



**The World Bank**

Turkey Water Circularity and Efficiency Improvement Project (P174915)

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# Project Information Document (PID)

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Appraisal Stage | Date Prepared/Updated: 05-Jan-2023 | Report No: PIDA32856

**BASIC INFORMATION****A. Basic Project Data**

Country Turkiye	Project ID P174915	Project Name Türkiye Water Circularity and Efficiency Improvement Project	Parent Project ID (if any)
Region EUROPE AND CENTRAL ASIA	Estimated Appraisal Date 08-Feb-2023	Estimated Board Date 28-Feb-2023	Practice Area (Lead) Water
Financing Instrument Investment Project Financing	Borrower(s) Republic of Turkiye (represented by the Ministry of Treasury and Finance), Ilker Bankasi Anonim Sirketi (ILBANK)	Implementing Agency Devlet Su Isleri	

## Proposed Development Objective(s)

The Project Development Objectives (PDOs) are: (i) to improve wastewater services and reuse; (ii) to increase irrigation services and efficiency; and (iii) to strengthen institutional capacity and coordination for managing water circularity and pollution reduction in selected water-stressed areas in Türkiye.

## Components

Component A: Wastewater Collection, Treatment and Reuse

Component B: Rehabilitation, Construction and Modernization of Irrigation Systems

Component C Technical Assistance for Institutional Strengthening, Capacity building and Innovation

Component D: Project Management

Unallocated

**PROJECT FINANCING DATA (US\$, Millions)****SUMMARY**

Total Project Cost	590.80
Total Financing	590.80
of which IBRD/IDA	590.80
Financing Gap	0.00

**DETAILS****World Bank Group Financing**

International Bank for Reconstruction and Development (IBRD)	590.80
Environmental and Social Risk Classification	
Substantial	
Decision	

**B. Introduction and Context**

## Country Context

1. **Türkiye is an upper-middle-income country with a strong record of inclusive growth, although recent shocks are risking the economic gains made since the early 2000s.** An emergent economic recovery starting late 2019 was undermined by the COVID-19 pandemic, which triggered a deep economic shock. The COVID-19 pandemic has further exacerbated the significant structural challenges that Türkiye had already experienced before the pandemic. The pandemic also threatens a significant setback in poverty reduction, which was already affected by the economic downturn of 2018. Between 2018 and 2019, the share of people below the US\$5.5 per capita per day (2011 purchasing power parity) poverty line rose from 8.5 percent to 10.2 percent of population, pushing around 1.5 million additional people into poverty. An extra 1.6 million individuals were estimated to have fallen into poverty in 2020 due to the pandemic.
2. **Beyond the impact of the Covid-19 pandemic, climate change<sup>1</sup> is one of the most critical risks to Türkiye's development.** Climate change and disaster-related vulnerabilities and extreme events have increased and are exacerbating poverty in Türkiye. The water sector is the primary medium through which the negative impacts of climate change are felt globally. The water sector is also a key entry point for interventions to ensure effective adaptation and build resilience to climate change. Extreme climate-induced events have occurred with greater frequency and intensity in the last two decades in Türkiye, with 984 extreme weather events in 2020, 935 in 2019, and 840 in 2018. Several parts of the country have experienced severe drought in recent years contributing to increasing water scarcity. Climate change impacts on water scarcity are expected to pose a major threat to agricultural productivity, rural incomes and employment, and food security.
3. **Current projections suggest a temperature increase of 3–4°C on average across Türkiye (from 2041 to 2070), as well as uneven changes in the precipitation patterns, which are in turn expected to affect the temporal and spatial distribution and availability of water resources and to increase the**

<sup>1</sup> Türkiye ratified the Paris Climate Agreement in 2021.

