undertake procurement for their respective project. The PMUs of these two projects have staff with well qualified professionals recruited from the market and government on competitive basis. The PICIIP PMU is undertaking the planning and design phase of PICIIP-Phase 2 that focuses on the Water Supply, Sanitation, and Solid Waste Management services in cities of Punjab. The Borrower also has experience of Punjab Cities Governance Improvement Project (PCGIP) in implementing WB guidelines and the staff is well versed in applying the Punjab Procurement Rules (PbPR) 2014 and have a preliminary understanding of harmonized international guidelines. The borrower has undertaken multiple National Water Supply and Sanitation schemes and a few international funded projects such as Pakistan's approach to total sanitation and Khadim-e-Punjab Rural Sanitation Program (KPRSP). The Borrower has adequate experience to undertake the Project with the help of the WB and the PRMSC. The PRMSC, as referred above, would immensely benefit from the established coordination and implementation mechanisms that have evolved over the years between various project implementation entities and various government departments. Moreover, as a result of earlier

projects, there are corps of qualified and experienced individuals that will serve as a talent pool for the PRMSC and the GoPunjab will explore the possibility of seconding some qualified and experienced staff to PRMSC.

92. **The PRMSC will ensure that procurement is in accordance with core principles and procedures stated in World Bank Procurement Regulations.** A Project Procurement Strategy for Development (PPSD) has been prepared with support from the WB. Project procurement will cover goods, works, and consultancies (both firms and individuals). There is a large component of sanitation infrastructure development (installation of BTFs and ABRs), services for engineering, design and supervision, behavior change and capacity development, condition survey, sampling and hydrologic studies, and development and management of the MIS. In addition, the Systematic Tracking of Exchanges in Procurement (STEP) system will be used to prepare and manage the procurement plan and procurement transactions. The procurement plan will be updated semiannually (or as required) using the STEP system. The implementing entity will nominate at least two staff as STEP users.

C. Safeguards

93. **Environmental Safeguards**: An ESMF was developed that included an assessment of the potential negative environmental and socioeconomic impacts of the Project. The safeguards category is assessed as B and the Project triggers Operational Policy 4.01 on Environmental Assessment. The overall environmental impact of the Project's investments will be positive. The Project supports the provision of WASH services that will lead to a healthier and improved environment in project areas besides reducing diarrheal diseases attributed to poor WASH conditions. However, some adverse environmental impacts are also anticipated as a result of implementation of some of the activities proposed in Component 1, such as laying of water supply and sewerage systems, and sewage treatment facilities (ABRs, BTRs, oxidation ponds etc.). Most of the adverse environmental impacts are anticipated to arise during the construction stage and will be related to soil and water contamination due to improper project siting, improper disposal of waste, contamination of open irrigation water channels to be used as a source, excavation and digging of trenches for laying pipes, excessive noise related to use of construction machinery, vehicular movement, and operation of generators. Health and safety issues are also anticipated due to improper handling of construction machinery, unprotected deep excavation, and not complying with the COVID-19-related SOPs/guidelines. Similarly, some adverse impacts envisaged during the operation phase may include health and safety issues if chlorine is used for water treatment/disinfection and it is stored, applied, or handled improperly; and possibility of bad smell and breeding place for mosquitos if the wastewater treatment facilities are not properly operated. Most of these impacts are, however, moderate, temporary, site specific, reversible, not unprecedented, and can be avoided, reduced, or mitigated through better engineering design/practices and applying simple and cost-effective mitigation measures.

94. **The ESMF has identified potential environmental impacts in implementing project activities and suggested generic mitigation measures**. The ESMF also provides guidance on the institutional set up, capacity building, and compliance monitoring requirements to implement safeguard documents. Additionally, it is worth mentioning that mitigating the adverse environmental and health impacts for likely water contamination is inherently in-built in the project design. ESMF monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. See the ESMF for further details.

95. **OP 7.50 Projects on International Waterways is triggered since the Project is situated in the Indus basin and relies on the waters of the Indus basin aquifer and the Indus River, which is an international waterway**. The exception to the notification requirement under paragraph 7 (a) of the Policy applies as project activities will be limited to rehabilitation and upgrading of existing water supply schemes to ensure safe provision of water. Combined with the sanitation and drainage system upgrades, the net effect on water quality will be positive and activities are not expected to increase groundwater abstraction. Thus, the Project will not adversely impact other riparians. The exception to the notification requirement was approved by the South Asia Regional Vice President on March 31, 2021.

96. **Social Safeguards**: The Project will finance civil works related to sanitation and water supply schemes and there is a potential for land acquisition. Small parcels of land—preferably government owned or communal, sometimes private property—will be needed. Right of way might be required through agricultural fields in cases where the water source is located away from the POU. Hence, OP 4.12 on Involuntary Resettlement is triggered to provide guidance on Bank standards on land acquisition, involuntary resettlement, restrictions on land use, or impacts on livelihoods from such restrictions/acquisition. For any land requirements under the Project, voluntary land donation will be the preferred mechanism. A Resettlement Planning Framework is part of the ESMF and contains relevant procedures and documentation requirements.

97. **At the village level, project-related infrastructure is likely to involve small-scale firms or informal contractors, which often face labor and occupational health and safety related challenges in Pakistan**. These include absence of social security benefits, unsafe working conditions, workplace accidents, below minimum wage payments, and use of child labor. The Government of Punjab has developed laws on child labor, minimum wage and occupational safety and health. The Project activities will have measures in place to adequately protect children from child labor, including the minimum age for work and hazardous work.

98. **The mentioned concerns have been evaluated by conducting a social assessment for the Project, as part of the ESMF developed by the LG&CD department**. The ESMF also identifies generic mitigation measures for the social impacts. It also provides a criterion for social screening of each sub-project, based on the land acquisition/resettlement impacts on households. The screening would lead to adopting an appropriate SG document. All EMPs/ (SG documents) will become an integral part of relevant Bill of Quantities/bidding document(s). See the ESMF for further details.

D. Gender

99. **The absence of significant investment in the treatment of drinking water and safe management of fecal waste has a disproportionately greater impact on women's health and quality of life.** Women devote extensive hours daily to collect clean water, household and care work, and other responsibilities dependent on water availability and usage. Women and girls aged 10 and over, spend 19.9 percent of their time on unpaid care and domestic work compared to 1.8 percent spent by men.[42] At the same time women lose disproportionately more time than men to water-borne and gastrointestinal diseases resulting from these routine activities.[43] Improved access to water and wastewater services reduces the time women need to spend on household chores and frees up time for greater investment in education and productive employment. Data indicates that poor sanitation infrastructure and practices are linked to a number of water-borne diseases such as diarrhea, cholera, dysentery, typhoid, and hepatitis.[44] These also often affect children, resulting in an mortality rate of 11 percent for children aged under five as well as significantly contributing to child stunting. The incidence of stunting and disease in children further adds to women's time poverty due to the burden of caregiving. It is also important to note that existing water and sanitation facilities in public spaces, such as health clinics, schools, and markets, typically do not ensure safe and sanitary access for women. The time poverty gap is exacerbated by the lack of effective representation of women in decision-making bodies at the village and institutional level.[45] For instance, despite 33% reservation for women in local governance, studies have found that women are not able to participate in decision making because of limited opportunities, low literacy and limited awareness of their roles. Within the household,

[42]. *https://data.unwomen.org/country/pakistan.*
[43] Yasar, Abdullah, Nuzrat Yar Khan, Ammara Batool, and Amtul Tabinda. "Women's Perception of Water Quality and its Impacts on Health in Gangapur, Pakistan." *Pakistan Journal of Nutrition* 10 (7): 702–6.
[44] PDHS 2017-18
[45] Dr. Aaqib Shahzad Dr. Alvim Aaqib, Rana Imran Ahmed, Ayesha Ahmad, (2020) "Level of Women's Political Empowerment in Local Government System: A study of Female Cousnselors in District Sargodha," *Pakistan Social Sciences Review.* Shah, Iqtidar Ali; Aziz, Arshad; and Ahmad, M. Shakil (2015). Women Councilors for Women's Empowerment in Pakistan. Journal of International Women's Studies, 16(3), 203-219. Available at: http://vc.bridgew.edu/jiws/vol16/iss3/14

gender gaps exist in decision making as well.[46]

100. **In line with the project's overall design, to address the gender gaps of higher time poverty among women, the project will combine infrastructure investment with BCC campaign targeted at women.** Instrumental in addressing the time poverty gender gap is strengthening women's voice and agency. Evidence and experience suggest that including women in project design and implementation is critical to bridging gender gaps. The Project will support women's decision making, voice, and agency by including at least 50 percent representation of women in new VOs and by reviving and upgrading existing VOs to have the same level of representation, and by increasing the share of VOs led by women. By engaging the women participants and leaders in the VOs in planning processes, the project will prioritize and respond to women's needs in its infrastructure investments.

E. Climate Co-benefits

101. **The main climate change vulnerabilities (identified in Sections I and II) are an increase in frequency of flood events, increase in likelihood of drought events, and climate warming and its projected impact on water demand.** The sections also highlight the contribution of poor SWM and wastewater management to Pakistan's GHG emissions. See Annex 2 for drivers of climate vulnerability and GHG emissions, and the Project's intent to address.

102. **The total estimated net GHG emissions for the Project over its economic lifetime are -3,678,690 tCO_2-eq, which represents significant net emission reductions**. The net average annual emissions are -147,148 tCO_2-eq, while the gross emissions are 3,406,390 tCO_2-eq (details provided in Annex 2).

F. Citizen Engagement

103. **The project design includes a robust and sustained engagement with village communities, most significantly through Components 2 and 3, which will be the first to get rolled out**. As described above, the focus of both Components 2 and 3 will be on engaging women and building their capacity to act as agents of change in their village. There is evidence of the success of such efforts, when done well, in the context of rural Pakistan, to deliver lasting improvements in inclusion, citizen engagement, empowerment of women, quality of public health service delivery, and in aspects of child and maternal health that can be addressed through improved public health. A key channel for citizen engagement will be the MIS for which large volumes of personal data and personally identifiable information are likely to be collected. The Project's approach to data protection is provided in subcomponent 4.1.

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

V. KEY RISKS

105. **Overall Risk Rating (Substantial)**. Key risks and mitigation measures are described below.

[46] Women participate less in decision making within the household. For example, while 50.5% women make decisions related to own health care and 44% on household purchases, 88.5% men make decisions on own health care and 82.5% on household purchases. DHS, 2017

106. **Political and Governance (Substantial)**. The government is keen to invest in rural WSS sector as part of its political mandate, however a legacy of unclear institutional roles exists. Assignment of full responsibility to LG&CD through recent legislation is yet to be tested on the ground. Delay in elections or inter-governmental transfers to the lower tiers could hamper progress of the newly conceived local government system. To address these issues, an apolitical and professional institution is being constituted with offices at the tehsil level and an oversight committee is proposed at the district or divisional level. Even if local elections do not take place as called for under the PLGA or are delayed, the existing Tehsil Administrations will be adequate to house the PRMSC-TOs and project implementation will proceed unaffected. A Steering Committee is proposed to allow multiple departments to work in an integrated manner. These arrangements will ensure project implementation even if elections are delayed.

107. **Macroeconomic (Substantial)**. These risks stem from recent deterioration in the macro-fiscal situation due to the COVID-19 crisis in Pakistan. Early effects are felt through decreased allocation towards development projects. Slow GDP growth and the economic crisis have led to unemployment, affecting the poor and vulnerable, predominantly in rural areas. It is anticipated that government interventions to manage the financial crisis will improve the situation. Project resources will support development and free up government resources and generate local employment.

108. **Institutional Capacity and Sustainability (Substantial)**. While LG&CD is a key department of the GoPunjab, it has not implemented projects in rural areas with multilateral agencies. Its human resource capacity in rural settings has limited experience of construction and lacks the capacity to prepare and implement technical designs. For example, in the past, sanitation-related public works focused only on open drains in village streets with no provision of fecal sludge solutions. The Project will engage consultancy firms and contractors to enhance the quality of work and strengthen PRMSC-TOs through the provision of key staff to ensure sustainability of infrastructure and customer-oriented services. A key risk to institutional sustainability is low-cost recovery by PRMSC through tariff collection on account of non-payment by customers and political opposition to tariff imposition. Both factors have been considered in project design. GoPunjab, through the PWA, acknowledges that service providers will need to charge tariff for provision of services, and the Act details a process for addressing non-payment of tariff. PRSWSSP will address non-payment in alignment with this process. Further, tariff collection has been a pillar of the dialogue with the Client throughout preparation and has been agreed to by both administrative and political wings of the government—Tehsil Administrations, LG&CD, P&D, Provincial Cabinet, Provincial Development Working Party, Central Development Working Party, and the Punjab Chief Minister.