**occurrence of floods associated with intense precipitation and coastal storms and droughts.**

Türkiye's rapid growth in the last two decades has caused its environmental footprint to increase rapidly. Total greenhouse gas (GHG) emissions rose from 219.6 million metric tons of carbon dioxide equivalent (MtCO<sub>2</sub>e) in 1990 to 488.144 million metric tons in 2018 and 506.1 in 2019.<sup>2</sup>

4. **While water can be a source of risk in extreme contexts, the sector is also a key enabler of development and Türkiye has an opportunity to move towards a more resilient, green, and inclusive growth path as its economy recovers from COVID-19.** Water is strongly linked to domains that are critical for economic growth such as agriculture, energy, health, the natural environment, regional development, and poverty alleviation. It supports important economic, social, and job-related agendas, including rural development and agriculture revitalization, as well as industry and services such as tourism. It is also essential for ensuring public health and hygiene, an aspect that has become even more evident in the face of recent stressors such as the ongoing COVID-19 pandemic. Water and its related ecosystems—including lakes, wetlands, and coastal zones—also provide a wide range of environmental and disaster mitigation benefits, such as flood protection, pollution abatement, and biodiversity conservation. As efforts are made to support post-pandemic economic growth, recovery, and jobs, Türkiye has an opportunity to build back better, prioritizing strategies that can improve its overall water security<sup>3</sup> and reduce its vulnerability to climate change.

#### Sectoral and Institutional Context

5. **Turkey is a water-stressed country with spatial and temporal distribution of water resources varying significantly, exacerbated by the impact of climate change, urbanization, and increasing demand from economic activities, especially irrigated agriculture.** Climate change is projected to further impact surface water availability and increase the frequency and severity of extreme weather events such as floods, heatwaves, and droughts—potentially affecting the safety and welfare of people, especially the most vulnerable, altering demand patterns, and causing substantial damages to water, energy, waste, transport, and other critical infrastructure.
6. **Demand for water resources in Turkey from all sectors of the economy has steadily increased in recent decades, with agriculture accounting for about 74 percent of freshwater withdrawals.** Water for domestic and industrial purposes each account for about 13 percent, with access to water supply services generally high – in 2019 about 99 percent of the population was connected to a piped network. Agriculture continues to play an important part in Turkey's economy employing more than a fifth of the population. The country is the world's 9th largest agricultural producer. Turkey's agriculture is heavily dependent on irrigation, which triples productivity compared with rain fed agriculture and ensures resilience of steady agricultural production and food security.

<sup>2</sup> Data source: Total Annual Volume of Greenhouse Gas Emissions in Türkiye from 1990 to 2019.

<https://www.statista.com/statistics/956997/greenhouse-gas-emissions-Turkey/#:~:text=The%20annual%20greenhouse%20gas%20emissions,at%20525%20MtCO2e%20in%202017.>

<sup>3</sup> Water security may be defined as “the adaptive capacity to safeguard the sustainable availability of, access to, and safe use of an adequate, reliable and resilient quantity and quality of water for health, livelihoods, ecosystems and productive economies.”, Sustainable Water Partnership.



7. **Freshwater productivity in Turkey (US\$20/m<sup>3</sup>) is low compared to that of high-income countries (US\$47/m<sup>3</sup>) (World Bank, 2016).** The country has extensive irrigation systems, however the efficiency of existing irrigation practices, although gradually being improved through initiation of an extensive modernization program, remains a challenge. With over 6 million hectares of irrigated land (more than any other country in the sub-region), a highly sophisticated State Hydraulic Works (DSI), and an emphasis on extending service delivery, Turkey is one of the top countries with extensive irrigation and drainage systems in the world. Yet, it still has widespread low-performing and inefficient irrigation schemes, outdated and obsolete infrastructure, and a limited regulatory framework in support of real water savings.
8. **The conservation of both the quantity and quality of water resources while managing water-related risks and strengthening resilience to shocks that include the impact of natural disasters and pandemics such as Covid-19, is essential for supporting Turkey's long-term water security and growth.** Key activities to conserve water aim to achieve beneficial reductions in water loss through more efficient conveyance systems, the reuse and reduction of waste resources through the application of circular economy principles; the avoidance or reduction of pollution on water quality; and improvement of integrated water management practices that reduce the use or enhance the beneficial use of water. A holistic approach at basin-wide levels, involving technology as well as behavioral solutions should be undertaken.
9. **While access to water supply and sanitation services in Turkey is high, significant service quality challenges remain especially with wastewater management, falling short of the Sustainable Development Goals relating to water (SDG 6).** According to WHO/UNICEF Joint Monitoring Program data, in 2019 about 99 percent of the population was connected to a piped water network. Rates of access to sanitation are also relatively high, though low compared to most OECD countries. About 97 percent of urban populations and 57 percent of rural population have access to sewerage, with the rest using on-site sanitation. While wastewater treatment capacity has steadily increased as a result of sustained investments in the last decade, with the share of the population served by wastewater treatment plants growing from 36 percent to 79 percent between 2004 and 2018 (Turkstat 2019), more attention needs to be paid to the quality of infrastructure and services across the entire sanitation value chain, much of which is in need of repair —from containment through to wastewater treatment, as well as the safe discharge or reuse to ensure sustainable service delivery and environmental protection in line with SDG 6. Seepage of sewage from ageing sewerage infrastructure contributes significantly to pollution.
10. **Significant threats to water quality from point and non-point pollution sources also present a risk to Turkey's water security in many parts of the country.** Threats to water quality stem from a combination of mostly man-made activities such as inadequate wastewater collection and treatment that create point source pollution from effluent leaks and discharges, dispersed pollution from agricultural water pollution, and groundwater depletion, leading to salinity and sea water intrusion. A third of Turkey's lakes and up to half of its rivers are currently considered either "contaminated" or "highly contaminated" by nutrients, particularly Phosphorus and Nitrogen.
11. **Addressing threats to water quality from the various sources of pollution calls for a holistic approach to water management at the basin level, including not just investment in improved**