109. **Fiduciary (Substantial)**. FM risk is Substantial as the implementing agency's FM capacity is weak. The geographical area is not contiguous, and the beneficiaries are scattered, thus requiring 16 field offices for service delivery to individual households. The accounting records and ledgers maintained at the department and tehsil level are manual. The capacity of the FM staff at the department level is also relatively weak. To mitigate the FM risks, PRMSC will engage dedicated FM staff. The FM capacity of these PRMSC staff will be strengthened by training and other necessary regular guidance by the Bank FM team. All payments of goods work and services shall be made centrally by the PRMSC (Head Office) after the required verifications, including from the field and monitoring departments. Until the company is fully functional, the respective local government shall support project activities with dedicated staff. With regard to Procurement, the implementing agency does not have experienced staff related to procurement and lacks understanding of Bank procedures and guidelines. The project envisages appropriate staffing at the provincial and tehsil level will mitigate residual risk to moderate

110. **Environmental and Social (Moderate)**. The policy and regulatory regime for environmental management and protection are well defined through the Provincial Environmental Protection Agency as the regulatory institution. The Project will hire and retain a dedicated Environmental Specialist and a Social Development Specialist at PRMSC and environment and social officers at PRMSC-TOs to adopt the guidance provided in the ESMF. Further, the ESMF by design excludes any potential Category A-type sub-project (E1-Subprojects per the ESMF screening criteria).

VI. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Pakistan

Punjab Rural Sustainable Water Supply and Sanitation Project

Project Development Objectives(s)

The project development objective is to provide equitable and sustainable access to safely managed water and sanitation and reduce child stunting.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	End Target
Reduction in the incidence of stunting			
Reduction in the incidence of stunting among children aged 0-3 (Percentage)		37.00	22.00
Number of beneficiaries provided safe drinking water in areas with high exposure to heat stress			
Number of beneficiaries provided safe drinking water in areas with high exposure to heat stress and water scarcity (Number)		0.00	6,000,000.00
Revenue Villages with wastewater treatment facilities that generate safe effluent			
Number of Revenue Villages with wastewater treatment facilities that mitigate risk of fecal contamination of water resources in heat stressed and water-scarce areas by generatinge safe effluent (Number)		0.00	2,000.00
Percentage increase in water quality at point-of-use			
Percentage of households that have WHO quality drinking water increase in water quality at point-of-use (Percentage)		35.00	75.00

Indicator Name	PBC	Baseline	End Target
O&M costs covered through tariff collection			
O&M costs covered through tariff collection (Percentage)		0.00	75.00

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	End Target
Water Supply and Sanitation Infrastructure			
Drinking water tested by a third-party on a quarterly basis, in all project schemes. (Number)		0.00	2,000.00
Water Supply and Sanitation Infrastructure			
Waste effluent quality tested by a third-party on a quarterly basis, in all project schemes. (Number)		0.00	2,000.00
Behavior Change and Capacity Building			
Female Ambassadors of Change trained for social influencing and behavior change in every village (Number)		0.00	2,000.00
Behavior Change and Capacity Building			
Behavior change trainings delivered in all project villages with women as the primary beneficiaries (Number)		0.00	1,000,000.00
Reduction of gap between women and men in average time lost per year from routine activities due to waterborne and gastrointestinal diseases in the family (Percentage)		100.00	80.00
Reduction of gap between women and men in average time spent with household workloads (including fetching water to the household) (Percentage)		100.00	80.00
Service Delivery Improvement			

Indicator Name	PBC	Baseline	End Target
Village level staff employed for street cleaning/solid waste collection (Number)		0.00	4,000.00
Project Management			
Digital open access MIS established for tracking fund flows, service delivery and project outcomes for all project villages (Number)		0.00	2,000.00
Project Management			
Customer service delivery complaints and grievances addressed within stipulated time (Percentage)		0.00	80.00
Behavior Change and Capacity Building			
Reduction in the incidence of diarrhea among children aged 0-5 (Percentage)		17.00	10.00
Village Organizations created or strengthened to promote WASH-friendly community behaviors, led by a woman - 20% share increase compared to baseline (Number)		0.00	2,000.00
Number of households with metered water supply			
Number of households with metered water supply (Number)		0.00	800,000.00

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Reduction in the incidence of stunting among children aged 0-3	Child stunting measured as height for weight (HAZ) among children 0-36 months, born in a program	4 times	Surveys done as part of the Impact Evaluation of	Child anthropometrics measured through household surveys	PRMSC/PIMU through the Impact Evaluation

	village, after the water and sanitation infrastructure is in place, as compared to similar age children born at the same time in program villages that have not yet received the infrastructure- under the randomized rollout of program villages in program tehsils. Total reduction expected is 40 percent.		the project: Baseline in 2021, Midline 1 in 2024, Midline 2 in 2026 and Endline in 2028		
Number of beneficiaries provided safe drinking water in areas with high exposure to heat stress and water scarcity	6 million people in 2000 revenue villages provided with safe water for drinking	3 times during the project duration	Project MIS	MIS linked to household water connections, billing and drinking water quality audits 4 times a year	PRMSC/PIMU
Number of Revenue Villages with wastewater treatment facilities that mitigate risk of fecal contamination of water resources in heat stressed and water-scarce areas by generatinge safe effluent	Number of villages that have fecal sludge management solutions treating wastewater before disposal	Continuos	Project MIS	MIS linked to household sanitation connections, billing and effluent water quality audits 4 times a year	PRMSC/PIMU
Percentage of households that have WHO quality drinking water increase in water quality at point-of-use	35% population has safe water at the point of use. This will increase to 75% within the project villages	4 times a year	Project MIS	MIS linked to point of use water quality audits 4 times a year	PRMSC/PIMU
O&M costs covered through tariff collection	O&M costs for running water and wastewater systems will be raised through household tariff.	Monthly	Utility bills	Computerized billing record and/or MIS linked to computerized billing record	PRMSC/PIMU