**wastewater collection and treatment, but improving management of wastewater across its value chain with the application of circular economy principles.** It will also require due attention to non-point sources of pollution such as the application of agricultural fertilizers and pesticides. Experience in several countries has shown that wastewater treatment with reuse for productive purposes such as irrigation can be a solution to address water scarcity by freeing scarce freshwater resources for other uses while reducing GHG emissions. The provision of adequate wastewater collection and treatment services to the population will be important, not only for reducing the water quality threats to environmental sustainability, but also for promoting public health and wellbeing of beneficiary populations. Moreover, in line with circular economy principles, resource recovery from wastewater treatment can become valuable for other products such as fertilizers for agriculture, as well as energy generation from methane.

### Institutional and Policy Context

12. **To address some of the most critical water security challenges and strengthen resilience to impacts of climate change the GoT has prioritized in its Eleventh National Development Plan the promotion of circular economy principles through increased wastewater treatment and reuse. The 11th NDP and sector Actions Plans have also prioritized expansion and modernization of irrigation systems to increase productivity and reduce water losses and GHG emissions.** Modernization of irrigation schemes to increase efficiency will need to be paired with strong regulations and monitoring capabilities, as well as reforms ensuring that water allocation and pricing better reflect the economic scarcity of water. Global experience has also shown in many countries that scheme modernization and efficiency improvement solutions alone do not resolve water scarcity as farmers can shift to more intensive cropping where farms are reclaimed and expanded. It is this imperative that such interventions are accompanied with policy measures such as resource limitations through licensing, close monitoring and capping of water use through smart water meters. To increase efficiency in the irrigation sector, Turkey has been actively exploring the potential for introducing public-private partnerships (PPP) in irrigation and drainage and it is making progress towards establishing the enabling environment and strengthening capacity towards this goal.
13. **The GoT has approached the World Bank to support the implementation of a program of priority sub-projects that will support its sector development goals by** improving circularity and efficiency in water resources management and irrigation services to reduce pressure on freshwater resources, enhance productivity, and strengthen climate resilience in selected basins of the country. Turkey has a strong academic research community in water management and there are opportunities to strengthen the capacity of water sector professionals.

### Project Development Objective(s)

14. **PDO Statement.** The Project Development Objectives (PDOs) are: (i) to improve wastewater services and reuse; (ii) to increase irrigation services and efficiency; and (iii) to strengthen institutional capacity and coordination for managing water circularity and pollution reduction in selected water-stressed areas in Türkiye.