	The remaining part will come through Tehsil budgets				

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Drinking water tested by a third-party on a quarterly basis, in all project schemes.	Water quality of village tested at source and at point of use within the household	Every three months	Third party assessment	Water quality test done with laboratories	PRMSC/PIMU
Waste effluent quality tested by a third-party on a quarterly basis, in all project schemes.	Effluent quality tested on a quarterly basis at the point of village discharge	Every three months	Third party	Effluent quality test done with laboratories	PRMSC/PIMU
Female Ambassadors of Change trained for social influencing and behavior change in every village	Local village social mobilizers trained which includes 70% women	Continuous	Project MIS	MIS data entry by trained women in villages	PRMSC/PIMU
Behavior change trainings delivered in all project villages with women as the primary beneficiaries	I million women trained for various aspects	Continuous	Project MIS	MIS data entry by trained women in villages	PRMSC/PIMU
Reduction of gap between women and men in average time lost per year from routine activities due to waterborne and gastrointestinal diseases in the family	The indicator will measure the reduction of gap between women and men in terms of the time lost (days/year). The project baseline will capture the time lost in terms of 'days	4 times	Baseline in 2021, Midline 1 in 2024, Midline 2 in 2026 and Endline in	Measured through household surveys using the standard methodology	PRMSC/PIMU

	per year' for both men and women separately. The subtraction of the two times (days/year) will become the gap between the two genders, that will qualify as 100% value of this indicator. Similarly, project End-line will also measure the same gap between the two genders which will qualify as the end-target achieved by the project. The IO indicator aims to bring a 20% net reduction in the difference of time (days/year) between the two genders from baseline to end-target date.		2028, household surveys and data collection done as part of Impact Evaluation		
Reduction of gap between women and men in average time spent with household workloads (including fetching water to the household)	The indicator will measure the reduction of gap between women and men in terms of the average time spent (days/year) with household workloads (including fetching water). The project baseline will capture the time lost in terms of 'days per year' for both men and women separately. The subtraction of the two times (days/year) will become the gap	4 times	Baseline in 2021, Midline 1 in 2024, Midline 2 in 2026 and Endline in 2028, household surveys and data collection done as part of Impact	Measured through household surveys using standard methodology	PRMSC/PIMU

	between the two genders, that will qualify as 100% value of this indicator. Similarly, project End-line will also measure the same gap between the two genders which will qualify as the end-target achieved by the project. The IO indicator aims to bring a 20% net reduction in the difference of time (days/year) between the two genders from baseline to end-target date.		Evaluation		
Village level staff employed for street cleaning/solid waste collection	Each village organisation or panchayat employs staff to clean streets and/or collect solid waste. The project will promote employing local women, where possible.	Continuous	Annual reports of village organisations /panchayats and baseline/Project MIS - complimented with Impact Evaluation surveys at 4 points	MIS data entry by trained women/village committees in villages; Community Surveys as part of the Impact Evaluation	PRMSC-TO's and PRMSC/ PIMU

Digital open access MIS established for tracking fund flows, service delivery and project outcomes for all project villages	A centralized MIS dashboard updating village-level data	Established in FY22, in the first year of project implement ation	MIS hardware system installed	Continuous	PRMSC/ PIMU
Customer service delivery complaints and grievances addressed within stipulated time	WSS Service Delivery Unit address complaints as tracked in the MIS	Continuous and during implement ation supervision missions	Project MIS - complement ed by Impact Evaluation to assess satisfaction with service quality and SDU-TO responsivene ss	Project MIS linked to grievance redress system	PRMSC/ PIMU
Reduction in the incidence of diarrhea among children aged 0-5	Diarrhea incidence measured over two-week period before each survey	4 times	Surveys done as part of the Impact Evaluation of the project: Baseline in 2021, Midline 1 in 2024, Midline 2 in 2026 and Endline in	Measured through household surveys using the standard methodology	PRMSC/ PIMU

			2028		
Village Organizations created or strengthened to promote WASH-friendly community behaviors, led by a woman - 20% share increase compared to baseline	The project will make an attempt that at least 50 percent of the members of all village organizations that are formed or strengthened are women in addition to increasing women-led VOs by 20% from baseline	On a rolling basis as villages enter the project cycle through the randomized rollout. This will be done as part of community mobilization and behavior change	Project MIS / Impact evaluation surveys	Data entry by trained village women / Household and community surveys	PRMSC-TO and PRMSC/PIMU
Number of households with metered water supply	All households provided with meters	4 times	Project MIS/ Impact evaluation surveys	MIS linked to computerized billing record / Household and community surveys	PRMSC-TO and PRMSC/PIMU

ANNEX 1: Adjusting the Pakistan Country Program in Response to COVID-19

1. **As of May 2, 2021, Pakistan reported 829,933 total confirmed COVID-19 cases and 18,070 deaths**. Since the pandemic was first detected in February 2020, the country has experienced a first wave that peaked at around 7,000 cases in June 2020, a second that peaked at around 4,000 in early December 2020 and is now experiencing a third wave with 4,414 recorded on May 2. The Government has initiated a national vaccine roll-out and as of April 14, 2.1 million doses had been administered.

Country Response to the COVID-19 Pandemic and World Bank Group Support

2. **The Government at both Federal and Provincial levels responded early to the outbreak of COVID-19 and put in place containment measures when the number of confirmed cases reached 1,000**. National lockdown measures put in place in March 23, 2020 were replaced by localized measures and adaptive decision making in response to the dynamics of the pandemic. In response to detection of the variant first discovered in the UK in February, and the resulting rapid increase in cases, Federal and sub-national authorities have introduced stringent lockdown measures. The pandemic and the lockdown measures have had an impact on the economy as well as the administrative and legislative abilities of government.

3. **The World Bank Group's engagement in Pakistan is guided by the Country Partnership Strategy FY2015–19 (CPS)**.[47] The CPS, extended through FY2021, comprises four results areas: (i) energy, (ii) private sector, (iii) inclusion, and (iv) service delivery. The Systematic Country Diagnostic has been finalized and will inform the next Country Partnership Framework, for which consultations began in December 2020 and Board approval sought in Q4-FY2021. The current IFC Strategy (FY2021–24) focuses on increasing engagement in critical sectors and opening up new markets through reforms in the following areas: housing; inclusion (digital/micro, small, and medium-sized enterprises [MSMEs]); urban; and energy.

4. **In response to the COVID-19 pandemic, resources were shifted to align with government priorities for crisis response and recovery, in line with the WBG Crisis Response Approach Paper**.[48] Under Pillar 1, *Saving Lives* US$200 million was made available through the Pandemic Response Effectiveness in Pakistan (PREP) project and reallocation of US$40 million from eight active projects. Pillar 2, *Protecting the Poor and Vulnerable*, was supported from cash transfers under PREP as well as SHIFT DPO (US$500 million) approved in May 2020. Two human capital projects, approved in June 2020, provided US$236 million to support the response in some of the poorest districts.[49] Under Pillar 4, *Strengthening Policies, Institutions and Investments for Rebuilding Better*, a PforR was approved in July to address disruptions to the education sector, in addition to an emergency operation to respond to the locust outbreak and food security. On December 8, 2020, two operations were approved that (i) support to Karachi to address vulnerabilities exacerbated by flooding and compounded by COVID-19, and (ii) additional financing to the Sindh Resilience Project to reduce vulnerabilities to disasters and public health emergencies in Sindh. On March 25 2021, the Board approved a US$600 million PforR to support the roll-out of the Government's poverty alleviation program and

[47] World Bank. 2014. Islamic Republic of Pakistan: Country Partnership Strategy, 2015-2019 (Report No. 84645-PK); extended to FY20 through the Performance and Learning Review (Report No. 113574) approved by the Board on June 15, 2017 and extended by management decision to FY21.
[48] WBG. June 2020. *https://www.worldbank.org/en/news/infographic/2020/11/17/world-bank-group-covid-19-crisis-response*.
[49] Khyber Pakhtunkhwa Human Capital Project (P188309 US$200 million); and Balochistan (US$36 million P166308) approved June 23, 2020.

modernization of the country's social protection systems[50]. In April, 2021, the Board approved a PforR to improve efficiency of spending for service delivery in Khyber Pakhtunkhwa[51]. The restructuring of the Pandemic Response Effectiveness in Pakistan project was approved by the World Bank Board on May 13, 2021, making US$ 153 million available for the Government's *National Vaccine and Deployment Plan*.

5. **The remaining FY2021 pipeline supports recovery needs as identified by the Approach Paper, across its four pillars, through three Development Policy Operations.** The three Development Policy Operations together support critical reforms necessary for building back better for a sustainable recovery from the impacts of the COVID-19 pandemic.[52]

6. **The IFC has also engaged the banking sector to provide banks non-financial services to support their MSME portfolios**. Going forward, IFC is looking to support MSMEs in key sectors impacted by COVID-19 through risk sharing facilities and credit enhancement with local banks. IFC is also in discussion with businesses in the manufacturing and infrastructure sectors to support their investment needs in the post-COVID-19 recovery phase. Additionally, IFC launched four upstream projects to support Public Private Partnerships (PPPs) in healthcare, water, and access to finance for women entrepreneurs, which will provide the necessary impetus for medium-term economic recovery. IFC, under its Global COVID-19 facility, has approved an increase of US$30 million under existing short-term trade facilities with five banks to support SMEs impacted by the pandemic.

7. **The Multilateral Investment Guarantee Agency (MIGA) continues to support cross-border investors and lenders throughout the crisis to address challenges in key sectors**. There are four current projects in the manufacturing, finance and energy sectors that account for US$318 million gross outstanding exposure in Pakistan. MIGA continues to monitor developments in financial markets, particularly in the energy sector, in which MIGA currently supports two hydropower projects. In April 2020, the US$6.5 billion fast-track facility was launched to help investors and lenders manage market fluctuations from COVID-19 is also available to Pakistan, but not yet leveraged by the GoP.

Selectivity, Complementarity, Partnerships

8. **Coordination is maintained with partner institutions through forums such as the bi-weekly Development Partner COVID-19 Meetings hosted by the World Bank**. This forum is also used to coordinate information on support to the National Vaccine and Deployment Plan.

9. **This Operation is consistent with the CPS (FY2015–19)[53] Results Area 4 on Service Delivery** and is also aligned with the Pillar 2 of the WBG Crisis Response Approach Paper,[54] Protecting the Poor and Vulnerable.

[50] Actions to Strengthen Performance for Inclusive and Responsive Education Program (P173399); Locust Emergency and Food Security Project (P174314), Karachi Solid Waste Emergency and Efficiency Project (P173021), Crisis Resilient Social Protection (P174484).
[51] KP Spending Efficiently for Enhanced Development (P175727)
[52] PACE (P174553), SHIFT – II (P172628), RISE – II (P172648).
[53] World Bank. 2014. Islamic Republic of Pakistan: Country Partnership Strategy, 2015–2020 (Report No. 84645-PK). The CPS was extended through FY2021 The Systematic Country Diagnostic has been finalized and will inform the next Country Partnership Framework, for which consultations began in December 2020 and Board approval is sought in Q1-FY2022.
[54] WBG. June 2020. *https://www.worldbank.org/en/news/infographic/2020/11/17/world-bank-group-covid-19-crisis-response.*

ANNEX 2: Climate Co-Benefits

1. **Articulated climate change vulnerability context.** The Strategic Context and Project Description sections identify the main climate change vulnerabilities: an increase in the frequency of flood events, an increase in the likelihood of drought events, and climate warming and its projected impact on water demand. The sections also highlight the contribution of poor SWM and wastewater management in Pakistan's GHG emissions. The key concerns articulated in the PAD include: (i) Punjab can face a decrease in living standards of 2.6 percent on account of temperature increase and precipitation variability by 2050; (ii) demand for water under a 3-degree warming scenario is projected to increase by about 60 percent by 2047, with the fastest rates of increase coming from domestic and industrial water sectors; (iii) projected temperature changes by HadAM3P over the twenty-first century indicate a temperature rise over central and southern Punjab of about 5.42°C; (iv) the Global Climate Risk Index 2021 ranks Pakistan eighth among countries most affected by weather-related events such as storms, floods and heatwaves—five major floods between 2010–14 have resulted in monetary losses of over US$18 billion with 38.12 million people affected and floods are projected to become more frequent and less predictable due to climate change; and (v) 4.79 Mt (CO2 equivalent) of CH4 and 4.27 Mt (CO2 equivalent) of N2O were produced by the waste sector in Pakistan in 2017.