## Project Components

15. **Component A: Wastewater Collection, Treatment and Reuse.** This component seeks to strengthen resilience to increasing climate change-induced water scarcity and to reduce environmental pollution in select water-stressed basins through wastewater treatment, reuse and resource recovery for agricultural irrigation and other beneficial purposes.<sup>4</sup>
16. **Subcomponent A1: Construction and Upgrade of Wastewater Collectors and Treatment Plants with Reuse and Resource Recovery Potential.** This subcomponent will provide loans to municipalities for consultancy services, goods, and works related to wastewater collection, treatment, reuse and resource recovery infrastructure investments, such as: (a) the extension or rehabilitation of priority raw wastewater collection and conveyance systems; (b) the expansion or upgrade of existing WWTPs with reuse potential; (c) rehabilitation and retrofitting of WWTPs in operation with biogas capture and energy generation facilities and/or sludge treatment processes, allowing for the recovery of these subproducts for reducing energy related operational costs or for other end uses such as agricultural or industrial use; and (d) the installation of treatment processes in existing facilities to allow for the reuse of the treated effluent. The tertiary treatment technology will be selected according to the planned end-use. The reuse focus of the project will be irrigation, but other uses will also be considered where appropriate. The most appropriate end-use under each sub-project and required treatment will be identified in coordination with the participating SKIs and municipalities. Innovative technical solutions for all of the above have the potential to reduce capital and operational costs and contribute to improved water and energy security while reducing GHG emissions.
17. **Subcomponent A2: Technical support for preparatory and implementation activities for wastewater treatment and reuse investments.** This subcomponent will finance loans to municipalities for consultancy services to support preparatory activities under Subcomponent A1, including (a) review of existing designs, development of the detailed engineering designs of the treatment, resource recovery, and reuse investments under the project, and preparation of bidding documents;<sup>5</sup> (b) construction supervision; (c) preparation of the required environmental and social management instruments, such as Environmental and Social Management Plans (ESMPs) and/or Environmental and Social Impact Assessments (ESIAs); and (d) monitoring of water quality of the wastewater effluent to ensure that it meets standards acceptable for irrigation and other uses, as applicable.
18. **Component B: Rehabilitation, Construction and Modernization of Irrigation Systems.** This component will be financed through the Government of Turkiye loan, to be implemented by DSI, to finance rehabilitation and modernization of irrigation infrastructure to improve water and energy efficiency and productivity. It would specifically finance (a) transformation of open channel irrigation systems to more water-efficient ‘closed’ (pressurized) irrigation systems to reduce non-beneficial water losses and conserve energy, (b) installation of irrigation hydrants and smart water meters to the piped irrigation systems, and (c) development of new or existing irrigation schemes to be supplied

<sup>4</sup> In line with the GoT’s 11<sup>th</sup> NDP, the subprojects to be prioritized under this project will focus on wastewater reuse and resource recovery for irrigation. However, opportunities for wastewater reuse and resource recovery for other purposes will be explored where appropriate and due consideration will be given to improve financial sustainability.

<sup>5</sup> In certain subprojects, procurement may be conducted based on design and build or design-build and operate contracts which may not require the full scope of preparatory work described under this activity.



by treated wastewater in selected basins. Activities under this component will lead to significant mitigation benefits by reducing non beneficial water losses, improving water and energy efficiency, and helping increase carbon sinks by assisting in enhancing storage of soil carbon through an increase in irrigated land.

- 19. Subcomponent B1: Conversion of open main, secondary, and tertiary canals to pressurized pipelines and rehabilitation of associated infrastructure.** Activities under this subcomponent will include the conversion of open concrete-lined trapezoidal main, secondary, and tertiary canals to closed, buried, and pressurized pipelines and rehabilitation of head structures and pumping stations, including the electrical and mechanical components. The project is expected to finance the modernization of at least three irrigation schemes or subprojects located in priority water-stressed provinces of Türkiye, identified by DSI and included in its Strategic Program and in the GoT's Annual Investment Plan (AIP). The subprojects will be selected from a long list of schemes identified by DSI and submitted to the SBO under a framework approach, based on specific criteria agreed with the parties and the World Bank. The final specific schemes will be confirmed by DSI in collaboration with the GoT's SBO by loan effectiveness.
- 20. Sub-component B2: Installation of irrigation hydrants and smart water meters to the piped irrigation systems.** This subcomponent will support the installation of prepaid meters to water intake facilities in existing piped irrigation systems as part of Türkiye's Effective Use of Water in Agriculture Program. DSI plans to purchase and install a total of 150,000 prepaid water meters in about 590 irrigation facilities in 25 of its regions under the Program, of which this project will finance the installation of 54,874 prepaid meters. The meters will allow for volume-based monitoring and payment with metered water intake for about 387,964 ha of irrigation area which are unmetered. The use of water meters is expected to prevent the farmers' excessive water consumption habits and to increase irrigation efficiency due to less water consumption.
- 21. Subcomponent B3: Construction of wastewater tertiary disinfection units and associated irrigation water distribution networks for reclaimed wastewater conveyance.** This subcomponent will finance feasibility studies, design, and construction of tertiary disinfection units of wastewater treatment plants, and irrigation infrastructure that will benefit from the treated wastewater from the WWTPs constructed or upgraded under Component A. Disinfection units comprise discrete infrastructure specifically responsible for treating wastewater to meet quality standards required for reuse for irrigation. DSI will coordinate implementation of this sub-component closely with ILBANK and respective SKIs. The respective SKIs will own and be responsible for construction and operation and maintenance of the entire wastewater treatment plant systems to ensure a smooth transition between the main treatment plants, the disinfection units, and the irrigation schemes that will use the treated wastewater.
- 22. Subcomponent B4: Provision of technical support to participating WUAs.** This subcomponent aims to strengthen the capacity of WUAs participating directly in the project, particularly those involved in the use of treated wastewater for irrigation, on key aspects linked to managing irrigation schemes. Activities supported under this subcomponent include consultations with WUAs in coordination with DSI on safe use of treated wastewater and incorporation of their feedback in the final design of schemes. This subcomponent will also support women's participation and voice in the context of



WUAs by increasing the employment of women as WUA staff, awareness raising about the importance and benefits of women's membership and leadership in WUAs, and capacity building activities for female WUA members, staff and women farmers that use the irrigation system in technical smart agricultural and irrigation technologies, products and markets, etc., to enhance opportunities for women in the field positions.

23. **Component C: Institutional Strengthening, Capacity Building and Innovation (DSI and ILBANK will implement discrete sub-components).** Component C will support technical assistance activities to strengthen the performance, financial viability, capacity and coordination of sector institutions at national and local government levels in order to deliver resilient, efficient, innovative, and sustainable water services across the sanitation and irrigation service value chain and to mitigate associated risks in the enabling policy, institutional and regulatory (PIR) environment. Proposed activities under this component will support the following specific activities:
24. **Subcomponent C1: Development of National Wastewater Reuse and Resource Recovery Guidelines. (Implementing agency: DSI, in coordination with other stakeholders such as DGWM and MoEUCC).** This sub-component will support consultancy services to develop National Wastewater Reuse Guidelines for Türkiye. The guidelines seek to provide a reference for beneficial and sustainable wastewater reuse in the Turkish context by providing guidance for the management of health and environmental risks associated with wastewater reuse and the recommended steps to make reuse projects viable (such as stakeholder engagement and outreach).
25. **Subcomponent C2: Study and Roadmap for Strengthening Reused Wastewater Financing and Regulatory Mechanisms (Implementing Agency DSI, in collaboration with other key stakeholders).<sup>6</sup>** This activity will support consultancy services to develop appropriate financing mechanisms, including CAPEX and OPEX costs for wastewater reuse and resource recovery for different uses in Türkiye, including a study to explore tariff and subsidy levels; tariff setting methodologies; cost recovery levels and affordability; willingness to pay for water, wastewater, and irrigation services; and financial modelling options.
26. **Subcomponent C3.1 and C3.2: Stakeholder Engagement.** This activity will comprise two sub-activities to be implemented by ILBANK and associated SKIs/municipalities (C3.1) and activities to be implemented by DSI (C3.2) to promote broad understanding and buy-in to project interventions by ensuring citizen engagement in project design and implementation and facilitating grievance redress mechanisms (GRMs) throughout the project cycle.
27. **Subcomponent C4.1 and C4.2: Energy Audits and Water Audits.** This activity will support consultancy services for detailed energy and water audits to identify opportunities for improving efficiency in wastewater management and irrigation systems, and to inform relevant results monitoring indicators.