2. **Identified drivers of climate vulnerability and the Project's intent to address them.** Contamination of groundwater resources—the primary source of drinking water in Punjab—exacerbates vulnerability to the impacts of meteorological drought and climate warming. As water demand increases and public water supply remains inadequate, private groundwater pumping is expected to increase. As described in Chapter I, drinking water quality in Punjab is severely degraded and the absence of wastewater treatment and solid waste management threaten to increase contamination and make groundwater unfit for consumption, thus reducing the adaptive capacity of households. The Project addresses these vulnerabilities in two ways: (i) Providing households with reliable access to safely managed water through metered connections (subcomponent 1.2) will ensure sustainable groundwater abstraction and allow for increased water allocations during periods of extreme heat. The management of water supply by PRMSC-TOs (Component 3.1) promotes adaptive service provision (e.g. through rationing and/or tariff adjustments) to ensure equity and resource sustainability across the service area of the water supply scheme. Protocols on service delivery during times of crisis (e.g. COVID-19, drought, etc.) are part of the capacity building activities of the Project. These aspects cumulatively ensure that all households receive water during periods of climate-induced heat and water stress, and that the resource is managed sustainably. (ii) The treatment of wastewater and fecal sludge (subcomponent 1.1) and the management of solid waste (subcomponent 3.2) will protect water resources from contaminants contained in both fecal and solid waste.

3. **The project design also increases household adaptation capacity and infrastructure and resource sustainability related to extreme precipitation and flood events in the following ways:** (i) ensuring that new infrastructure investments are resilient so that they continue delivering services during floods, or can be secured from the physical impacts and do not require replacement or rehabilitation in the aftermath of floods; (ii) creating safe passage for rain and flood waters, so that retention of water in human settlements is reduced; and (iii) ensuring that there is no mixing of fecal or solid waste with flood water, so that water resources and public health are protected. Specifically, the Project will achieve the above through four activities: (i) Cleaning up existing surface drains to serve as storm water drains only and cleaning up the stagnant pools into which they flow (Components 1.2 and 3.2) will allow this existing infrastructure to be repurposed to serve as a hygienic drainage system for rain and flood water conveyance, thus preventing or significantly reducing the likelihood of flood water retention in human settlements, while replenishing the ponds and recharging ground water. Currently, fecal and solid waste residue clogs up surface drains and outlets. This is not only a major health-hazard, but also reduces the conveyance capacity of these drains, causing the build-up of contaminated standing water in communities during extreme rain events. (ii) Underground covered sewers and treated wastewater effluent (subcomponent 1.1), and SWM (subcomponent 3.2) will ensure that flood water does not mix with and spread sewage and solid waste. (iii) The Project's selection of ABR for wastewater treatment in 90 percent of project

areas (subcomponent 1.1) increases resilience of the wastewater system to floods due to its robust structure—a sealed concrete chamber with a secure piped inlet and outlet valves that remain shut except for when wastewater and sludge need to be released. There are no electrical parts or everyday operational requirements, which means the unit that is sealed for 2–3 months at a time will continue treating wastewater during flood events. (iv) Water supply systems (subcomponent 1.2) will consist of pumps in a secure pump house that will not allow flood water to enter and damage electrical equipment when the pump house is closed. Furthermore, the distribution system consists of overhead water tanks. Emergency operation protocols of the PRMSC-TOs (subcomponent 3.1) will include promptly filling over-head tanks and switching off and securely closing pump houses in response to flood warnings so that rationed drinking water can be released to households during subsequent days.

4. **Identified drivers of GHG emissions and the Project's intent to address them.** The lack of fecal waste and SWM are significant drivers of CH4 and N2O emissions in rural areas, outside of agriculture. The widespread use of leachate pit toilets and poorly constructed septic tanks in areas where the pit is below the water table leads to fecal waste leaching into the groundwater and consequent CH4 emissions to the atmosphere through the soil. Where there is a sewage conveyance system, it consists of open drains that dispose untreated wastewater into water bodies. The Project directly addresses these drivers of CH4 and N2O emissions in two ways: (i) The safe conveyance of sewage through underground pipes and the treatment and safe disposal of wastewater and inert fecal sludge (subcomponent 1.1) will reduce CH4 and N2O emissions. The existing nature of wastewater treatment in rural Punjab is through aerobic decomposition in open ponds and wetlands, and in most cases untreated sewage is disposed directly into water bodies. The Project will ensure that no domestic wastewater is disposed without treatment. All household wastewater in project locations will be treated anaerobically through ABRs (90 percent of villages) or septic tanks (10 percent of villages). For the latter, in the case of big settlements, the septic tank will be followed by further anaerobic treatment through BTRs; and (ii) The reduction of household waste that is generated and the institutionalization of waste separation, composting, and safe disposal of residual waste that cannot be composted or recycled will reduce emissions from open solid waste piles that accumulate on land within villages (subcomponent 3.2).

5. **The total estimated net GHG emissions for the Project over its economic lifetime are -3,678,690 tCO2-eq, which represents significant net emission reductions**. The net average annual emissions are -147,148 tCO2-eq, while the gross emissions are 3,406,390 tCO2-eq.

6. **The GHG analysis for the wastewater and sanitation activities under subcomponent 1.1 was divided into two types of investments**. Ninety percent of beneficiaries will benefit from investments in treatment using ABRs that use A2O[55] treatment technology. The wastewater collection and treatment activities for these beneficiaries sees estimated net emissions of -3,491,415 tCO2-eq over the Project's economic lifetime, representing net emissions reductions due to collection and treatment. These investments will be displacing the use of septic tanks and neighborhood lagoons with better managed A2O wastewater treatment. The other 10 percent of beneficiaries will rely on BTRs that also use A2O treatment technology. The net emissions for this portion of the investment are estimated at 51,386 tCO2-eq. This increase is because a portion of the 10 percent of these beneficiaries will require new septic tanks.

7. **For the water supply activities under subcomponent 1.2, the Project's investments will result in estimated net emissions of 238,661 tCO2-eq**. The Project will source 10 percent of its energy requirements for sourcing, treatment, and conveyance to overhead storage tanks from solar photovoltaic sources. The distribution system will rely completely on zero-energy zero-emissions gravity-based systems. Groundwater pumping in particular will see net emissions of 677,717 tCO2-eq over the economic lifetime due to shifting from diesel to solar pumping, as well as 50 percent energy efficiency gains, thus ensuring the water supply system would see overall net emissions reductions despite investments in improved treatment and some investments in desalination in select-few locations.

[55] Anaerobic/Anoxic/Oxic process

ANNEX 3: Implementation Arrangements and Support Plan

1. **The PRMSC will have suitably qualified staff hired competitively, following Bank Regulations, including a financial management specialist (FMS) and a procurement specialist**. The Project may need support from the Bank in terms of implementing Bank policies, and the training of the new Procurement Specialist as well as other project staff.

2. **Budgeting and planning**. With input from technical staff, the FMS will be responsible for the annual planning and budgeting and submission to the P&D Board for inclusion in the ADP. Budget and actual expenditure reports will be prepared monthly and shared with the project director and the PCC or PSC or Board for further actions. The implementing agency will prepare annual budgets based on its work plans and submit them to the WB at least one month before beginning of the Project's fiscal year for review and approval. Budgets will follow applicable Government/entity budgeting guidelines, which will be set out in detail in the POM. The Project will be a part of the GoPunjab's annual development budget. To assure transparency of budget allocation and use, the Project aims that budgeted fund flows from the provincial government to TCs (and Village Councils, when applicable) for water (Budget Code 062) and sanitation (Budget Code 063) must be tracked overall and by category of spending through to their final use.

3. **Accounting**. The project FMS shall maintain on cash basis separate books of accounts (cash books, ledgers, bank reconciliations, cheque register, invoice register, commitment register as per agreed formats, fixed asset register, and inventory/stock register). Financial accounting software is recommended for transparency, accuracy, and effective reports generation. The Project will use the chart of accounts under the NAM. Project management is responsible for ensuring transparency in the use of budgets at the tehsil level. The Project's annual financial statements will be prepared in accordance with the cash basis of accounting.

4. **Internal controls**. Internal controls will comprise relevant GoPunjab Rules and Regulations including Punjab Financial Rules and Accounting Policies and Procedures Manual, which include budget checks, segregated scheme of assignments, delegation of financial power rules, and custody of assets. Project's expenditure will be incurred by the implementing entities in accordance with these internal controls, except for procurements wherein the World Bank's Procurement Regulations will be followed. When PRMSC is fully functional, its Board approved internal controls shall be followed. For Safeguarding of assets and stocks/inventory procured under the Project, separate fixed asset register along with inventory/stock register shall be maintained as per the agreed formats. These will be tagged for identification and subjected to regular physical verification and audit. The FM staff will conduct regular reconciliation with the GoPunjab's Financial Management Information System (FMIS-SAP R/3) as per the Revolving Fund Assignment Account Rules 2013. The existing internal audit set up at the department level, which ensures proper internal controls are in place to validate the funds issued by WB, are used for intended purpose needs strengthening.

5. **Reporting**. The Project shall prepare and submit semiannual IUFRs to the WB within 45 days after the end of each six months. Further, the Project shall prepare and submit to the external auditors, within two months after the end of the financial year, annual financial statements. The audited financial statements for each period will be shared with the WB no later than six months after the end of the fiscal year.

6. **Disbursements and fund flow**. Project funds will be disbursed into two segregated DAs to be opened and maintained at the National Bank of Pakistan. Withdrawal Applications will be submitted to the Bank, supported by a six-month cash flow forecast and Interim Financial Reports.

7. **External audit**. The Project will hire an independent external auditor acceptable to the Bank. However, if the funds are not handled by PRMSC then the auditors will be DG-Audit Punjab. Acceptable audited financial statements along with auditor's report thereon and auditor's management letter reporting control weaknesses must be submitted within six months of the close of the financial year (December 31).

8. **Supervision Plan**. FM supervision shall be determined based on the risk assessed of the Project.

ANNEX 4: Benefit-Cost Analysis

1. **The summary of the benefit-cost analysis of PRSWSSP is presented in Table 1.** The table shows that using different estimation methodologies, the average benefit-cost ratio (BCR) of the Project is 7.6[56] with a minimum BCR of 6.9 and a maximum of 7.9. On average, the Project cost is about US$443 per household and the average benefit per household is US$3,369.

Table 1: Benefits-cost Analysis of the Project *(In US$ Million otherwise indicated)*

Benefit Types	Value	Benefit Combinations	Value	BCR
) Value of Reduced IMR (ODF)	97	Combined Benefits (i+ii+viii+ix+x)	3,531	7.8
i) Value of Reduced IMR (Water)	841	Combined Benefits (iii+iv+viii+ix+x)	3,118	6.9
ii) Value of DALYs saved (ODF)	54	Combined Benefits (v+vi++viii+ix+x)	3,553	7.8
v) Value of DALYs saved (Water)	470	Combined Benefits (i+vii+viii+ix+x)	3,506	7.7
) PV of saving in Govt Expenditures (ODF)	190	Combined Benefits (iii+vii+viii+ix+x)	3,463	7.6
vi) PV of saving in Govt Expenditures (Water)	769	Combined Benefits (v+vii+viii+ix+x)	3,600	7.9
vii) Clean Water Benefits (Cost Saving Method)	815	Average Benefits	3,462	
viii) Complete Sanitation	2,416			
x) Benefits of Washing hands	83	**Project Cost**	**455[a]**	
) Shadow price of carbon	95			
		Average Benefit-cost Ratio		**7.6**

[a] Project cost in nominal terms is US$553 million. The discount rate of 7% is used to calculate the present value of annual outlays and depreciation of 10% is applied to the total cost for benefit-cost analysis.

2. **The benefits of an open defecation-free (ODF) community range from US$54 to US$190 million.** About 29.5% population in the rural areas of target districts defecate in the open which corresponds to 1.97 million persons. The ODF benefits are estimated using three methods: reduction in Infant Mortality Rate (IMR), reduction in DALYs, and government expenditures avoided. Under the first method, it is expected that ODF will lower the infant mortality rate (IMR) by about 4 infants per 1000.[57] The survival of these additional infants can be valued at income per worker assuming that the infants that survived will add the same to the future value of GDP of the country. The estimated benefits of ODF under method 1 are US$97 million. Under the second method, the monetary value of the DALYs saved by ODF is estimated. According to WHO guidelines, each life saved yields an additional 20.8 disability-adjusted life years (DALYs)[58] therefore, 4,640 DALYs are averted annually in the target population. Assuming a value of US$1000 per DALY saved, the project is expected to yield the total benefits of US$54 million. The third method estimates the government expenditures required to reduce infant mortality by 4 per 1000 live births. Fink (2015) estimates that an additional GDP growth rate of 1.25% per year, for the next 15 years, would reduce IMR by 4 deaths per 1000 births. Assuming the value of government expenditure multiplier of 3, the reduction of IMR by 4 would require US$190 million additional government expenditures.