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<sup>6</sup> Stakeholder consultations held during January 2022 revealed interest in exploring recycled wastewater tariff setting methodologies. The World Bank will provide technical support for development and implementation of this study, such as support for preparation of terms of reference and related activities.



28. **Subcomponent C5: Capacity Building, Training and Innovation.** This component will have two subcomponents for activities implemented through ILBANK (C5.1 and C5.2) and those through DSI (Sub-component C5.3).
29. **Subcomponent C5.1: Capacity Building, Training and Innovation implemented through ILBANK.** This activity will support institutional capacity-building activities including knowledge exchange workshops, study tours, training, and other activities aimed at promoting innovation and learning and sharing of best practices for sector institutions at central and local government level within Türkiye, including ILBANK and SKIs on aspects relating to promoting water security and resilience.
30. **Subcomponent C5.2: Technical Assistance and Capacity Building to Promote Sustainability and Resilience of SKI Wastewater Systems (implemented through ILBANK).** This subcomponent will support priority interventions and capacity building to promote sustainability and resilience of infrastructure investments. Eligible activities will include the following:
  - (a) Goods and consultancy services to support participating SKIs in the development of Supervisory Control and Data Acquisition (SCADA) systems for monitoring<sup>7</sup> wastewater quality, and preparation of performance improvement action plans to promote operational and energy efficiency in order to enhance sustainable management and O&M of wastewater systems, resilience (to climatic and non-climatic events), and innovation.
  - (b) Activities in participating SKIs to support promotion of gender and inclusion, such as equal opportunities for women.
31. **Subcomponent C5.3: Capacity Building, Training and Innovation implemented through DSI.** This activity will support knowledge exchange workshops, study tours, training, and other activities aimed at promoting innovation and learning and sharing of best practices for sector institutions at central and local government level on aspects relating to promoting water security and resilience.
32. **Subcomponent C6: Support for Piloting of an Irrigation Scheme under PPP arrangement.** The subcomponent will support the piloting of innovative financing and business models such as the use of PPP for financing and management of specific irrigation subprojects.
33. **Component D: Project Management.** This component will have two subcomponents that finance project management costs for ILBANK (Sub-component D1) and DSI (Sub-component D2). Eligible activities to be supported will include consultant and non-consulting services, goods, training, and operating costs required by ILBANK (Subcomponent D1) and DSI (Subcomponent D2) to implement the project according to World Bank policies and guidelines. These will include consultant services required to support implementation of procurement and financial management (FM) aspects, social and environmental risk management and climate change-related aspects, technical and contract management, monitoring and evaluation (M&E), and project reporting and communications, as agreed with the World Bank. It will also finance incremental operating costs, including goods and non-consulting services required to support DSI, ILBANK, and municipalities'/SKIs' day-to-day project coordination and supervision activities in the above areas as well as workshops and other events required to facilitate project management

<sup>7</sup> The SCADA systems and monitoring and reporting mechanisms are to ensure the quality of treated wastewater meet the reuse requirements amongst other performance elements.



34. The project will be implemented through two main agencies at the central level: DSI and IIBank; and by the respective water and wastewater utilities (SKIs) and WUAs at the local levels. There will be two Loan Agreements at the central level: Loan A with IIBank as the Borrower, with the guarantee of the Government of Turkey through MoTF; and Loan B with MoTF as the Borrower. The Law on Public Finance and Debt Management No.4749 (the Debt Law) describes the procedures for international borrowing in the Republic of Turkey. The Debt Law classifies the international borrowing under three categories: Allocation, On-lending and Guarantee. The debt law authorizes the MoTF to allocate foreign financed loans to general budget institutions including DSI is a special budget institution.

**Legal Operational Policies****Triggered?**

Projects on International Waterways OP 7.50	No
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Projects in Disputed Areas OP 7.60	No
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**Summary of Assessment of Environmental and Social Risks and Impacts****E. Implementation****Institutional and Implementation Arrangements****CONTACT POINT****World Bank**

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