3. **The provision of clean water on-premises is likely to generate benefits in the range of US$470 and**

[56] Discount rate of 7% is assumed. Using discount rate of 7.5%, the average BC ratio is 7.1.
[57] The estimates are taken from Spears (2012)
[58] See Fink (2015) for more details

US$815 million. The benefits of clean water are calculated using four methods. Methods 1 to 3 are the same as explained above for ODF status. A study on US cities has shown that the provision of clean water can reduce infant mortality by 62%[59]. However, this analysis assumes that the reduction in infant mortality attributable to clean water will be one-fourth of 62% which corresponds to the reduction of 10 infant deaths per thousand live births. The rest of the methodology is the same as explained for ODF. The fourth method estimates the direct and indirect costs currently borne by the residents of the target area. These costs include the cost of purchasing bottled water, water bills currently paid, electricity cost of using motorized pumps or bores for overhead tanks, time value of fetching water, the value of productivity losses, water treatment costs, the capital cost of water pumping infrastructure, and cost of water cart or tanker. It is estimated that the target population will save about US$1.1 million of bottled water costs in present value terms. About 8.7% of the rural households in Punjab pay for their piped water supply. In general, the households with access to piped water store it in the underground tanks and use motorized pumps to pump it to overhead tanks. The estimated present value of the water bills over the project life is US$0.8 million. Estimated electricity costs incurred by the households in the target villages would be US$175 million without project intervention. The estimated expenditures on installation and maintenance of water pumping machinery at the household level are estimated at US$120 million. It is estimated that households lose about US$181 million worth of time fetching water from distant sources. Productivity losses amount to US$127 million over the project life. Finally, about 2.3% of households boil water before drinking in rural Punjab. It is estimated that households in the target villages will spend about US$10 million on boiling water in absence of the intervention.

4. **Prevention of diarrheal diseases caused by total sanitation is expected to generate seven types of benefits with a cumulative value of US$2.4 Billion**.[60] First, better sanitation facilities will prevent diarrheal diseases in the target villages which will save the out-of-pocket expenditure. Second, the prevention of diarrheal diseases saves transportation costs. Third, there are non-health benefits associated with total sanitation solutions including timesaving to access sanitary facilities, availability of more and clean water usable for agriculture, and conveying storm-water. Fourth, the prevention of diseases saves days lost from work for the working-age population. The economic value of these saved days can be estimated based on income per worker. Fifth, diarrheal diseases are a major cause of the absenteeism of children from schools. Time not spent at school by children of school age is valued based on the minimum wage or income per worker. Sixth, for the children under five, parents have to spend more time with a sick child than a healthy one, or alternative childcare arrangements cost is incurred. Therefore, opportunity cost of caring for a sick child are valued at 50% of the income per worker. Seventh, following improved sanitation, diarrhea-associated deaths can be avoided which can be valued at the discounted income stream of individuals whose death is avoided. Following Hutton and Haller (2004), 16.3 years are used for the under-five population and 20 years for the over-five population.

5. **The benefits of handwashing and reductions in GHG emissions are calculated separately and included in all methods of benefit-cost ratios.** Research studies show that approximately 50% of diarrheal diseases can be controlled by washing hands with soap (However, it is too optimistic to assume 50% improvement; therefore, this analysis assumes 10% improvement). Diarrhea-related deaths in the target population are estimated to be 1,922[61]. The proposed intervention in the project area is estimated to prevent approximately 192 deaths which have a discounted economic value of about US$83 million. It is estimated that the project will reduce GHG emissions by 149,203 tCO2e annually (9,546 with water supply and 139,657 with wastewater management). Using the low shadow price of carbon, the present value of benefits from reducing GHG emissions is US$94 million.

[59] David Cutler and Grant Miller, "The Role of Public Health Improvements in Health Advances: The Twentieth-Century United States," Demography 42, no. 1. Website: https://www.prb.org/cleanwatershistoriceffectonusmortalityratesprovideshopefordevelopingcountries/

[60] The benchmark values of benefits are taken from Hutton and Haller (2004).

[61] Assuming deaths are evenly distributed across different regions of Pakistan. This assumption underestimates the benefits of the project as prevalence of diarrheal diseases is high in backward areas of Punjab.

Table 2: Benefits - Cost Analysis of the Project: Details[62]			
Benefits of ODF Community		**Benefits of Sanitation Infrastructure**	
Population Practicing Open Defecation	1,970,600	Target Population	6,680,000
Reduced Number of Deaths	223	Direct Expenditures avoided due to better sanitation (US$ Million)	80
Economic Value per person (US$ Million)	0.3	Transport Cost Savings (US$ Million)	13
Present Value of Economic Value per person (US$ Million)	0.04	Non-health care patient cost saving (US$ Million)	21
Total ODF Benefits - IMR method (US$ Million)	97	Income gained due to days lost from work avoided (US$ Million)	92
		Days of school absenteeism avoided (US$ Million)	116
DALYs saved per life	21	Productive parents days lost avoided due to less child illness (US$ Million)	50
DALYs saved per year	4,640	Value of loss of life avoided (US$ Million)	2,045
Value of DALY (US$)	1,000	Total Sanitation Infrastructure Benefits (US$ Million)	2,416
Total ODF Benefits - DALY method (US$ Million)	54		
		Benefits of Continuous and Safe Water Supply	
Increase in per capita GDP to reduce IMR by 4/1000	1.25	Bottled water	1
Govt Expenditure Multiplier	3	Water bill	1
Total ODF Benefits - Govt Exp. method (US$ Million)	190	Electricity cost	175
		Time loss in fetching water	181
Benefits of Handwashing		Productivity loss	127
Number of deaths averted due to washing hands	192	Water boiling	10
Total Benefits from Handwashing (US$ Million)	83	Infrastructure Installation/O&M	120
Benefits of GHG Emission Reductions		Cart or Tanker	221
Annual Net Emissions Reduction TCO2e	149,203	- Project Tariff	(20)
Gains from reduction in GHG emissions ($ Million)	94	Total Water Infrastructure Benefits	815

[62] Assumptions behind benefit-cost analysis: Discount rates = 7% - 7.5%; Depreciation rate = 10%; Project life = 25 years; Population growth (CAGR between 1998 and 2017 census) = 1.7%; Open defecation in the target population (MICS 2017-18) = 29.5%; Annual diarrhea prevalence in the target population (two-week incidenceX2, MICS 2017-18) = 33%; Growth in percentage of households using piped water, motorized pumps and handpumps = No growth; US$ to PKR exchange rate = 162